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World Bank Research Program

January 23, 1978

Office of the Vice President, Development Policy

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THE WORLD BANK
Washington, D.C. 20433
U.S.A.

Office of the President

January 23, 1978

MEMORANDUM TO THE EXECUTIVE DIRECTORS

SUBJECT: Bank Group Research Program

The attached report by the Vice President, Development Policy provides the fifth annual review of the socio-economic research activities of the Bank. The report covers all research except for that financed under loans and credits and research of a technical nature, such as that funded by Bank participation in the Consultative Group on International Agricultural Research (CGIAR). The question of the size of the resources to be devoted to research in the future will be considered when the overall budget is presented later in the year.

Robert S. McNamara
President
by
J. Burke Knapp

Attachment

WORLD BANK RESEARCH PROGRAM

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APPENDIX TABLES

WORLD BANK RESEARCH PROGRAM: 1977 REPORT

This annual report on research discusses the evolution of research in the Bank, the nature of ongoing research, and some significant results of past research. To avoid repetition, the coverage is selective and reference is made to previous annual reports for a fuller treatment of some topics.

1. THE ROLE OF RESEARCH IN THE BANK

Introduction

1.1 In FY77 economic and social research absorbed, as it did the previous year, approximately 4% of program costs in the World Bank. Details of how this was distributed among departments and among different types of research are given in a later section of this chapter, which also gives some perspective of evolution over time. Research is conducted mainly in the Development Policy Staff (about 70%) and the Central Projects Staff (about 30%) with a small but increasing contribution from the Regional Offices. The spectrum of subject-matter is broad, as broad as that of the Bank's operational activities and policy concerns.

1.2 In many fields, research in the Bank constitutes only a small fraction of all research carried out in the world. Use is made of research carried out elsewhere, wherever relevant. But questions thrown up in the course of the Bank's operations may suggest a lacuna and, therefore, the need for complementary research, more directly aimed at answering those questions. The latter may be undertaken in the Bank itself, especially if use can be made of the Bank's experience. Moreover, the Bank has certain advantages as an institution in particular types of research, especially comparative analysis across a number of countries. Factors such as these determine the particular nature of Bank research.

1.3 In Appendix A of this report, there is a brief description of each research activity under way during FY77. There are more than 140 of these, some small purely in-house projects of short duration and some large international projects,

using outside consultants or researchers and spanning a number of years. The list is intended mainly for the purpose of reference; by itself, it conveys more a sense of variety than of coherence. Chapter 2 of the report explains on the one hand how the various types of activity fit into the organizational structure of the Bank and, on the other, describes the themes which over the past five or six years have been given the most attention.

1.4 In the last few years, concern with the relief of poverty has been, as with other Bank activities, an important guiding principle in setting the direction of Bank research. There is always a risk, in devising new ways of helping the poor, that services intended to do this will not be acceptable or will otherwise have untoward consequences. For this reason, some of the newer research projects have a sociological component. For example, in one project 1/ an attempt is being made to identify appropriate technology for water supply and waste disposal for the rural and urban poor; experience in a wide variety of countries (including a number where there are Bank projects) over a range of income levels will be drawn on. An important component of the project will be sociological research on the condition for acceptability of different systems.

1.5 As another example, another project 2/ will be concerned with the complex extended family system in the Senegal Valley in West Africa. The need for this has arisen because of plans to develop irrigation in a part of the world notoriously subject to famine. However, the social and economic consequences of the introduction of a new technology to replace the traditional agriculture are, at best, little understood.

1/ Appropriate Technology for Water Supply and Waste Disposal (Ref. 671-46).

2/ Distribution of Income through the Extended Family System (Ref. 671-57).

1.6 It is easily appreciated that the process of formulating research, carrying it out and presenting the findings takes time in itself. It is perhaps less readily appreciated that the subsequent process of putting the research findings to work is itself quite protracted. Experimentation and adaptation in field conditions--the development phase of "research and development"--must precede the stage at which the results merge into the common body of understanding. Since the Bank's major commitment to research started only in FY72, it is only in the last couple of years that it has approached the stage of maturity, when development and dissemination become as important an activity as the research itself. Case studies of important individual projects, together with the successors that have grown out of them, can illustrate, at least as a sample, how the process has worked over time. One such case study on the agricultural sector model known as CHAC was presented in last year's report; another appears in Chapter 3 of this report.

Dissemination

1.7 The results of research have, as might be expected, been mixed. As the evaluations show, although there have been some failures or false starts, there have also been successes. The successes now present a problem of dissemination, since research is only useful, once it has been converted into a tool or a way of approaching problems that can be put to everyday use. Monographs and similar research outputs are the end product in only one sense; in another they are merely the beginning.

1.8 Dissemination of research results is neither automatic nor cost free. Other things being equal, dissemination is more effective, if potential users are involved in the design and execution of research; but there is always a concomitant cost. The trend of Bank research is in the direction of greater involvement and responsibility of users; even so, the burden of exposition, experimentation and application falls in the first instance on those who are intimately familiar with the original research. In effect, the manpower originally allocated to research per se is now being called upon to fill a dual role.

The question of the allocation of resources within the Bank to these two functions will become more acute as time passes; not only will there be more to disseminate from current research, but also the data emerging from monitoring and evaluation systems set up under Bank projects will require synthesis and analysis as well.

Evaluation

1.9 Eight research projects were evaluated in 1977; the results are summarized in Appendix B. The results of several of them have begun to influence Bank operations or policy or research and their high quality is recognized. For example, work on marginal cost pricing for public utilities attracted considerable interest on the part of Bank borrowers and may be expected to have an effect in due course on tariff structures. Work on the impact of educational expenditure and income distribution was influential in reaching the conclusion that, in its analysis of education systems and policies, the Bank will want to know "who benefits most and how the financial burden is distributed". 1/ Some research projects, however, have met with limited success. The experience emphasizes some pitfalls to be avoided in having research done for the Bank by outside institutions, whether in developing or developed countries; several of the lessons to be drawn are already well documented. Subcontracting of projects--in whole or in part--to local institutions may be unsatisfactory unless there is strong local support for the project, a reasonable degree of common understanding of its objectives and a mechanism for periodic interchange of views. Therefore, the purpose of the research and the issues to be investigated need to be stated as precisely as present knowledge will permit. The groundwork for collaboration with outside researchers must be carefully prepared and a clear agreement reached as to the time and effort they are to contribute; a good deal of Bank staff time will normally be needed if the results are to be relevant for the Bank's work. Unbroken collaboration and monitoring is especially important in areas of research where objectives are likely to change over time, as certain questions are found to be more complicated, or certain topics less fruitful, than could be perceived at the outset of a study. For complex research projects which need innovative and flexible management, arrangements need to be made for review at critical stages by an advisory group.

1/ World Bank, Education, Sector Working Paper, December 1974, p. 56.

1.10 Members of the panel evaluating one of the small projects questioned the value of separately assessing the results of a single project, rather than the whole body of research being done by the Bank in a given area, including studies financed from sources other than the Research Committee. They felt that though obviously more expensive, occasional evaluations of this sort would yield better-informed comments and suggestions and might also be more cost-efficient (in terms of the ratio between research costs and evaluation costs).

1.11 In last year's report (para. 1.33) the intention of reviewing groups of completed projects on related subjects was stated in order to give a broader overview of how research is proceeding; this would be done by outside panels. The first such panel--on income distribution and employment--was appointed in September 1977 with the following members: Albert Fishlow (US, chairman), Simon Kuznets (US), Sir Arthur Lewis (UK), Justinian Rweyemamu (Tanzania), Gerardo Sicat (Philippines) and Leopoldo Solis (Mexico). The panel held two meetings, one at the beginning of October and the other in the middle of December. Their report will contain an evaluation of past research from the point of view of its quality, its usefulness within the Bank and its value to the developing countries. It will also have recommendations about its future content and dissemination; a draft report is expected in late February.

1.12 Other external panels will review other subjects in the course of the next two years, although some of them will not focus primarily on research. As already announced, a panel under the chairmanship of Mr. David Bell will be reviewing Bank activities in the field of education and training. During 1978, it is intended that a panel on research on trade and industry will be appointed. The scope and timing of possible reviews of public utilities, transportation and agriculture and rural development are also under consideration.

Allocation of Resources to Research

1.13 In FY77 total resources devoted to research amounted to approximately $9 million (in FY77 $). 1/ This figure has been calculated after allocating to research its share of the overhead costs allocated to the 14 program categories currently used in the Bank's budgetary presentation. The figure may be compared with other program categories, approximately $24 million for country economic and sector work together and $11 million for operational review and policy work.

1.14 Of the total of $9 million, about $2 million is accounted for by the "external" expenditure (consultants, travel, data processing) authorized by the Research Committee for projects approved by it (RPO projects). The remainder, which is mainly the cost of staff-time (plus the cost of consultants not financed by the "external" research budget) was about equally divided between projects approved by the Research Committee and "in-house" projects. 2/ Tables 1.1 and 1.2 (on the two following pages) give two breakdowns of (a) "external" expenditure from the research budget; and (b) manpower allocated to research: one by departments and the other by subject-matter. Table 1.1 distinguishes between Research Committee-approved projects, departmental studies and a third miscellaneous category. This latter category includes mainly research preparation and very small studies; since a subject-matter breakdown is not available, this category is excluded from Table 1.2.

1/ This excludes commodity analysis and projections.

2/ In round figures 70 professional or consultant man-years at a unit cost, including allocated overhead and support services, of $100,000.

Table 1.1: FY77 RESOURCES DEVOTED TO RESEARCH: PROFILE BY DEPARTMENT
(expenditures in $'000; manpower in man-years)

Department	Research Committee-Approved Projects			Departmental Studies		Other	
	"External" Exp.	Manpower		Manpower		Manpower	
		Prof.	Asst.	Prof.	Asst.	Prof.	Asst.
DPS							
Development Research Center	633.0	11.9	6.4	0.5	-/b	3.4	1.2
Economic Analysis and Projections /a	233.0	0.3	-	0.8	-/b	0.6	0.1
Development Economics	327.1	11.0	8.4	5.0	4.0	8.8	1.0
Office of Vice Pres., Development Policy	19.4	0.1	-	-	-	-	-
Total DPS	1,212.5	23.3	14.8	6.3	4.0	12.8	2.3
CPS							
Agriculture and Rural Development	269.0	3.9	-	1.3	-	0.5	-
Transportation	261.6	3.5	-	0.5	-	0.4	-
Urban Projects	7.3	1.8	-	0.3	0.9	0.7	-
Energy, Water and Telecommunications	232.7	3.1	-	2.0	-	-	-
Education	16.7	-/b	-	-	-	0.6	-
Industrial Projects	-	-	-	1.5	-	0.4	-
Tourism Projects	-	-	-	1.7	-	0.1	-
Office of the Vice Pres., Projects Staff	-	0.2	-	-	-	1.0	-
Other CPS	-	-	-	-	-	0.8	-
Total CPS	787.3	12.5	-	7.3	0.9	4.5	-
Regional Offices	39.4	0.2	-	-	-	1.8	-
TOTAL	2,039.2	36.0	14.8	13.6	4.9	19.1	2.3

Footnote: Professional manpower includes YP's (3.6) and consultants not financed under "external" expenditure (16.0).

/a Excluding commodity analysis and projections (approximately 6.7 professional/consultant and 2.2 assistant man-years).
/b Less than 0.1 staff year.

Table 1.2: FY77 RESOURCES DEVOTED TO RESEARCH: PROFILE BY FUNCTIONAL CATEGORY
(expenditures in $'000; manpower in man-years)

Category	Research Committee-Approved Projects			Departmental Studies	
	"External" Exp.	Manpower		Manpower	
		Prof.	Asst.	Prof.	Asst.
Income Distribution	118.7	2.4	1.4	0.6	0.1
Growth/Country Economic Analysis	367.8	3.1	0.9	0.7	-
International Finance and Trade	172.0	2.8	1.1	0.2	0.8
Agriculture and Rural Development	503.9	8.7	1.9	1.3	0.2
Industry	99.3	5.6	7.2	3.3	0.5
Transportation	248.0	3.5	-	0.5	-
Energy, Water and Telecommunications	232.7	3.1	-	2.0	-
Urbanization	65.1	3.3	1.1	0.6	1.1
Education	51.4	0.2	0.3	0.3	-
Labor and Employment	69.9	1.8	0.8	0.9	0.6
Population, Nutrition, and Health	91.0	1.5	0.1	1.7	1.6
Tourism	-	-	-	1.5	-
Other	19.4	-	-	-	-
TOTAL	2,039.2	36.0	14.8	13.6	4.9

1.15 The "external" expenditure on RPO projects can be traced from the inception of the program. As the chart on the next page shows, it has fluctuated somewhat from year to year around an average of about $2-1/2 million (in FY78 $). The chart also shows the mix of expenditure on projects according to the year in which they were initiated. Several very large projects, which were begun in FY72, absorbed a substantial part of the resources in earlier years but these are coming to an end: for example, the capital-labor substitution project (described in Chapter 3), the highway design project and the international comparison project (see Appendix A, pages 22 and 5 respectively). It is too early to say that a pattern has been established, but, as a rough rule of thumb, one could say that one-third of the expenditure in any given year is on new projects, one-third on projects from the previous year and the remaining third on older projects. At the present time completions and new starts are in balance; in FY77 there were 14 completions and 13 new starts.

1.16 In the first research report in 1973, informal guidelines for the allocation of external expenditure funds were set forth by sector for the fiscal years FY75 through FY78. 1/ Table 1.3 (following the chart) compares these guidelines with the actual expenditure for the period in question. As is pointed out in Chapter 2, the lines between different categories have become blurred. Some projects are on the borderline between income distribution and country analysis; between industry and trade; and between public utilities and urbanization. Taking this fact into account, the correspondence between guidelines and actual expenditure, which was not intended to be exact in the first place, is fairly close. New guidelines will be established, once the results of investigations into various sectors have been assessed.

1/ Bank Group Research Program, R73-257, November 12, 1973, Table 2.

EXTERNAL RESEARCH EXPENDITURE
FY 1972 – 1978
(ACTUAL 1972 – 1977; AUTHORIZATION 1978)

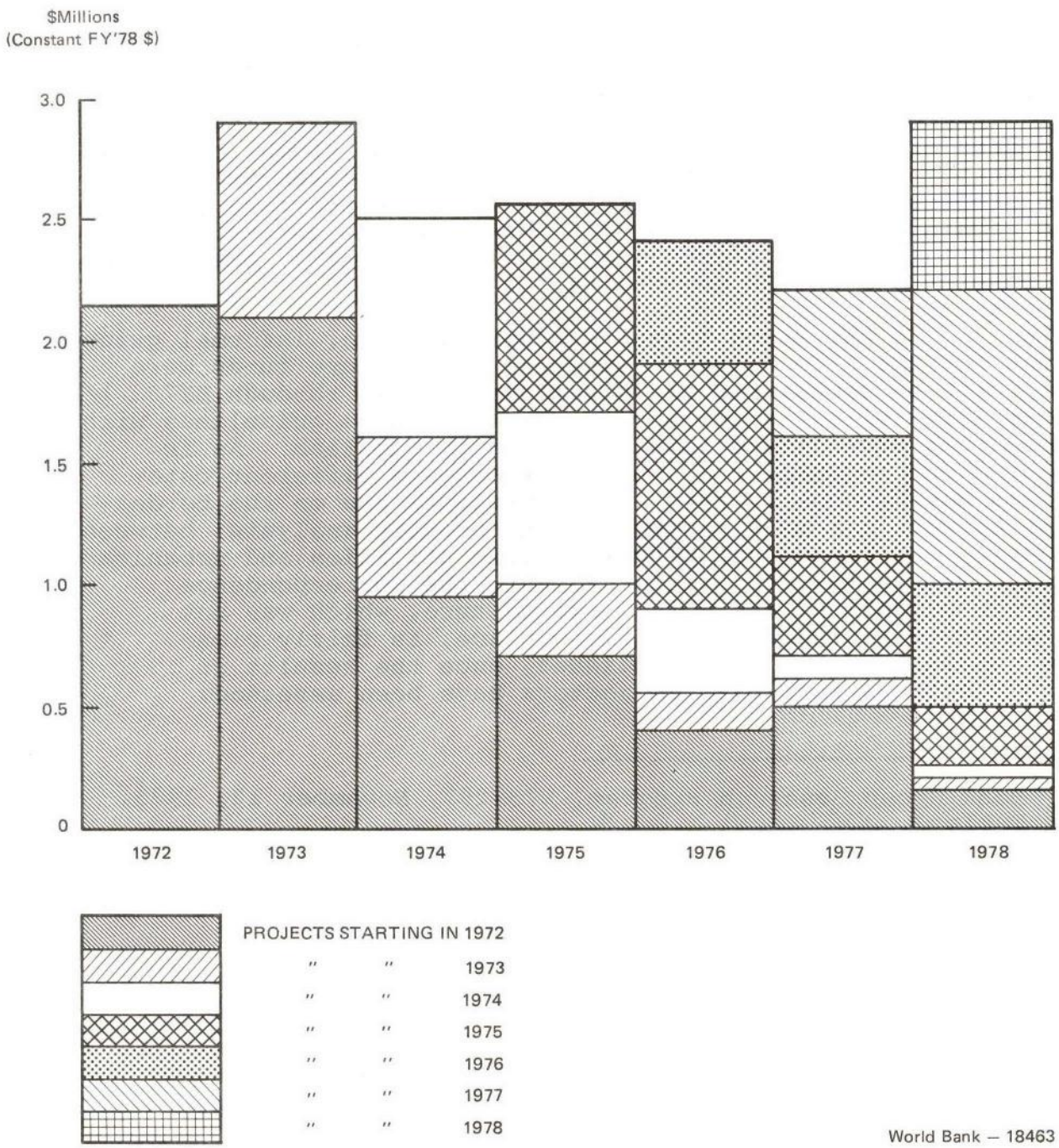

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Table 1.3

External Expenditure FY75 to FY78, Compared to Guidelines
(Percentage of external expenditure)

Category		Guidelines	Actual 1/
IA.	General Planning	1.0	-
IB.	Income Distribution	14.0	10.7
IC.	Growth/Country Economic Analysis	10.0	13.9
II.	International Finance and Trade	4.0	6.7
III.	Agriculture and Rural Development	20.0	17.2
IV.	Industry	10.0	6.4
V.	Transportation	10.0	10.9
VI.	Energy, Water and Telecommunications	5.0	7.7
VII.	Urbanization	10.0	8.6
VIIIA.	Education	5.0	4.5
VIIIB.	Labor and Employment	5.0	7.6
VIIIC.	Population, Nutrition, and Health	5.0	4.9
	Others	1.0	0.9
		100.0	100.0

1/ Actual for FY75 to FY77 (in FY78 $); authorizations for FY78.

2. THE CURRENT RESEARCH PROGRAM

Introduction

2.1 In this year's report the format of this chapter has been changed somewhat from the previous two years. Instead of describing every research project here, brief descriptions of each project have been placed in Appendix A, immediately following the main text of the report. Of the 147 such descriptions, 85 are research projects financed through the formal research program; extended descriptions of these projects will be found in the latest "Abstracts of Current Studies" with the exception of a few very recent ones. 1/ The remaining studies have been financed from regular departmental budgets. Many of them are small studies, involving only staff time. However, one at least is large; this is the Monitoring and Evaluation of Site and Service Projects.

2.2 Both the remaining text of this chapter and Appendix A have been arranged by the traditional subject-matter categories used in the statistical annexes of this and earlier reports and in the "Abstracts of Current Studies". These categories have been maintained for the sake of continuity, but they are becoming increasingly arbitrary, because they often capture only one dimension. Should projects concerning manufactured exports be included under Trade or under Industry? Should the effects of education on fertility be included under Education or Population? Two of the categories distinguish rural development and urbanization, but in fact many projects in other categories have a rural or an urban emphasis.

2.3 In this chapter we attempt to show how research fits into the organizational structure of the Bank. With very few exceptions research projects originate either in the Central Projects Staff (CPS) or in the Development Policy Staff (DPS). In the CPS the subject matter of research projects corresponds, with some exceptions, to the functional description of the department undertaking it. In the DPS, except for the International Comparison Project and research connected with international trade and commodities, research is concentrated in two departments: the Development Research Center (DRC) and

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1/ The Abstracts also list the publications from these projects. Consequently references to publications in the rest of the chapter are selective and in no way intended to be comprehensive.

the Development Economics Department (DED). 1/ The work in these two departments, although specialized to some extent, cuts across subject-matter lines. In the DED subject-matter corresponds, roughly, to divisions within the department on a sectoral basis. In several cases these divisions have close relations with corresponding departments in CPS. Work in the DRC is characterized to a somewhat greater extent by the use of quantitative techniques and their application to macroeconomic problems.

2.4 Several themes recur under the different subject-matter headings. As amelioration of conditions of poverty is now given great weight in the objectives of economic development, much of the research is concerned with the primary questions about the poor: who they are, how their productivity can be raised and how public services can be delivered to them at standards which can be afforded. This is in fact the stuff of what has recently been subsumed under the rubric of "Basic Needs." Since statistical and other sorts of information have traditionally been more available in the organized segments of economies, fact-finding has been a prime necessity. Much effort is being devoted to collecting the scattered elements of existing information, creating new bases of information, synthesis and the establishment, where it can be done, of interrelationships.

2.5 In the large capital-consuming public (or at least publicly regulated) sectors such as power, water and transportation, it will be found that attention has been directed at questions of pricing and investment policy as well as standards of service and appropriate technology. The object

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1/ The abbreviations CPS, DPS, DRC and DED will be used frequently in the remainder of this chapter.

has been to establish guidelines for discussion of Bank financed projects in order to improve the allocation of resources, while remaining sensitive to other issues of public policy. The same issues reappear in agriculture with the additional complexity that there are many sorts of farmers and farm workers growing a variety of crops and the trade-offs between different objectives are far from self-evident.

2.6 The more complex the interdependencies between acts of public policy and private responses to these acts, the greater is the need for modeling techniques which can at least capture the nature and direction of the consequences of public policy. These models may be applied either in a sectoral or in an economy-wide context. In order that these models can become operationally useful and, in principle, transferable from one context to another, concurrent development of suitable software for data processing and interaction with the consumer is a logical necessity.

Income Distribution

2.7 The Income Distribution Division of the DRC has had the responsibility for almost all the Bank's research on income distribution. When the division was established in 1972, estimates of the distribution of income in developing countries were scattered and in different forms. The first effort was to compile whatever was available and present the results in a readily comparable form. Since there was, in most cases, no way to evaluate the validity of these estimates, the next step was to secure primary data, for the most part household surveys, and analyze it from scratch.

2.8 Raw data for a number of countries in Latin America and Asia has been processed in cooperation with several regional organizations, ECLA and ECIEL in Latin America and ESCAP in Asia. This has proved a much more time-consuming exercise than originally expected, because the tapes recording raw data usually have to be subjected to a protracted "cleaning" process before transformation into a form suitable for analysis. At the same time, it has been necessary to test the congruency between household survey information and other sources, such as national accounts. In fact, a project carried out in

conjunction with ECLA suggests that the congruency is less than perfect. One way of reconciling the principal sources of information is to use a Social Accounting Matrix (SAM), which links the traditional expenditure and production accounts with household incomes in a disaggregated form; this has been done in Malaysia with the close cooperation of the Malaysian Government.

2.9 The phase of data collection from existing sources is coming to an end. It remains to present the results together with whatever conclusions can be drawn from analysis of them. Since the thrust of the enquiry has shifted over the years from income distribution per se to the identification of poverty groups, this will be the main focus of the conclusions. It is hoped that an overview of what has been learnt in the course of investigation will improve the capacity to analyze problems of poverty in an operational context.

2.10 Government services such as health and education, which are not reflected in standard income and expenditure accounts, are significant elements in household welfare. Accordingly, a study has been conducted in two countries (Colombia and Malaysia) into the distribution of the incidence of government expenditure.

2.11 Since the relief of poverty requires some understanding of the kinds of policy intervention which are most effective, there have been several efforts to construct economy-wide models sufficiently disaggregated to show over time the consequences of different policy packages. Models were constructed for Brazil, Korea and Malaysia. These models suggest that, though different policies may affect who is poor, the relief of poverty per se is unlikely to be accomplished without a broad array of policy interventions. However, though certain insights into the effects of growth on distribution have been obtained, the way in which structural change materially affects the welfare of poverty groups has proved elusive.

2.12 Clearly, historical experience of changes in income distribution might shed some light on the problem, but consistent and comparable data over time are virtually non-existent. An effort has been made to trace the evolution in

Taiwan, where a fair amount of evidence exists and where the changes in distribution have been substantial. A more restricted enquiry has also been made to assess the evidence on the level of consumption of the rural poor in India, where change has evidently been small and the direction variable. Despite the evident difficulties in tracing the evolution of income distribution over time, it seems clear that more needs to be done.

Country Economic Analysis/Development Strategy

2.13 This is a group of somewhat diverse projects concerned with the development of individual economies or the international economy as a whole. In the latter category, the oldest and best known is the International Comparison Project being carried out by the UN Statistical Office and a team led by Professor Kravis at the University of Pennsylvania and monitored by the Economic Analysis and Projections Department, which is responsible for economic data collection. This project, supported by the Bank and a number of national agencies because of their interest in a better basis for comparing estimates of per capita income, is now in its third and final phase; publication of the report of Phase II is scheduled for April 1978. As a result of the widespread interest, work on international comparisons will become part of the ongoing program of the UN Statistical Office.

2.14 The majority of the other projects in this group have been carried out in the DRC. One of the earliest was a comparative study of the development strategies of six semi-industrial countries with particular emphasis on the incentive system and its effect on resource allocation. By now, five of the country studies have been completed, but the comparative phase of the project has been unavoidably held up.

2.15 Country models have been used in an operational context for a decade or more. Originally these models had the modest objective of ensuring a plausible consistency in projecting sectoral growth, overall growth, fiscal development, the balance of payments and capital requirements. These models were used both in country economic work and as an ingredient in the development of global projections such as those in the "Prospects" papers. The Comparative Analysis and Projections Division of the Economic Analysis and Projections Department has had the central responsibility for this work. Over time,

such modelling efforts have become increasingly sophisticated in an attempt to illuminate the possible range of policy choices or development strategies. This has happened especially in the context of the basic economic reports which were unaugurated about five years ago. 1/ Cumulative experience has been gained in building these models, despite the fact that each model has been constructed to illuminate policies at issue in the country concerned and their characteristics differ widely.

2.16 Concurrently, an effort is being made in the Development Research Center to provide a more standardized basis for modelling work with sufficient flexibility to be used in different situations, particularly in terms of the available data and the policy questions most pertinent. This work has proceeded on different fronts. Part of it is a project to design a generalized model framework or "prototype," composed of a number of separate parts or "modules." Each module can have a variety of specifications, which can be simple or complex, depending on the data availability and the structural characteristics of the sector concerned.

2.17 A second approach is to develop further the systematic presentation of a great variety of economic data in the form of a Social Accounting Matrix (SAM) (already referred to under Income Distribution). SAM's which have been constructed in several countries, especially in connection with ILO employment missions, take the logic of national accounting a substantial step further by tracing on a more disaggregated level the

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1/ Recently published examples are Syamaprasad Gupta, A Model for Income Distribution and Growth, A Case Study of Indonesia, World Bank Staff Occasional Paper 24, (Johns Hopkins University Press, Baltimore, 1977) and Alternative Development Strategies of Korea (1976-1990), World Bank Staff Working Paper No. 250 (March 1977).

circular process of production, income and expenditure for different subsectors (e.g., the so-called formal and informal subsectors) and different classes of households. The framework is quite general and the application can be adapted to the available data. The accounting framework provides the basis for various types of country models.

2.18 It is intended that these efforts will move from the experimental to the demonstration phase within the next year or so. Since the intelligibility, the serviceability and the transferability of models depend very much on adequate documentation and suitable software, parallel development of these aids to communication between model-builder and computer is going on.

2.19 Also deserving of mention are several DED projects listed under the International Trade and Industry areas, as these projects are equally aimed at improving the basis for country economic analysis. Two are direct outgrowths of the project on semi-industrial economies; in one, the approach developed in this project has been extended to economies at an earlier stage of industrialization in work on four West African economies; in the other more detailed information on exporting activity is being sought in work on export incentives and their effects. Both of these projects use data obtained directly from enterprises, which, as was found in the earlier project, permit more reliable analysis and lead more directly to operationally useful information. Another project, on the sources of industrial growth and structural change, complements the work discussed previously on modelling and SAM's. Its prime motivation is to develop the in-house capability to use input-output analysis for examining questions of industrial strategy, while at the same time developing a comparable data base and set of empirical results across several developing countries following contrasting industrialization strategies.

International Trade

2.20 Because of their importance in the economies of developing countries, the Bank has almost from its inception studied the trade and price prospects of primary or semi-manufactured commodities. This work was originally conceived of as a central ingredient in country economic reporting. It

is currently carried out by the Commodities and Export Projections Division in the Economic Analysis and Projections Department (EPD). Information on a range of commodities is now published annually in "Commodity Trade and Price Trends."

2.21 The principal markets for primary commodities are in the industrialized countries, and, in the case of a few commodities (notably food), they also supply the import needs of developing countries. The need to study the interdependence between the growth of developed countries and developing countries in this context, was stimulated by the preparation of annual papers on the prospects of developing countries. For this purpose and to provide a consistency check on individual country models, a global model of trade and growth was used; experience gained with this comparatively simple model is being applied to the development of a more sophisticated one. Research in the EPD has concentrated on the expansion and refinement of commodity and energy models, in particular, the introduction of primary commodities into project LINK, an international cooperative effort to estimate the impact of economic fluctuations. Some earlier work in the DRC, which was intended to improve the methodology for analysis of global supply and demand conditions, is being incorporated in the Bank-wide effort.

2.22 Studies on the supply side of exports from less developed countries have tended to concentrate on non-traditional exports, especially manufactures, and began with the work on semi-industrial economies that was discussed in the preceding section. The promotion of non-traditional exports from Latin America was the subject of a cooperative venture between the Bank's Latin American Region and ECLA; Bank staff provided some comparative studies on countries outside the region as well as participating in discussions of the Latin American studies. More recently, a study in greater depth of the history of export incentives in four developing countries has been initiated in order to evaluate their experience and thus further illuminate the most appropriate policies for export promotion. Though concentrated on incentive policies and manufactures, this study will also investigate export marketing and non-traditional primary exports as well as services exports such as tourism.

2.23 Also recently begun is work exclusively on manufactured exports, which is described under the heading of Industry. As the volume of manufactured exports grows, future research will clearly have to deal with the problems occasioned by this growth: market limitations in the developed countries, including the possibility of protectionist reactions; and the possibilities for development of trade among developing countries.

Agriculture and Rural Development

2.24 As the Rural Development sector policy paper 1/ pointed out; information on the characteristics of the rural poor and the response of traditional societies to modernization is inadequate. The setting up of evaluation units in connection with Bank projects should help to provide the basis for data collection and analysis in member countries themselves.

2.25 The principal departments originating research on this subject are the DRC and the Agriculture and Rural Development Department in CPS. The DED initiated several projects in the past, including the well-known African Rural Development Survey. Most of the recent research has been focussed on rural employment (see para. 2.57). Regional offices have in the last three years sponsored four projects, three of them in cooperation with the DRC.

2.26 The DRC's involvement began with CHAC, the model of the agricultural sector in Mexico described at some length in last year's report on research (Chapter III). The model attempts to capture the complex interdependence among the demand for a variety of crops, their prices, the choice of technology and the constraints imposed, at least potentially, at different times of the year by resources such as land, labor and water. The objective was to trace the effect on the one hand of growth in income and hence a shift in the pattern of demand, and on the other of specific government interventions in the market, including new investments. The techniques or at least the experience gained in developing this model have been used in the appraisal of Bank agricultural projects and in subsequent research projects.

1/ World Bank, Rural Development, Sector Policy Paper Washington, D.C., February 1975).

2.27 One subsequent project was designed to examine the economic conditions in Northeast Brazil and the reasons why it appears difficult to improve the lot of large numbers of rural poor. This project involved a survey of 8,000 farms, which has provided useful descriptive material for the design of rural development projects. In this project, farms are distinguished by both size and tenurial arrangements; aversion of poor farmers to the risks of introducing new technologies, particularly in conditions of uncertain rainfall, is also introduced into the model. A second project utilizes extensive data collected in the Command Area of the Muda River irrigation project in Malaysia. In this case an effort has been made not only to examine the farm household behavior, but also to explore the project's secondary effects outside agriculture and the interactions between agriculture and these outside activities. A social accounting matrix (see para. 2.17) was used for organizing the data.

2.28 A third project was designed to illuminate the choice of pricing and storage policies in Zambia where maize is the principal food crop. An effort has been made to distinguish the different types of farmers who range from those living close to subsistence on the one hand to modern commercial farmers on the other. The project has run into serious data problems, but has served to identify the kinds of data collection which should have the highest priority. The fourth project will use the data collected in the Indus Basin in Pakistan under a UNDP project executed by the South Asia Projects Department. Here the interdependence is particularly complex, since it extends not only to the market in a broad sense but also to the use of water in the entire basin. Consequently, the model structure will require a module representing the hydrology of the Basin. The principal aim of the model system is to aid in the choice of investments among a variety of possibilities. Since there is a wide choice of geographical areas in which they can be undertaken, the optimum choice is far from clear. Moreover, agricultural development is not the only issue; so is income distribution among farmers. The model is designed to shed light on the trade-offs involved as between one set of choices and another.

2.29 Research in the Agriculture and Rural Development Department is conducted mainly by the Economics and Policy Division. Although two agricultural sector modelling exercises, broadly similar to those carried out by the DRC, were under-

taken in Brazil and Portugal in the past, by and large there is a division of labor. Research undertaken in this department is normally directed towards the production of a policy statement, either a policy paper or guidelines to Projects staff. Currently, three main areas may be distinguished. The first consists of food policy studies. This category includes studies of the prospects for foodgrain consumption and production in developing countries in future years and the attendant policy measures and investment required in order to provide improved food security. It also includes a review of food distribution and nutrition policies (including storage) within countries.

2.30 This part of the program also includes a comparative study of agricultural prices, taxes and subsidies in eight countries around the world. The objectives are to assess the impact of incentive or disincentive policies on agricultural investment and growth and, on the basis of this assessment, to provide guidance on the use of such policies. The methodology is based on that used in an earlier study of West Africa (see the following section on Industry). It includes the estimation of effective protection and domestic resources cost coefficients for alternative products, locations and technologies for each country. These results will be compared with those obtained under related analysis using the Mexican and Portuguese sector models referred to above.

2.31 A second broad group of studies is concerned with the design of rural development projects. The spectrum covered here is wide, dealing generally with studies of the factors affecting technical innovation in developing countries and the policies best suited to bring them about. These include identification of appropriate levels of field mechanization; the organization and management of irrigation projects; the role of risk in farmers' decisions (building on earlier work in the DRC); identification of the particular constraints to production on small farms and the methods or policies best suited to overcoming these constraints; and an analysis of the diffusion of technology in rural areas in order to have a better idea of how to manage the transfer and adoption of new technology.

2.32 A third type of activity deals with the process of project evolution from broad planning procedures through design appraisal and monitoring and evaluation. Methodological issues, which arise in the course of project appraisal, are prominent in this group: for example, development of a methodology for taking account of the risk elements in appraising agricultural projects and modifications of cost-benefit methodology. Separate studies in this group deal with the development of approaches for sector analysis and planning, and the monitoring and evaluation of projects.

2.33 Regional Offices have been joint sponsors with the DRC in three of their more recent projects, in India, Pakistan, and Zambia. Another Regional Office (Western Africa) has initiated a project of a rather novel kind for the Bank. In designing irrigation projects in the Senegal Valley, where the risks of dry land farming are very high, the Bank has been faced with an almost total lack of information about the social structure of the villages which would be affected. The aim of this project, therefore, is to investigate the social structure, which is known to be a complicated one, in order to understand better how it might be affected by the introduction of large scale irrigation projects and who the beneficiaries may be.

Industry

2.34 Economic research on industry is mostly centered on the Economics of Industry Division in the DED. Other sources are the Industrial Projects Department, the Industrial Development and Finance Department and the DRC; some of the earlier work undertaken by the latter has since been undertaken by the DED. Like other divisions in the DED, the Economics of Industry Division complements its research with operational support activities which are a major vehicle of dissemination. Much of the Division's operational support is an outgrowth of involvement in research on issues of industrial strategy, particularly with respect to trade policy. Operational support also includes the application of tools of industrial investment analysis developed in cooperation with the DRC.

2.35 Two early projects, one in the Industrial Projects Department and the other in the Development Economics Department, were stimulated by the belief that industrial capacity utilization in developing countries was low despite the availability of cheap labor and scarcity of capital. The two projects, now substantially completed, endeavored to show the reasons for capacity underutilization, the possible policy steps to improve it and the improvements to income, employment and the balance of payments resulting from a move from one to two shifts.

2.36 The project on industrial incentives in four West African countries has previously been mentioned under Country Economic Analysis/Development Strategy. This project stemmed from the Western Africa Region's interest in extending methods used to analyze the strategies of semi-industrial countries in order to advise on industrial strategy in West African countries where industry is less well developed. Alternative strategies are evaluated through an analysis of comparative advantage at the project or firm level. Also being considered are the relative merits of expanding agriculture versus industry, as well as how to expand intraregional trade and the gains that would be realized from its expansion. The methodology developed in this project, involving the simultaneous investigation of incentive policies and comparative advantage, has subsequently been used in the projects on export incentives and on agricultural prices and subsidies already referred to (para. 2.30).

2.37 In another project, also largely completed, a methodology has been developed for analyzing investment alternatives in large-scale process industries (for example, fertilizer, forest products), where economies of scale and location play an important part. This project, which originated in the DRC and is now being undertaken mainly in the DED, has throughout been carried on in close cooperation with the Industrial Projects Department. In cooperation with the Fertilizer Unit in that department, which itself has conducted several studies on fertilizers, the methodology has been applied in the fertilizer industry in Egypt, Southeast Asia and the Andean Common Market; other applications are under way.

2.38 There has also been parallel work on the mechanical engineering industries, where economies of scale are equally important but choices among production techniques pose a difficult set of analytical problems. These are separately addressed in a project concerned with the scope for capital-labor substitution in the mechanical engineering industries, which strives simultaneously to develop analytical methods and to assess the prospects for increasing employment within these industries through the choice of labor-intensive methods. The latter component of this work has led to a more general project on appropriate industrial technology across sectors. Of particular concern is the apparent fact that more appropriate technology exists than is actually adopted in many circumstances; why this is so is the first question to be addressed.

2.39 In another broad area of research, Chenery and Syrquin's earlier work on Patterns of Development has stimulated two further projects. One of these applies the same approach to examine the internal structure of industry, by establishing development patterns for individual subsectors. This project has established a data bank on production, trade, and other variables by subsector for over 100 developing countries and a period extending back as long as 20 years. The data so assembled have been used in other contexts as well, including such global exercises as the "Prospects" papers. The second extension, already mentioned above, uses input-output techniques to probe causes of observed patterns by analyzing the sources of industrial development and structural change, one aim being to evaluate alternative industrialization strategies through case studies of eight countries. The experience gained in this project has been put to use in two operational missions to assess the adequacy of medium-term plans for Korea and Yugoslavia, and similar work is under way in Turkey.

2.40 Two new projects indicate the direction in which research on industry is shifting. While previous research has demonstrated that the existence of a profitable export market for manufactured goods is a necessary condition for export growth, there remains some question whether it is also sufficient in view of our ignorance concerning how exports are institutionally channeled. Marketing and other institutional obstacles are being explored in a case study in

Colombia, where the rapid growth of textile exports from a meager base does not, on the face of it, appear fully explicable in terms of increased export incentives. This case study is largely concerned with questions of organizing exports from small scale enterprises. In turn, another project just started jointly in two divisions of the Development Economics Department focuses explicitly on small and medium enterprises.

2.41 Small-scale enterprises are now thought to be a possible vehicle for much needed growth in employment, but too little is known about their characteristics, their potential and the economic environment in which they operate. An effort will be made through case studies and enterprise surveys to establish a better factual and analytic basis for formulating policy in this area.

Transportation

2.42 The Transportation Projects Department's largest research project, dating back to the beginning of the formal research program, is described fully in the case study in Chapter 3. It was originally designed to explore the possibility of using labor-intensive techniques on highways, but, since the problems are in principle the same, was subsequently extended to all civil construction. Another large project concerned with the construction of highways was started somewhat earlier; since the trade-off between initial construction costs and future maintenance and road user costs is likely to be different in developing countries from what it is in developed, the object was to create a planning tool for designs suitable to developing countries. Both these projects are coming to a close.

2.43 Very little systematic information has existed on feeder roads in the sense that surveys of areas within the roads' area of influence have rarely, if ever, been taken before, during and after construction. The Transportation Projects Department is carrying out such surveys in three different countries, utilizing an existing base line survey in one case. The main objective has been to determine the nature of the relationship between construction of farm-to-market roads and consequent changes in production and social conditions. As a result of the experience gained, a model to analyze the economic impact of feeder roads has been developed and is being improved.

2.44 Well before the formal Research Program was inaugurated, a study of pricing and investment policies for roads was undertaken for the then equivalents of the Transportation Projects and Development Economics Departments. The book, which came out of this study, can be regarded as the precursor of a number of others in different sectors dealing with the practical application of marginal cost pricing principles. 1/ One such successor has been a study on port pricing and investment policies, which demonstrates the appropriateness of marginal cost pricing in ports in developing countries.

2.45 Railways, on which projects have been financed by the Bank, have usually, though not always, borne less traffic than forecast. This has led to the conviction that, besides the need for better forecasting, there should be a broad study of the economic role of railways. As a first step, a detailed proposal for this project is being worked out.

Public Utilities

2.46 Research in this field has been carried out by the Energy, Water and Telecommunications Department in CPS. The main thrust of the earliest phase of the research was similar to that in Transportation; the application to public utilities, particularly electricity and water supply, in developing countries of marginal-cost pricing and systems analysis in investment planning. Traditionally, pricing policy followed accounting criteria, often with adverse consequences for the allocation of resources: unwitting cross-subsidization, underutilized capacity at times and overstrained capacity at others. In recent years, several European countries have made use of the theory of marginal-cost pricing in determing price policy. One purpose of the research, therefore, was to review current theory and practice and thereby to lay the groundwork for devising appropriate tariff structures

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1/ A. A. Walters, The Economics of Road User Charges, World Bank Staff Occasional Papers No. 5, (Johns Hopkins University Press, Baltimore, 1968).

in the context of developing countries, given the constraints of administrative convenience and social acceptability. An efficient price policy is a necessary condition for efficient investment planning, so that it was rational to link the two together. Since the ultimate objective was the adoption of the principles involved and their adaptation to local circumstances by the utility authorities themselves, an important part of the research consisted of country case-studies. 1/

2.47 Concern with the supply of public services to the poor has led research in two complementary directions. In most developing countries a large proportion of the poor are to be found in the rural areas, which are generally expensive to service because villages or even houses are dispersed and because requirements are small in scale. Questions of cost-effectiveness, financing, the setting of priorities and the justification for those priorities are therefore bound to arise. Research into these aspects of the supply of water, electricity and telecommunications have therefore been conducted, the results of which are reflected in two World Bank Papers. 2/

2.48 The cost of utility services in urban areas in developing countries reflects the fact that standards developed in industrial countries with much higher standards of living have been used. 3/ If these services are to be widely extended

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1/ See, for example, Ralph Turvey and Dennis Anderson, Electricity Economics: Essays and Case Studies (Baltimore, Johns Hopkins University Press, 1977).

2/ World Bank, Rural Electrification (Washington, D.C., 1975) and Village Water Supply (Washington, D.C., 1976).

3/ There are some obvious exceptions such as public standpipes. One project examines their efficiency and the possibility for reduction of waste water.

to the urban poor, i.e., without excessive subsidization, it is necessary to examine what lower standards of service are possible and what the relationship between cost and level of service is for the various alternatives. These questions are being examined in two different fields: distribution of electricity and the provision of water and sewerage, considered as an integrated system. In the latter case, a world-wide survey of existing techniques will include some being used on Bank projects.

Urbanization

2.49 Bank concern with urban problems and urban projects as such (as opposed to projects in cities) is less than a decade old. Consequently, initial research was directed at urban data needs and availability and at issues of urban public finance and administration. Urban research has in the past been conducted in both the DED and in CPS, but at present the main effort is undertaken in the Urban and Regional Economics Division in DED working closely with the Urban Projects Department in CPS.

2.50 Following the initial exploratory stage, additional case-studies have been investigated in order to identify ways in which public services can be financed in growing urban areas, through self-financing or the taxation of land price increases. In a quite different project, advantage was taken of the initiative taken in Singapore, where the world's first experiment in reducing traffic congestion in the core area by means of area licensing and other coordinated measures has been carried through. Before and after observations can, it is hoped, give some basis for predicting the effects of similar policies elsewhere.

2.51 Since the Bank's main contribution to urban development has been through the financing of sites and services projects, considerable resources have been devoted to studying them. One research project aimed at producing a manual giving quick access to cost data on designs at various standards; although not fully satisfactory, the resulting manual is the first of its kind outlining this approach. A much larger effort, financed outside the regular Research budget, 1/ is

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1/ Roughly half the finance comes from the International Research Development Centre in Ottawa.

being devoted to the establishment of monitoring and evaluation units in the three countries, where the Bank's first site-and-service projects were located and subsequently in another country. This study will take five years. It has already generated one additional research project (see para. 2.63) and may well give rise to others.

2.52 The interactions between economic sectors in cities are made complex because of the spatial dimension. Past attempts to model urban development in developed countries as an aid to policy-making and investment decisions have been expensive and not conspicuously successful. The Bank has therefore now embarked on its first venture of this kind in a developing country cautiously. Some sectoral studies (urban transport, land, housing, employment location), have been carried out, but when they are undertaken in different cities at different times, there is little opportunity to establish any connection between them. In a major project (the "City Study"), they will all be undertaken in a single city, Bogota, using a common data base. Attempts will be made to establish intersectoral linkages and, if possible, to develop means of estimating the impact of public policy interventions. Other research projects conducted in Colombia will be coordinated with the City Study as far as possible; for example the small-scale enterprise study (para. 2.41).

Education

2.53 Research on education is conducted mainly by the Education Projects Department and the Division of Population and Human Resources in the DED, in some cases jointly. One recent project has been initiated in the EMENA Regional Office.

2.54 One of the first research projects undertaken in the Bank focussed on the redistributive effect of education and educational financing, both in a current and in a dynamic sense. Although the contrary is popularly believed, it does not appear that education per se, even with devices such as student loan schemes, is a particularly effective vehicle for income redistribution, unless pricing, financing and taxation of educational services are appropriately designed to meet this objective. Another early research project followed the evolution of the focus of interest in the educational projects financed by the Bank: from "bricks and mortar" to the content

of the educational service provided. 1/ The aim was to design a widely applicable methodology for the evaluation of learning in Bank-assisted programs. The proposed system of "formative" evaluation would incorporate repetitive cycles of testing and feedback to curriculum writers of a kind which would make it possible to improve the education service, especially by removing disadvantages for poverty groups. The system is being tried out in the field in cooperation with the Tanzanian Government.

2.55 Education in poor countries, if extended to a large proportion of the population by traditional methods, presents a crushing fiscal burden. Consequently, most subsequent research projects have explored the cost-effectiveness of education in two respects. The first set is concerned with assessing the impact of educational inputs on student achievement: for example, teacher training; the use of radio in remote areas; the impact of textbooks; and the design of basic education. The other set is concerned with the effect of education on other activities. One project, for example, is concerned with the relation between education and agricultural productivity; another with the existence and the nature of the threshold exposure to education which enables someone to retain the skills which he has been taught. Another important area, discussed in a subsequent section, is the relationship between education and fertility.

Employment

2.56 The principal research work on employment is carried on in the Employment and Rural Development Division of the DED, but contributions have also been made by the Urban and Regional Economics Division in the same Department and by the Education Projects Department. Much of the stimulus for research on employment came from concern with urban poverty and the realization that, not only are the majority of jobs in cities in developing countries in the so-called informal sector, but that this state of affairs will persist for a long time.

1/ See, for example, World Bank, Education, Sector Working Paper (Washington, D.C., December 1974), p. 50.

National statistics often exclude the informal sector by definition and other information is fragmentary. Thus, it was necessary, first, to find out more about the sector itself and its relationship with the urban formal sector on the one hand and, via migration, rural living conditions on the other; in other words, how the labor market functions.

2.57 There have been two employment research projects with a rural emphasis, both using data obtained in conjunction with Bank projects. Here the objective is to study the behavior of households both as users and sellers of labor in order to understand better the direct and indirect effects of rural projects on employment. 1/ In three other research projects the emphasis has been largely urban. Studies of urban poverty have been made in three countries with emphasis on determining the characteristics of those working within the informal sector (age, sex, migrant status, etc.) and the specific causes of poverty such as low participation in the labor market or low wages and on the nature of demand for labor by employers in the informal sector.

2.58 Two research projects are concerned with projections of future employment. The first of these is an attempt to develop a standard methodology for projecting sector employment on the basis of alternative assumptions about such macroeconomic quantities as investment, foreign exchange availability and the composition of final demand; case studies in three developing countries will be used as the basis. A later project is designed to fill some of the needs of educational planners who necessarily have to make manpower projections. The necessary data for making such projections have until recently hardly been available except in developed countries, where conditions change only slowly in any case. Data becoming available from 1970 censuses may make it possible to improve our ability to forecast requirements for different types of skills.

2.59 Although information on the informal labor market may be fragmentary or difficult of access, it is doubtful whether what information there is in any given country has been adequately exploited. In a new research project an effort will be made to assemble all data on employment in two

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1/ Research on ways of increasing employment in rural industry, commerce, construction, etc., was used in Development Issues in Rural Non-Farm Employment, Report No. 1577, April 25, 1977.

country case studies with, where possible, evidence of changes over time; it is hoped that a set of "employment accounts," somewhat on the analogy of national accounts, can be produced. This project will use two Latin American countries as the basis for case studies; since one of them is Colombia, the results can be integrated with the City Study mentioned earlier. It is worth noting that the small-scale enterprise study, mentioned earlier under Industry, will also be very closely concerned with questions of employment potential and demand for labor in the informal market.

Population, Health and Nutrition

2.60 The Population and Human Resources Division of the Development Economics Department has been responsible for almost all the Bank's research on population. Following the recommendations of the Berelson Committee, a significant part of the Division's current work consists of country studies on population which may be considered as part of the current economic reporting on the countries concerned. Among its past responsibilities has been the preparation of reviews on the state of the art on various aspects of population, of which the 1974 "White Paper" is the best known. 1/ A second review with a more limited scope examines how experiments in the delivery of family planning services have been carried out and how they have worked. 2/ The Bank has also joined with other donors in sponsoring the review by an expert group of current use of the findings of social science research in this field and of the capacity for field research in developing countries.

1/ World Bank, Population Policies and Economic Development, (Baltimore, Johns Hopkins University Press, 1974).

2/ Roberto Cuca and Catherine S. Pierce, Experimentation in Family Planning: Lessons for the Developing World, (Baltimore, Johns Hopkins University Press, 1978).

2.61 There are two studies of intercountry migration. The first is in West Africa, where migration across frontiers is of long standing and occurs with considerable freedom; these movements are of interest in the design of Bank projects in that area. The second and more recent one is on the phenomenon of migration to countries in the Middle East, where there has been a growing demand for a variety of specialized skills.

2.62 Several projects examine the determinants of fertility with rather different approaches. One of the older ones studies this question at the village level in four different developing countries. A recent one will attempt to draw conclusions from the unusually detailed statistical information collected in the course of the Botswana Rural Income Distribution Survey, itself financed in large part by the Bank. Other studies examine the relationship between education and fertility, between female participation in the labor force and fertility and between household size and savings.

2.63 In Narangwal in India, household data were collected over a period of years using control groups of villages to facilitate subsequent analysis of the effectiveness of health, nutrition and family planning services provided in that area. Other health and nutrition studies have originated in several other parts of the Bank, starting as an outgrowth of quite different types of research. One such is a series of studies of the effects of health and nutrition on work output, sponsored by the Transportation Projects Department as a result of its larger research project on capital-labor substitution (see Chapter 3). Another example is a study of the health of low-income groups before and after site-and-service projects, monitored by the Urban Projects Department and the Urban and Regional Economics Division of DED. Finally, the DRC and DED have collaborated on special studies in nutrition, pointing to the need for better means to distribute available food as well as increasing its supply. 1/ In the Agricultural Projects

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1/ See Shlomo Reutlinger and Marcelo Selowsky, Malnutrition and Poverty, Magnitude and Policy Options, World Bank Staff Occasional Paper No. 23 (Baltimore, Johns Hopkins University Press, 1976).

Department, attention is being given to the exploitation of the potential of roots and tubers in the agriculture of developing countries, with particular emphasis on the nutritional benefits.

Public and Private Finance

2.64 Research in public finance, including certain aspects of banking, is conducted by the Public and Private Finance Division of DED. The Division's current research work falls into three categories: (i) Small Enterprise Financing, (ii) Fiscal-Financial Structure and Policies, and (iii) Public Sector Enterprises. In addition, a number of other studies are related to participation in regular economic missions.

2.65 Among the projects related to Small Enterprise Financing are three which focus on the formal financial sector and one which studies the informal credit market. The main purpose of these studies is to identify the real costs (administrative costs plus default risk) of lending to small enterprises and financial innovations that may reduce these costs.

2.66 Fiscal-Financial Structure and Policies has been the area of major concentration in the recent past. The study of the distributive impact of public expenditures, referred to earlier (para. 2.10), is now largely completed. A second project aims at studying the impact of social security institutions on resource mobilization and allocation. Next to the banks, social security institutions mobilize the largest share of the household sector's financial savings in many developing countries. Some of the preliminary results of this study indicate a strong case for the promotion of social security institutions as a major objective of financial policy. The most recent project is aimed at improving knowledge on the interaction between capital market structures and economic development; the hypothesis to be examined is that capital market imperfections affect the rate as well as composition of saving and investment.

2.67 The impacts on the performance of public enterprises of organizational and managerial structures and practices, and of the policy environment has long been a vexing question. Some exploratory research has been carried out in this difficult field. Now it is intended that selected public manufacturing enterprises in several countries be studied in order to draw some preliminary conclusions and establish the basis for a wider investigation.

Tourism

2.68 Research on tourism is carried out by the Tourism Projects Department. This research concerns the benefits and costs of tourism, and issues connected with the design of projects. Studies have been carried out on tourism investment criteria and investment incentives, the social and cultural impacts of tourism, and the effects of tourism on the role of women in an area of tourism development. A recent brief study dealt with climatic factors in the siting and design of tourist resorts.

3. "THE SUBSTITUTION OF LABOR AND EQUIPMENT IN CIVIL CONSTRUCTION:" A CASE STUDY

A. Introduction

3.1 By the late 1960s it had become apparent that high rates of capital accumulation and growth had not sufficed to eliminate unemployment. Traditional agriculture in many areas had been modernized, but disguised unemployment persisted. Industrial employment had not grown by enough to provide jobs for the increasing numbers of urban migrants, many of whom joined the ranks of the unemployed or became partially employed in services. "Striving to reduce unemployment," which became an objective of the UN Second Development Decade, entailed the realization that innovations should be examined more critically as to their effects on the demand for labor.

3.2 For several decades the construction of civil engineering works in developing countries had been a central feature of the efforts to promote growth. Moreover, in construction the range of technically feasible factor combinations appeared to be wider (at least in theory) than in manufacturing and some other sectors. Road building had long been felt to have a high potential for employment creation. Yet more often than not, modern construction technologies had been transferred in toto for use in developing countries without regard to the vastly different resource endowments and factor prices characteristic of these countries. Several member governments of the Bank had been concerned about the prevalence of highly equipment-intensive techniques for civil construction in areas with an abundant supply of cheap labor.

3.3 One outcome of this concern was the initiation in 1969 of a study to determine the standards appropriate for constructing and maintaining roads in areas with low volumes of traffic and relatively abundant labor. 1/ Previously, highway engineers and planners in developing countries had had little idea what the consequences would be, for vehicle

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1/ "Highway Design Study," No. 670-27. Initial field research in Kenya, completed in 1974, has been extended to Brazil and India. The study is scheduled to be completed in 1979.

speeds and for the costs of vehicle operation and maintenance, of building a road and maintaining it at the lower standards which it was thought would be more appropriate. Nor was it known whether construction at lower standards using manual methods was technically feasible, let alone economically competitive with equipment-based methods.

3.4 These questions prompted the Bank in February 1971 to launch a study of the possibility of substituting labor for capital in the construction of roads, irrigation canals, and other civil works (No. 670-26). The rationale for focusing on civil construction was twofold. First, technology choice tended to be polarized--either one used several hundred laborers or a single machine to replace them. The design and testing of labor and equipment combinations suitable for different phases of the construction process at various standards was thus a major policy concern. The second reason was the prominence of civil construction in domestic capital formation and consequently in Bank lending, along with its significant employment potential.

3.5 The narrative which follows traces the evolution of this research project, from its origins to the current phase of application and dissemination. This account is in no sense a full-fledged evaluation of what has been accomplished up to the present. The purpose is instead to review the study's principal findings and to highlight the steps taken toward implementation of the results, in order to shed some light on themes of wider relevance in the design and execution of research.

B. Quantification of Substitution Possibilities

3.6 Though usually stated more comprehensively, the objectives of this study boil down to an attempt to answer two questions, the second of which requires a positive answer to the first:

1. Is it feasible to use labor-based methods in place of equipment-based methods in civil construction?

2. How should a program of civil construction projects oriented toward the use of labor be designed and carried out?

3.7 Several months of initial explorations, ending in October 1971, demonstrated that the answer to the first question differed markedly depending on whether the issue was feasibility in the technical or economic sense. From a review of the engineering literature supplemented by consultations with contractors, supervisory engineers, and public works departments, a wide range of labor-based road construction methods was seen as technically feasible. Labor could substitute for capital for as much as 80 to 90% of total direct costs (i.e., excluding materials and overhead) at a high quality standard, and up to 98% at an intermediate standard.

3.8 A judgment about whether it made economic sense to employ such methods, however, could not be made from the information at hand. Using different sets of reasonable assumptions about labor and equipment productivity, two of the consulting firms engaged to carry out the Phase I review had estimated production relations for a series of tasks, at various wage rates and assuming fixed prices for equipment, materials, and fuel. 1/ Sharply divergent conclusions were reached about which combinations of labor and equipment were in fact optimal in those tasks. Productivity rates, ostensibly for identical activities and site conditions, were found to vary by as much as 1,300%. Although partly due to errors of measurement, the variations in productivity estimates responsible for these discrepancies were felt to be largely genuine, the result of differences in site-specific physical, economic and environmental factors which "are so important that a case by case analysis may be required." 2/ Collection of further data from ongoing construction activities, with emphasis on careful measurement, would be necessary if a sound quantitative basis for evaluating substitution possibilities was to be established.

1/ The firms were Scott Wilson, Kirkpatrick and Partners (SWKP, United Kingdom) and Bureau Central d'Etudes pour les Equipements d'Outre-Mer (BCEOM, France).

2/ C. G. Harral, et al, "Study of the Substitution of Labor for Equipment in Road Construction, Phase I: Final Report," October 1971, p. VII.

3.9 India's large underemployed labor force, extensive experience with labor-intensive construction, and variety of environmental conditions presented an opportunity to generate such data. Bank staff and members of the Phase I consulting firm Scott Wilson, Kirkpatrick and Partners (SWKP) visited New Delhi in November 1971 to discuss the framework of the second-phase study and the selection of projects to be observed. The Ministry of Shipping and Transport and several state public works departments made available five to six engineers for the study team, which was headed by an SWKP senior engineer. This group received some initial training, but with so little previous research as a guide, many of the standardized definitions and measurement procedures had to be worked out in the field. 1/ After a short visit to road construction projects in several states arranged by the Ministry of Shipping and Transport, observations began at what eventually become 16 road projects heavily favoring labor in construction. Since none of these projects made extensive use of equipment, the team also observed two other sites where earthfill dams and irrigation channels were being constructed with both equipment-based and labor-based methods.

3.10 By mid 1972, when field observations in India were nearly completed, a second engineer assigned by SWKP to the study team began designing similar field studies in Indonesia, which continued through December 1972. While the projects observed in India were mainly labor-intensive, those in Indonesia included irrigation works in Central and West Java involving different combinations of machines and manpower. Existing records of a highway project in Nepal were also analyzed. However, because a good deal more information on equipment productivities was already available, the primary data collection focused on labor-intensive (and, later, intermediate) methods.

1/ These procedures, refined in the course of subsequent field-work and discussions with the Technology and Employment Branch of the ILO World Employment Programme, were later set out in a joint Bank/ILO field manual. "A Field Manual for the Collection of Productivity Data from Civil Construction Projects" (Study of the Substitution of Labor and Equipment Technical Memorandum No. 8, July 1975) describes the system for productivity data collection adopted by both agencies.

3.11 Accurate data on labor productivity, factor costs, and environmental parameters associated with a quite detailed disaggregation of construction activities made it possible to pinpoint the sources of divergence among the production relations estimated in Phase I. The Phase II observations in India and Indonesia lent quantitative support to what had earlier been mostly supposition. Along with physical parameters such as climate, soils, and terrain which had seldom been identified in detail, the organization, management, and supervision of the job site were found to be critical to the efficient execution of civil construction projects. Better supervision was associated with labor productivities from 33 to 97% higher in labor-intensive operations. Increases in labor productivity of 24 to 69% were further observed when laborers were given incentive payments for piecework rather than a fixed daily wage.

3.12 Besides work organization, the nutrition and health status of laborers had also been hypothesized in the Phase I conclusions to exert a major influence on labor productivity by affecting physical capacity and endurance. A survey of over 500 construction workers in Indonesia was consequently launched, whose ultimate aim was to identify and assess the mechanisms available for nutrition intervention. Survey findings revealed a high prevalence of anemia and hookworms and severe nutritional deficiencies among the workers examined. 1/ A simple test of physical endurance showed a significant correlation between the severity of the anemia and capacity for arduous physical labor. This suggested that a sizeable labor productivity effect, in addition to the broader public health benefits, could result from increasing the iron intake of affected workers.

1/ D. Karyadi and S. Basta, "Nutrition and Health of Indonesian Construction Workers: Endurance and Anemia," Bank Staff Working Paper No. 152, April 1973.

3.13 A follow-up study with an iron intervention program was accordingly initiated on a sample of Indonesian plantation workers, chosen because their relative stability of employment permitted measurement over time of the effects of increased iron intake on labor productivity. 1/ Within eight weeks the productivity of workers receiving iron supplements had increased by up to 25% relative to control groups given an inert placebo, at a cost per worker of about 50 cents a year. Even as they answered some questions, these results raised others. For what other groups of workers and environments would improvements of this sort be obtained? Why was caloric intake not correlated with work potential and output while anemia was? Later investigations in India and Kenya would be undertaken to help throw light on these questions.

3.14 With these social, physical, and managerial parameters affecting factor productivity in ways which, if not fully known, had at least become less mysterious, a set of economically feasible methods of accomplishing a given construction task could be drawn up. For the "base case" of a typical excavation/loading/hauling/unloading/spreading (ELHUS) task, for example, the resources required for 15 different methods of moving a given quantity of earth were considered. Not all of these methods, however, would be efficient, in the sense of minimizing costs. A linear programming model was thus developed by the Bank study team, and its input coefficients estimated with assistance from DPS. The model was designed to determine the choice of optimal construction technology under prevailing constraints of resource availability and time for completion of specific tasks. 2/

1/ S. Basta and A. Churchill, "Iron Deficiency Anemia and the Productivity of Adult Males in Indonesia," Bank Staff Working Paper No. 175, April 1974. Like the earlier survey, this intervention study was financed from Research Committee authorizations to the Labor Substitution study.

2/ Results are reported in "Study of Substitution of Labor and Equipment in Civil Construction: Phase II Final Report," Bank Staff Working Paper No. 172, January 1974, especially the Main Report (Volume 1). Other volumes of the Phase II report deal with the collection and analysis of productivity data and with field procedures for data collection.

In the example cited earlier, five of the 15 methods were economically efficient, the others being inferior in the sense that they would involve both higher labor and equipment costs for the same level of output.

3.15 As Phase II neared completion in the summer of 1973, pessimistic conclusions had been reached and discussed in a seminar with the Executive Directors about the competitiveness of traditional labor-intensive techniques. Even with wages as low as $.50 per day and propitious environmental conditions, it did not pay to use traditional labor-intensive methods because of their neglect of basic principles of force and motion, as well as their emphasis on employment creation rather than efficiency. 1/ "Headbasket" technologies, as they had come to be called, were two to three times costlier in the ELHUS tasks (which make up 60 to 80% of the direct costs of construction) than, for example, methods utilizing a small bulldozer. Nor did observed attempts to combine traditional labor-intensive with modern capital-intensive methods, as in hand-loading of trucks, yield anything other than an inefficient use of both.

3.16 This did not necessarily imply a bleak outlook for greater use of labor in construction. With very few exceptions, methods in use in the projects observed during Phase II were at the extreme labor-intensive or capital-intensive ends of the spectrum. There had been little opportunity to identify promising "intermediate" technologies or observe them in action. In the analytical model, technologies of this kind had to be synthesized from elements of available data and judgment. Sensitivity tests had shown that, if labor productivities could be increased by a factor of at least three, intermediate or improved labor-based methods would be economically competitive at market or shadow wages of 40 to 50 cents per day, roughly the level then prevailing in countries such as India and Indonesia.

3.17 Bringing about such productivity increases would require improvements in organization and management at the program and site levels, improved tools and simple machinery for use by casual labor, and attention to the health and

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1/ As discussed in the next section, these conclusions were based in part on equipment productivities later agreed to be over-optimistic for developing country conditions.

nutrition status of the labor force. Organization and management problems were also seen as greatly intensified by shortages of labor at different times and places. Labor scarcities during planting and harvesting showed that, even in the most labor-abundant economies, wage premia would have to be paid to attract sufficient numbers of labor and stave off delays in completion of projects. 1/

3.18 Another set of organizational problems concerned the efficiency of the entire construction process and the sequencing of tasks. Observations of selected project tasks during a brief period of time, such as those undertaken in India and Indonesia during Phase II, could only hint at the gains to be had from better integration of the operation as a whole and improvements in project management. For these gains to be observable, the construction period had to be monitored from beginning to end. While doing so there would be opportunities to develop and demonstrate modified labor-based techniques, and to further investigate labor supply conditions and the impact of improvements in nutrition and health. By mid-1973 these elements had coalesced into a program for an expanded third phase of work, in which participation by bilateral and multilateral aid agencies and further collaboration with local governmental agencies were being sought.

C. Conditions for Efficient Use of Labor-Intensive Methods: Demonstration and Further Research

3.19 The final test of success for an innovative construction technology is its adoption by local planners, engineers, and contractors. In discussions of the study's future work program there were no illusions that adoption of improved labor-based methods of construction could be accomplished by reports, seminars, and conferences alone. Contractors, apprehensive about the high organization and management costs of such schemes and the risk surrounding what to them were untried methods, had

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1/ Largely for this reason, it was concluded that application of a single shadow wage rate for project evaluation, when alternative employment prospects fluctuate wildly with season and location, made little sense. Even in India, shadow and market wages were probably about equal for many months of the year.

frequently been hesitant. Since many labor-intensive programs had indeed led to higher costs, unanticipated delays, and other management problems, their reluctance was not difficult to explain.

3.20 In the circumstances, controlled experiments with different blends of labor and equipment and their demonstration under project conditions offered the most rapid and (if successful) persuasive means of promoting acceptance. A series of experimental studies with new tools, equipment, and work organization was begun in India and Indonesia in September 1973. Three senior engineers from SWKP, constituting a central team, were to spend about six months in each country conducting exploratory studies and training counterpart teams. Experiments and subsequent demonstration projects over one to two years would then be carried out by the counterpart teams, with periodic supervision from the central team and short term expert assistance as necessary.

3.21 The cost of such an expanded program, initially estimated at $825,000 per country, would require far greater resources than the approximately $280,000 and three staff-years the project had expended in the first two phases. Six months earlier, in March 1973, Mr. McNamara had inquired of the study sponsors what steps could be taken to speed up the availability of operational results. In response, the accelerated Phase III program was drawn up, involving a broader range of experiments in several countries at once. To carry out this program, priorities among Bank research staff were reallocated and participation sought from bilateral aid agencies. Including expected disbursements through FY78, bilateral contributions to the study have totalled $1.8 million, of which about 60% has come from the US, Germany, and Britain and the remainder from Japan, Canada, Norway, Sweden, Denmark and Finland. 1/ Donor

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1/ Including additional Bank research funds of about $575,000, the total cost of work undertaken from FY74 onward is thus close to $2.4 million. When completed, the study will have disbursed about $2.7 million ($850,000 from Bank research funds) in direct expenditure, or roughly $3.6 million if local expenditure, donor-financed technical assistance, and Bank overhead are included. The project will also have absorbed a bit more than nine years of professional and assistant staff time.

governments have had a voice in the evolution of the study through a Steering Committee, which has met in Washington (April 1975) and Paris (May 1976) to review progress and consider suitable means of disseminating results.

3.22 Experiments with modified equipment and work procedures were initially conducted in India from October 1973 to April 1974 and in Indonesia for a slightly longer period beginning in September 1974; the experiments were subsequently extended in later phases of the study. Some experiments concerned comparisons of the total cost of two or more methods of accomplishing a given task, such as stone crushing or earth haulage. Others dealt more directly with improving the design and testing the performance of wheelbarrows, light wagons, and similar equipment and tools. A few concentrated on specific means of improving labor organization, though all experiments pursued this objective to some degree.

3.23 In the cost comparisons for earth haulage, nine different technologies were given field trials at various lengths of haul. At unskilled labor wage rates of under $0.75 per day, several intermediate technologies, particularly wheelbarrows and animal-drawn carts, proved considerably more economical than traditional labor-intensive methods. Some were also competitive with bulldozers and other heavy equipment. More generally, improved labor-intensive technologies were found to be economical for unskilled labor wage rates of $1.00 per day or less, with equipment-based methods more cost-effective for most activities at wages over $1.50 per day. Traditional methods were uneconomical under any assumptions about wages.

3.24 Knowledge of the influence on productivity of the wheelbarrows used in such trials has been provided in other experiments. 1/ At one site in northern India, two haul routes (one level, the other having a 4% grade) were laid out, and locally employed laborers hired to move a stockpile of loose earth from

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1/ "Comparison of Alternative Design Wheelbarrows for Haulage in Civil Construction Tasks," Study of the Substitution of Labor and Equipment Technical Memorandum No. 1, January 1975.

one end to the other using wheelbarrows of various designs. On the basis of six weeks of trials it was concluded that productivity can indeed be increased if a number of low cost improvements were made in the design and quality of wheelbarrows. The Indian Roads Congress is currently preparing standard specifications for wheelbarrows based on these designs, to be issued by the Indian Institute of Standards.

3.25 Most of these comparisons were based on the direct costs of employing labor and capital in varying proportions, and did not explicitly consider the gains from making organization and supervision of the task more effective. Among several experiments concerned primarily with work organization, one conducted in India in collaboration with the Border Roads Organization yielded estimates of the improvement in labor productivity possible from organizing tasks more efficiently. 1/ The experiments were carried out along a mountain road in northern India, where at intervals wider sections permitting vehicles to pass were being cut into the hillside. Work gangs of 20 to 25 men under one supervisor were assigned this task, consisting of excavation and removal of soil and rock to the downhill side of the road. Several inefficiencies were noted in prevailing construction methods. Since excavators and haulers worked simultaneously on the same stretch of road, haulers had to avoid being struck by the material being excavated above them. The tools in use were generally of poor quality and badly maintained, and workers were paid on a daily wage basis.

3.26 During experimentation, reorganized work procedures were introduced consisting mainly of excavation in a series of shelves or terraces, with excavators and haulers employed on different sections to avoid interfering with each other. Wheelbarrows and heavier crowbars were put into use, and all tools were regularly maintained. Payment for work performed, rather than on a flat daily basis, was also instituted. As a result

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1/ See "Increasing Output of Manual Excavation by Work Reorganization: An Example of Passing Place Construction on a Mountain Road," Study of the Substitution of Labor and Equipment Technical Memorandum No. 2, January 1975.

of these changes, labor productivity improved 155% in soil excavation and 250% where soft rock was the predominant material. Since the Phase II results had suggested that incentive methods of payment alone may increase labor productivity in this type of work by 50 to 75%, it was concluded that with a simple reorganization and scheduling of tasks, work output could be at least doubled.

3.27 As in other fields, experimental results, however impressive, could not be expected to be reproduced instantaneously on a routine basis. Application in an actual project setting was required for a reasonable degree of confidence to be reached. As experimental trials in India were nearing completion, the central study team and Bank staff agreed with the Director General of Border Roads that demonstrations of efficient labor-based techniques should begin on a 15-km length of a road excavation and surfacing project to be undertaken by Border Roads during the 1974 construction season. Participating in this demonstration would be a Border Roads Work Study Unit, guided by the central study team, which would serve as a catalyst in spreading knowledge of improved techniques throughout the agency itself. In the original Phase III work program, similar arrangements were envisaged for at least two other demonstration sites in India and Indonesia.

3.28 The Border Roads Project within which demonstrations took place involved formation cutting and pavement construction with heavy reliance on equipment. The daily paid labor, recruited mainly from surrounding localities, was employed in collecting and breaking stones, feeding the stone crushers, loading trucks, and laying pavement. In some activities equipment was responsible for most or all of the output. Demonstrations consequently entailed substitution of more labor-intensive techniques, such as manual instead of bulldozer excavation along hillsides. In other cases it appeared that labor and equipment were being used together inefficiently. Here the feasibility of reorganized work procedures was demonstrated (in part to employ labor during delays in mobilizing the necessary equipment), and improved tools introduced to increase equipment output. Where labor was the main factor of production, the emphasis was on increasing labor productivity. Besides the full-scale intervention studies, experiments with improved equipment and reorganized work procedures

were continued. At the peak construction period in late summer 1974, about 650 laborers were involved in various facets of the demonstration project.

3.29 All told, this effort could be judged a partial success. Measurable improvements in the productivity of labor-intensive tasks were realized by the reorganization of work procedures and the use of modified or new simple equipment. Significant increases in output were achieved, though not as high as might have been expected from the experimental results. As a result of the project, the Border Roads Organization gave further attention to the importance of improvements in equipment and tools and to the sequencing of work tasks. 1/

3.30 To further test the proposition that variations in work performance may also be traced to differing work capacities of the laborers, a survey of the health and nutrition status of a population of road construction workers in northern Uttar Pradesh, India, was carried out in early 1974 by the All-India Institute of Medical Sciences in liaison with the Border Roads Organization and the study team. 2/ As with the earlier study in Indonesia, the purpose was to examine the relation between a number of nutritional and health deficiencies and work output. An added dimension in this instance, however, that the 198 laborers selected for the study were divided nearly evenly between those recruited locally and migratory

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1/ Another road project in India had more limited success as a demonstration, though a number of experimental studies were conducted. As the Border Roads demonstration project neared completion in late 1974, a second one was initiated in conjunction with new road construction in Madhya Pradesh. However, a cutback in government funds and shortages of resources (particularly labor) at the site combined in February 1975 to force abandonment of the project as a demonstration. Experimental studies continued until May 1975 to take advantage of opportunities to test several intermediate modes of haulage, quarrying, and excavating.

2/ "Effect of Health and Nutrition Status of Road Construction Workers in Northern India on Productivity," Study of the Substitution of Labor and Equipment Technical Memorandum No. 4, January 1975.

workers brought from the state of Bihar for road construction. Work output was measured as the number of kilograms of sand per hour each worker could carry in a sack between the river bank, where the sack was filled, and the side of the road.

3.31 As in Indonesia, iron deficiency anemia was found for the local laborers to be correlated with work output. However, chiefly because the local diet was rich in iron and hookworm loads were much lower, the association was not nearly as strong, and did not hold for the entire sample. Anemia, in fact, was far more common in the Bihar laborers, but their work output was also higher, probably because more of them were professional road builders who tended to be more efficient than the less experienced local labor. Caloric intake once again did not correlate with output, though the accuracy of respondents' recall of food consumed was difficult to assess. No significant associations emerged between work output and any of the other health and nutrition variables.

3.32 Arrangements had also been concluded in February 1975 with the Central Water Commission to apply labor-based techniques to canal construction. At a site in Uttar Pradesh, a 60-meter length of major canal was reserved for the exclusive use of the study. Observations of the ongoing work and experiments with improved hardware and earthworks construction were undertaken until mid-June 1975, when the monsoons caused the work to be stopped, and resumed in late summer for another three months.

3.33 In Indonesia, difficulties with the selection of projects was the major factor hindering completion of the planned demonstrations. Because the project originally chosen was slow to get under way, an alternative site had to be found. Experimental studies concentrating mainly on earthworks tasks and efficient labor-intensive methods of excavation, haulage, and compaction began in November 1974 on a 200-meter length of irrigation canal which had been reserved for the study's use. As one example of such studies, aerial ropeways were tested for the haulage of materials down a slope. The labor inputs required for the gravity-assisted ropeway were only about half those of manual haulage methods. Similar

results were obtained in India for uphill ropeways which eliminated the necessity of a laborer having to overcome his own body weight in addition to the weight being carried. 1/

3.34 Cost comparisons of this type did not explicitly consider what would happen to the supply price and availability of resources such as labor when construction activities were undertaken on a large scale. To generate information on the supply function for construction labor, a study of sites in Madhya Pradesh and Uttar Pradesh was initiated in February 1975, at the height of the construction season when, by all accounts, labor shortages were frequently severe. Considerable variation in wage rates was revealed across regions and seasons of the year. 2/ Many of the observed patterns appeared to be consistent with an s-shaped supply curve, flat as local labor is hired, turning up with the growing scarcity of local labor as project size increases, then flatter again as a fairly elastic supply of migratory labor from other regions is drawn upon.

3.35 The question arises whether these results apply more broadly than to the specific projects and circumstances examined, as some attendees of the first Steering Committee meeting in April 1975 pointed out. Subsequent observations at the canal demonstration site in Uttar Pradesh, in fact, revealed a dearth of imported laborers, conceivably because the previous year's crop in their home districts had been exceptionally good. Whatever the reasons, the results of this pilot study were of value in identifying the major determinants of labor availability in the localities surveyed and in establishing priorities for further research.

1/ See "Haulage Using Aerial Ropeways," Study of the Substitution of Labor and Equipment Technical Memorandum No. 22, June 1976.

2/ See S. Bose, "Some Aspects of Unskilled Labor Markets for Civil Construction in India: Observations Based on Field Investigation," World Bank Staff Working Paper No. 223, November 1975. Because of political sensitivities and to some extent language problems, no labor market study was carried out in Indonesia.

3.36 On the whole, the Phase III demonstrations and research partially dispelled the atmosphere of doubt about the efficiency of improved labor-based methods that followed publication of the Phase II findings. For certain construction tasks, the increases in labor productivity realized from improvements in basic tools, worker incentives, and site management made labor-based methods competitive with equipment at base wages up to about US$1.50 per day in 1976 prices. With wage incentives and better quality shovels, for example, labor productivity in excavation of hard soils was observed to rise 150%. Further increases of 50 to 100% could be achieved by using animal-drawn ploughs to break up the soil beforehand.

3.37 Aside from these field results, two other factors contributed to explanations of why the Phase III demonstrations showed labor-based methods to be more attractive than had been concluded in Phase II. One was the fact that, as pointed out by many reviewers of the Phase II final report, the equipment productivities taken from performance handbooks and other sources were much too high for the project conditions prevailing in most developing countries. This was corroborated by the Phase III field experiments. The other was that since 1973 equipment and fuel prices had increased much more rapidly than wages, further enhancing the competitiveness of labor-based methods.

3.38 Competitiveness at the task level, however, though a necessary condition for the successful introduction of appropriate labor-based techniques, is almost never sufficient by itself. The ultimate value of such techniques often depends on the organization and management capabilities of contractors and public works authorities. Clearly, the need for proper management is not confined to labor-intensive construction. As revealed in Phase III, however, there are unique problems associated with the recruitment, supervision, and motivation of labor. In countries lacking a tradition of labor-intensive construction, this special set of skills may be virtually absent. Supervisors must coordinate and balance a variety of activities. They may well need to establish and administer incentive methods of payment. Basic design standards need to be established by the construction authority, which would also be responsible for ensuring a regular flow of financing to the project. These issues have been taken up in a series of program applications begun in the latter stages of Phase III and, in parallel with dissemination of results within the Bank and outside, continuing to the present.

D. Application and Dissemination

3.39 By mid-1975, with growing evidence on the competitiveness of labor-based methods under pilot site conditions, attention had shifted fully toward the second principal objective: the design and execution of multi-site programs. Sufficient casual labor, a few trained supervisors, and some picks and shovels could always be found for pilot projects, if only because the resources are often supplied by external donors. On a national scale, however, shortages may quickly become acute. Mobilization of such resources in a national program of labor-intensive works, whose planned expansion might eventually make it the country's largest single employer, requires close attention to issues of program organization, staffing, and training. In collaboration with the International Labour Office (ILO) and the British Overseas Development Ministry, government agencies in Honduras and Kenya agreed to move into a phase of study application in construction programs. Dissemination of study results within the Bank and outside, as well as participation in Bank economic and project analysis, is occurring contemporaneously.

Program Design and Implementation: Honduras and Kenya

3.40 In February 1975 a member of the Bank research team was invited by the Central American Bank for Economic Integration (CABEI) to give a seminar in Tegucigalpa, Honduras on the findings of the study. Following the seminar, the Honduran Minister of Communications, Public Works, and Transport expressed interest in having the Bank study team contribute to a nationwide program of construction of feeder roads, financed by the sixth Bank highway loan and a USAID loan for agricultural development. As a low wage country with pockets of serious unemployment, Honduras seemed quite suitable for extending the study outside Asia.

3.41 To support such activities, a two-year, $400,000 program of technical assistance was established, financed in equal parts by the Government of Honduras (out of the Bank loan) and the study budget. Two engineers from the consulting firm GITEC (F. R. Germany) have been working since April 1976 with three Honduran engineers and one economist in a Feeder

Roads Unit to provide guidance to the Transport Ministry on practical aspects of planning and organizing labor-based construction. The construction program itself is oriented toward maximum use of labor-based methods. Projects have been kept small, so that each site could rely upon local laborers. Training programs for supervisory staff have been initiated to provide the supervisors required over the program's five to ten year horizon. Detailed monitoring programs evaluate and improve upon the technologies used.

3.42 So far about 150 km of road have been built. Since this initial phase of work was expected to require a considerable amount of management input, overhead expenses have amounted to almost 20% of the total cost. As is also suggested by the Kenya example, overheads of this sort may be unavoidable until the operations reach their planned levels of expansion and counterpart staff replace the expatriate advisers. In other respects the program appears to be dealing successfully with problems which frequently crop up in the execution of labor-based works. Labor availability has presented no major difficulties, and there is evidence that sufficient supervisory staff can be trained as the program expands.

3.43 After an initial breaking-in period, the program also appears to have achieved a large measure of local acceptance. Completion in early 1977 of a road built with locally recruited labor and under Honduran supervision (the Marilica-La Laguna road) was a pragmatic demonstration to construction officials of the promise of labor-based techniques. Local leaders, as well, displayed a growing interest in feeder roads for their communities. By July 1977 requests for road improvements totalling 700 km had been channeled to the Feeder Roads Unit. As a consequence, the government's commitment has now become more substantial. The FY78 allocation by the national planning agency is about $500,000, double the FY77 budget. Ministry officials, with advice from the Feeder Roads Unit, are formulating procedures for screening the community requests, ranking construction priorities, and coordinating the financing of the expanded program. They also intend to proceed with integration of the Feeder Roads Unit into a Department of Labor-Based Works within the Ministry, which would offer better career opportunities to the Feeder Roads Unit staff.

3.44 Involvement in Kenya also grew out of the mechanisms for disseminating results of the study, in this instance on the occasion of the first Steering Committee meeting (April 1975), which senior officials of the Kenya Ministry of Works attended as observers. Strong interest was expressed in applying the lessons of labor-based construction in the Rural Access Roads Program (RARP), a major program of feeder road construction to which Bank and IDA assistance, approved in 1976, has contributed $8 million. 1/ The Steering Committee lent its full support, to the extent of suggesting that a portion of the planned experiments in India and Indonesia could be curtailed to accommodate work in Kenya.

3.45 Work in Kenya by the study team has been carried out in collaboration with the ILO, which since October 1974 had been undertaking a study in Kenya to collect productivity data for existing methods of road construction. 2/ Since

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1/ The Appraisal Report (No. 1039b-KE, June 3, 1976) compares the costs of labor-intensive methods with those of comparable equipment-intensive methods to examine the financial and economic case for the former. Technical Memoranda issued under the auspices of the study were relied upon for productivity and cost data for certain types of construction. Labor-intensive construction was the preferred alternative from both a financial and an economic standpoint. In financial terms, labor-based methods were 19% less expensive than methods using equipment. In the economic analysis it was found that while construction with equipment is more rapid, the earlier realization of program benefits is more than offset by higher construction and maintenance costs, giving an economic return for equipment-based methods of 8.5% compared with 12.5% for labor-based methods.

2/ Financing for this ILO study had been obtained from the Norwegian Agency for International Development (NORAD).

publication of the Bank Phase I report, Bank and ILO staff have maintained awareness of each other's research on the choice of technology. Technical Memoranda from the Bank study have been sent to the ILO for comment, and, as mentioned earlier, one was issued as a joint publication. ILO teams had undertaken studies in Iran, Nepal, the Philippines, and Thailand on the social and economic impacts of road investments using applied social cost-benefit analysis. A common endeavor with the more technically oriented Bank study group therefore held significant mutual advantages.

3.46 Such an opportunity was all the more attractive as the RARP has provided the most important test so far of the feasibility of large-scale labor-based works in an African country with no previous experience in such methods. Initiated in 1974, the RARP involves the construction of 15,000 km of rural roads over an eight-year period in districts covering nearly 80% of Kenya's population. In accordance with government policy, labor is to be used to the maximum feasible extent. To manage the laborers effectively and improve work organization, a series of Construction Units is being established, each employing roughly 250 to 300 workers and responsible for about 45 km of road construction annually.

3.47 To advise on appropriate planning, organization, and control systems for labor-based construction, a Technology Unit has been established within the Ministry of Works. Similar in its essentials to the Honduras Feeder Roads Unit, the Technology Unit is managed by the Bank with the assistance of the ILO, which, through a UNDP grant, contributes technical assistance staff to the Rural Access Roads Program. At present the Technology Unit consists of three full-time expatriate advisers financed from a $400,000 grant from the study budget. 1/ The Unit's operations have been supplemented, from grants by the British Government, with the shorter-term services of a specialist who investigated methods of promoting local manufacture of tools and equipment, and a labor economist who is currently examining various aspects of local labor supply.

1/ The fourth adviser, an organization and management expert, is being financed by a technical assistance grant of the (UK) Overseas Development Ministry.

3.48 Contact has also been maintained with studies presently under way in Kenya whose results bear on issues of concern to the RARP, such as an investigation of road design standards. Following the Bank study of highway design standards completed in Kenya in 1974, the (UK) Transport and Road Research Laboratory, which had carried out the study, was retained by the Ministry of Works in an advisory role. In about two years' time the extended program of research conducted by TRRL should provide additional guidance on the tradeoffs among different design and compaction standards and substitution of locally available materials for those requiring longer haul distances.

3.49 Also included in the scope of activities of the RARP was an assessment of the nutritional and health status of workers involved in construction projects. A successor to earlier studies in Indonesia and India was launched in the two districts (one in the highlands, the other near the coast) in which RARP Construction Units had been established in 1975. 1/ The highland population was found to suffer from caloric undernutrition, but had few parasitic diseases and little anemia. The coastal group, on the other hand, showed evidence of chronic anemia and a high incidence of parasitic infections, as had earlier been observed in Indonesia. Preliminary results revealed that poor caloric status (and, for the coastal population, anemia) did in fact correlate with reduced work output in activities such as earth haulage.

3.50 Interventions lasting three to four weeks (a period too short for major changes but, in the event, long enough to detect trends) were conducted on both populations. The provision of a fortified drink had a positive impact on nutritional status compared with the control group which had received the same drink calorie-free, although no effect on worker productivity was discernible. For the lowland workers given iron pills, a small increase in productivity was observed with improvements in health status. Bank staff and consultants are presently reviewing a multi-year program of experimentation with various practical interventions, many of which would again be conducted within the context of the Rural Access Roads Program.

1/ Financing was provided under another Bank research project, "Effect of Health and Nutrition Standards on Worker Productivity" (No. 671-15), which also contributed to earlier work in Indonesia and India and to a parallel study in Kenya of the nutritional and economic implications of roundworm infections.

3.51 To a much greater extent than in Honduras, the RARP has so far required considerable management input. Although the direct costs of the roads constructed to date have been quite competitive, overheads and start-up costs, including technical assistance and training, had more than doubled the cost per kilometer as of early 1977. This proportion is expected to diminish as the intensive efforts toward a major expansion in the pace of work begin to bear fruit. A fair amount of progress has already been made in identifying appropriate management and administrative systems, design standards, and equipment to support the planned expansion of operations. A number of supervisors have also been selected and trained from the ranks of the laborers. As a result of initial work and suggestions made by the Technology Unit during 1976-1977, the Ministry of Works has introduced quality considerations, based on specifications laid down by the Technology Unit, in the procurement of hand tools. Further work is planned over the coming year to develop procedures for assisting local hand tool manufacturers, expand the use of the most appropriate practices, and make recommendations on standards of construction and maintenance.

Country-Related Implementation

3.52 While the Honduras and Kenya programs have been under way, the study staff has furnished guidance on several other occasions in which, for Bank projects or domestic construction programs, the search for more appropriate technologies would suggest a heavier reliance on labor.

3.53 At the request of the Western Africa Projects Department, a review has been conducted on the prospects for greater use of labor-based methods in the Sategui-Deressia Irrigation Project in Chad. Since bids received from contractors were often well above the appraisal estimates, the possibility of using less costly techniques was explored. In combination with equipment, labor-based methods under force account were shown in a 300-hectare pilot irrigation scheme to be technically and economically promising. As a consequence, a significantly enhanced role for labor was envisioned in the supplementary IDA credit approved for this project in August 1976.

3.54 Construction plans for 1976-77 called for earthmoving to be done principally by machine. During the 1976 construction season, however, it had become apparent that the organization of casual labor operations needed improvement. In response to the Region's request, 14 weeks of technical assistance were allocated from the study budget to assist in planning the work to be carried out by casual labor. An expatriate engineer, to be provided by SWKP, would also organize and supervise the construction of a demonstration length of drainage canal employing about 1,000 workers, as additional guidance to the project consulting engineers on better utilization of labor. At a meeting in November 1976 attended by Bank project and research staff, consulting engineers, and representatives of the Chad Office du Mise en Valeur du Sategui-Deressia, the government supported this proposal and agreed to assign adequate labor and supervisors to the site.

3.55 Lessons from the demonstration project, completed in July 1977, are presently being consolidated in a report by the SWKP adviser. Because equipment was immobilized for lack of diesel fuel, a direct comparison between the labor-based demonstration unit and one using full equipment was unfortunately not possible. The consulting engineers on the project have nonetheless become more aware of efficient methods of organizing and managing laborers. Labor use will be continued during the 1977-78 dry season, to improve on the experimental techniques and provide more information on cost comparisons of equipment-based and labor-based methods. On a recent supervision visit the study staff also reviewed the prospects for introducing labor-based methods of construction in highways, education, and urbanization projects currently under discussion with the government.

3.56 Guidance of a somewhat different sort was provided in a November 1976 economic mission to the Dominican Republic. Financed from the study funds, a member of the research team and the chief adviser to the Honduras Feeder Roads Unit joined this mission to assess the feasibility of instituting a program of labor-based civil construction, should the government express a willingness to support such a program. With a large and growing rural population and substantial unemployment, labor availability was not found to be a limiting factor, as for some operations it could be in Chad. Daily minimum wages of $1.50 to $2, however, had contributed to the relatively high average costs of an earlier USAID-financed project to introduce labor-intensive methods in feeder road construction.

3.57 In the meantime, an extensive program of rural infrastructure improvements had been carried out almost wholly with machines. Government officials felt that the benefits of using labor in such operations could be more readily perceived if the procedures were demonstrated in an actual construction setting. As a consequence, a demonstration project, in which UNDP and USAID have also expressed interest, has been designed for review by government agencies and the Latin America and Caribbean Region.

3.58 Study assistance in the case of a feeder roads project in Benin further elaborated upon many of the principles applied in Honduras and Kenya. 1/ During appraisal about 700 km of rural roads in all parts of the country were recommended for upgrading using equipment-based methods. At the request of the Bank's Regional Mission in Western Africa, a member of the study staff and the head of the (Kenya) Technology Unit visited Benin in November 1976 to help introduce construction formulas more suited to local conditions and not too costly for expansion to the more than 6,000 km of low-class roads in need of rehabilitation. Labor-based methods were found to be more appropriate in the densely populated south, while equipment-based methods were suggested for the north where population was sparse and the terrain difficult.

3.59 As low-class roads had been the responsibility of local authorities having few resources to improve them, it was agreed that a Feeder Roads Division would be established within the Ministry of Works. This unit during the first two or three years of expatriate staffing would, among other things, begin to develop local capabilities for undertaking periodic maintenance. Construction would be performed by "brigades," fully labor-based in the south and with a sizeable labor component (except for the north) in other areas. It was also agreed that local and expatriate staff could spend one or two months with the Technology Unit in Kenya to gain additional practical experience.

1/ IDA Credit No. 717-BEN, approved by the Board of Executive Directors in May 1977.

3.60 The large-scale implementation of labor-intensive works may be inefficient in countries like the Philippines, unless the development of skills in organizing and managing such operations is well planned in advance. To determine the feasibility of introducing greater labor intensity in the construction and maintenance of low-class roads and irrigation works, a study-financed mission consisting of a Bank expert and the chief adviser to the Honduras Feeder Roads Unit visited the Philippines in October 1977. With daily wages below $1.50 and a large demand for rural infrastructure, wide scope was found for labor-based technologies. Indeed, a Presidential Decree promulgated in June 1976 stated that labor-based methods should be used whenever the structural integrity of the project is not impaired, use of labor does not harm agricultural production, and financial costs are not more than 10% above methods using equipment.

3.61 The mission concluded that management and organization skills could eventually be brought up to the levels required for carrying out large-scale programs. To accelerate this process the formation of a small construction and maintenance unit within the Department of Public Highways was encouraged. In addition to the construction of 300 km of roads over a three-year period, this unit would coordinate measures to promote the local contracting industry and local manufacture of tools, and would give attention to means of improving the health ahd nutrition status of casual laborers.

3.62 Study team members have been a focal point for operational advice in a number of other instances, including the Second Highways project in Lesotho in which technical assistance in constituting a Labor-Intensive Works Unit was provided by SWKP. In Malawi, study staff and consultants participated in the establishment of a pilot program in road improvements and maintenance, also in conjunction with a Second Highways Project. Similarly, a seminar on labor-intensive methods given by a study staff member in Botswana (February 1977) furnished an occasion to discuss the feasibility of labor-based methods in the construction and maintenance of district roads.

Synthesis and Dissemination of Study Findings

3.63 Dissemination of the results of a research project typically take several forms, ranging from informal contact with potential users to seminars and a published synthesis of findings. This is especially pertinent in a study which has made over 7,000 observations of the productivity of traditional and experimental labor-intensive methods at over 40 construction sites in Africa, Asia, and Latin America, and addresses a number of quite distinct audiences. Public works departments in developing countries are most likely to be persuaded by demonstrations which, for success, must be carefully tailored to local needs and resources. Indeed, no single "product," sold in quantity to all customers, could emerge from a study such as this. Bank research staff have accordingly given most attention to efforts which hold the promise of leading to specific projects, or project components, applying research results.

3.64 This is not to suggest that the more familiar means of disseminating results have not been utilized. In addition to liaison with the ILO (a relationship which has progressed from detachment to a merging of ideas and sharing of a common work program), interim reports have been presented to USAID, UNDP, the Canadian International Development Agency (CIDA), and, most recently, to the Indian Roads Congress (December 1976). Mainly because of geographical proximity, the study team is in constant, although informal, contact with USAID. A series of presentations in each country whose government has contributed to the study is planned for early 1978, ideally to include representatives of consulting and contracting firms as well as government officials. The experience does suggest, however, that in a study of this complexity and with limited Bank supervisory staff, not all means of dissemination can be pursued with equal vigor, at least by the same individuals. A kind of division of labor, probably not well perceived when the study began, seems to have emerged. Bank staff have devoted more attention to the program applications described earlier and to discussions with Regional operational staff, while study consultants have been somewhat more prominent in the pages of professional journals.

3.65 The principal occasion for exposing Regional operating staff to the results of the study was a series of discussions on labor-intensive civil construction held in March 1977. As stated in the report of this seminar, the

main purpose was "to confront the Bank's research and its operational experience--which includes some major labor-intensive programs--with a view to reaching more of a consensus than had previously existed as to the circumstances in which labor-intensive techniques are appropriate and the ways in which problems and obstacles can be overcome or avoided." 1/ About 50 representatives of Regional projects and programs departments attended the three-day seminar. Several conclusions were drawn from these discussions, among them the need for some brief practical notes on how to avoid unnecessary bias against labor-based techniques in project design, specifications, and procurement. The Transportation Department has undertaken to produce such notes. Twenty-three countries, mainly in Africa, with rural wages below the breakeven level and with little modern experience in labor-based construction were also identified as ones in which the potential for a useful Bank contribution to promoting labor-based techniques should be especially considered.

3.66 Broadened by discussions of this kind and additional material from the ILO World Employment Programme, findings from the study are being summarized in two handbooks. The Site Planning and Management Handbook, intended as a reference volume for engineers charged with setting up and managing a labor-intensive construction site, is now being reviewed by Bank Regional staff, by the ILO, and by the field teams in Honduras and Kenya. The Program Planning and Management Handbook, for construction authorities responsible for large-scale public works programs, is scheduled to be issued in the fall of 1978.

Further Study of Program Issues

3.67 A number of other endeavors launched within or parallel to the study are helping to pull together various strands of the research and stimulate further research and development. Some of these are expected to carry on beyond formal completion of the study.

3.68 To present a profile of the requirements for planning and carrying out major labor-intensive programs, comparisons of total costs and time to completion are being prepared in collaboration with SWKP, the ILO, and the Kenya Technology Unit. The intention is to benefit from knowledge of when, in the past, too much time and too many resources have been devoted

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1/ "Labor-Intensive Construction Techniques: Report of a Bank Seminar, March 9-11, 1977," September 15, 1977, p. 1.

to certain planning and construction tasks. SWKP is also participating in a first effort to examine ways in which the economic costs of different bids may be compared, to help neutralize any bias toward equipment in competitive bidding procedures. Another investigation in Kenya, funded outside the study budget, has been testing the appropriateness of intermediate-sized vehicles for use on rural roads and the prospects for expanded local manufacture and distribution.

Concluding Remarks

3.69 The evolution of this research project aptly illustrates the point made in Chapter 1 that the lapse of time is often great before results are absorbed into the common body of understanding. It takes time for interim findings to be disseminated and understood, and still more time to appreciate how these findings modify the emphasis given to issues identified at the outset. Improvements in tools and equipment, contrary to some initial expectations, did not usually result in major increases in labor productivity of the kind brought about by, for example, reorganization of work procedures. Other issues not originally seen as important later became so. It is fair to say that difficulties of mobilizing labor for large-scale construction programs, even in low wage, labor-abundant economies, were not adequately foreseen when the study began but emerged only during field experimentation.

3.70 More broadly, the study's conclusions suggest patience and the long view, when considering how long it will take for programs of labor-based works to be mounted in more than a handful of the countries where conditions are favorable. Even in the most intensive efforts to operationalize results, there is a question how much momentum will be lost once the consultants depart and the programs shift to dependence on a steady flow of domestic financing and staff. Transformations of another sort, from force account to reliance on local contractors for an increasing share of construction and maintenance operations, also lie in the future. More research, it is true, will deepen understanding of many of these issues. Clearly the main body of results, however, has progressed to the point where the pace of further development can be scarcely more rapid than that of the projects and programs to which it lends support.

APPENDIX A

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Note: A fuller description of projects approved by the Research Committee (those with reference numbers in the 67- series) will be found in World Bank Research Program, Abstracts of Current Studies, October 1977. At the end of each section, the departments responsible for other ("non-RPO") projects are listed.

APPENDIX A

Brief Descriptions of Projects Active During FY77

I.B. Income Distribution

Short-Run and Long-Run Influences Upon Income Distribution

This study focuses on the effects of alternative development strategies on the size distribution of income within a country, using an economy-wide general equilibrium model of Korea. Results indicate that while the size distribution of income and its path over time are difficult to change by policy intervention, the relative position of various groups is sensitive to economic policy changes. Simulation exercises suggest that comprehensive policy packages, rather than piecemeal programs, are most effective in alleviating poverty. (Ref. No. 670-06)

Growth and Income Distribution in Brazil

This project assesses the direct and indirect impact of policy instruments on growth and income distribution in Brazil, using general equilibrium planning models. Two models have been developed: a multisectoral model in which the labor force is disaggregated by skills, and a more aggregative model focusing on fiscal-monetary variables. Both have been used to simulate recent historical trends in order to test alternative hypotheses about the causes of observed changes in the distribution of income. (Ref. No. 670-69)

Evaluation of Latin American Data on Income Distribution

A major limitation of empirical work on income distribution and the relationship between inequality, poverty, and development is the poor quality of the available information. This study is part of a broad program of work to improve the data base for the systematic study of distributional problems (see Ref. No. 670-85 and Ref. No. 671-08). The study will identify for each country in Latin America a recent data set suitable for the analysis of patterns of income distribution, and use these data to present a detailed picture of the various aspects of income distribution. (Ref. No. 670-83)

Growth, Employment, and Size Distribution of Income

Evidence from certain countries, notably the Republic of China (Taiwan), runs counter to the hypothesis that the size distribution of income appears to worsen as development proceeds. This study analyzes the relationship between economic growth, governmental policies and income distribution in Taiwan and attempts to isolate the factors responsible for observed changes in income inequality for the period 1964-72. (Ref. No. 670-84)

Urban Income Distribution in Latin America

This research project is part of the Bank's program of data-oriented research on income distribution (see Ref. Nos. 670-83 and 671-08) and involves the study of patterns of urban income distribution with special emphasis on the problems of identifying poverty groups. Through case studies of the cities of Bogotá, Medellín (Colombia) and Lima (Peru) the study will develop criteria for identifying such groups. The empirical results obtained when alternative criteria are used will also be analyzed. (Ref. No. 670-85)

Employment and Income Distribution in Malaysia

This study of the related problems of income distribution and employment in Malaysia has two components. The first examines the contributions to the extent and pattern of income inequality in Malaysia of such factors as rural-urban location, sector of employment, employment status, education and so on. The second is the construction of an input-output planning model in order to project the employment implications of growth and to examine feasible rates of employment restructuring. The data base developed in the course of this study is being expanded in order to construct a more advanced planning model for Malaysia which will show how income is distributed among socioeconomic groups. (Ref. No. 670-94)

Distributive Impact of Public Expenditures

Public expenditures are known to have a substantial impact on income distribution, but information as to the mechanisms at work is meager. Previous investigations have often been limited by their need to rely on statistics compiled for other purposes; their restrictive assumptions and the highly aggregated nature of their results have been major drawbacks.

This project will assess the impact of public expenditures on the distribution of income in Colombia and Malaysia. The study identifies major public expenditures allocable by specific households; classifies these expenditures by income distribution, ethnic group, and other factors; explores the determinants of household demand for certain government services; and compares results for the two countries. (Ref. No. 670-96)

Evaluation of Asian Data on Income Distribution

This study was designed to parallel the research project on the "Evaluation of Latin American Data on Income Distribution" (see Ref. No. 670-83) and is part of a work program aimed to improve the data base in this area. The basic research objective is to analyze patterns of income distribution in nine countries of the region: Republic of China (Taiwan), Hong Kong, India (for the States of Gujarat and Maharashtra only), Malaysia, Nepal, Philippines, Singapore, Sri Lanka, and Thailand. Particular attention will be paid to the nature of rural-urban differences in income distribution and the relationship between income and various labor force characteristics. (Ref. No. 671-08)

Income Distribution in Thailand

This study will identify the forces affecting the distribution of household income within a country by applying techniques of statistical inference and economic analysis to a nationwide survey conducted in the early 1970s of some 14,000 households in Thailand. Specifically, it explores the relationship between the earning power of individuals, labor force participation, and household income. The human capital earnings function is extended to incorporate the behavior of two important groups of non-wage earning labor force participants: the self employed and unpaid family workers. (Ref. No. 671-36)

Indirect Estimation of the Size Distribution of Income

Empirical research on income distribution generally lacks reliable estimates of the size distribution of income and often involves the use of large-scale income surveys which are very expensive. This study attempts to develop a more concise methodology for estimating the size distribution of income among various socioeconomic groups at different income

levels. Starting with estimates of the total consumption of different commodities, usually available from national accounts, and information on the consumption shares of different groups (obtainable through small, relatively inexpensive surveys), the consumer budget of each group and hence the implicit distribution of income among groups are estimated. (Ref. No. 671-41)

Rural Poverty in India

In this study trends in poverty incidence in the rural areas over a 20-year period are documented for India as a whole and for individual states. The study also examines the relationship between the incidence of poverty and agricultural performance in relation to the growth of the rural population. (Ref. No. DRCIDO5)

Uniform Analysis of Growth Distribution

This study was undertaken in an attempt to produce a uniform consistent global analysis of income distribution as a function of growth in GDP and to examine the implications of the Bank's current growth projections on income distribution by country and region. (Ref. No. EPDCA01)

Note: Rural Poverty in India - Development Research Center
Uniform Analysis - Economic Analysis and Projections Department

I.C. Country Economic Analysis/Development Strategy

Development Strategies in Semi-Industrial Countries

This study examines the incentives for import substitution and export promotion in six semi-industrial countries (Argentina, Colombia, Israel, Korea, Singapore, Taiwan) in order to analyze the effects of alternative incentive policies on resource allocation, trade and economic growth. Government tax, credit and expenditure policies, as well as tariffs, subsidies and other incentives are examined in order to assess net incentives to individual industries and to export and import substituting activities. The country studies will be followed by a comparative analysis of the experience of the six countries. (Ref. No. 670-01)

International Model

This study will develop a model to examine the adjustment of developing countries to changes in the international economic situation, including changes in the level of protection in these countries and elsewhere; changes in the rate of growth of developed countries; and changes in oil prices. The model examines the relations between five regions of the world economy, Africa, Asia, Latin America, the Middle East and the developed countries. Each developing country is represented by an activity analysis model; the developed countries are represented by a trade welfare function. The model has been solved using a fixed point algorithm capable of solving large general equilibrium systems. (Ref. No. 670-07)

International Comparison Project

Although considerable progress has been made in standardizing statistical methodologies for estimating national aggregates, the conversion of these to a common international base of valuation is still being made at official exchange rates which do not satisfactorily reflect the differences in price levels among different countries.

The International Comparison Project (ICP), initiated by the United Nations in 1968, is designed to provide detailed comparisons of national products by expenditure categories in terms of relative quantities and relative prices. These comparisons will permit a more accurate determination of the relative purchasing power of currencies and the real gross domestic product per capita of different countries. (Ref. No. 670-68)

Prototype Models for Country Analysis

This research project aims to improve the Bank's country economic models program by developing a quantitative framework that addresses a broader range of issues in development policy than has been possible so far. These include the effects of alternative development strategies on employment creation and income distribution, the traditional-modern production dichotomy, and issues of investment allocation. The study will enable the Bank and its member countries to better assess the distributive aspects of economic growth and development policy and will permit country economic analysis to take full advantage of the expanding data base of most countries. (Ref. No. 670-86)

Social Accounts and Development Models

Macroeconomic analysis of development has been restricted mainly to two-gap models of resource needs and input-output models of industrial structure. These approaches are inadequate for studying the effects of policies concerned with employment generation, income distribution and eradication of poverty. This study aims to provide the basis for a new generation of macroeconomic models that will permit analysis of the tradeoffs between alternative policy goals such as growth and redistribution. It focuses simultaneously on the causes of poverty and inequality and their measurement, and on the determination of both prices and quantities in a model framework. At present the study involves the construction of a Social Accounting Matrix (SAM) for Malaysia and the development of an economy-wide model based on the SAM. (Ref. No. 671-27)

Aggregative Models

The tasks of this project have been threefold: 1) to survey the literature on the theory of development in dual economies; 2) to establish the macroeconomic theory underlying the Bank's large scale General Equilibrium models for Brazil (RPO 670-69); 3) to formulate a research proposal on the study of growth and income distribution in Brazil and Malaysia, using small scale models. (Ref. No. DRCIDO2)

General Algebraic Modeling System (GAMS)

Mathematical modeling is a potentially effective tool for the social sciences and for planning. However, its effectiveness has been hampered by the difficulty of efficiently communicating models to others as well as to computers. This difficulty and the high cost associated with the dissemination of models for policy planning and project selection dictate the need for a new modeling technology. This study aims to establish a system (GAMS) which will permit direct communication between the mathematically skilled social scientist, who can correctly specify a problem in algebraic form, and the computer. (Ref. No. 671-58)

Measurement of Economic Growth in Developing Countries

This study undertaken at the suggestion of the International Economic Association analyzes the conceptual and theoretical issues involved in quantifying economic activity and socio-economic development and welfare in developing economies. It examines the experiences of various international organizations in the collection, preparation and publication of measurements of economic growth for LDC's. In addition, a survey is made of the major practical difficulties encountered in the collection and compilation of socio-economic statistics suitable for the quantitative analysis of the growth and development process in developing countries. (Ref. No. EPDES01)

Note: Aggregative Models - Development Research Center
GAMS - Development Research Center
Measurement of Growth - Economic Analysis and Projections Department

II. International Trade

Natural Resources and Planning: Issues in Trade and Investment

A systematic framework for the compilation of data and analysis of commodity markets is needed for the Bank's periodic evaluation of the world economic situation and the prospects of developing countries. The aim of this study is to provide the methodology and the data format to analyze global supply and demand conditions of important natural resources and resource-based secondary commodities. It comprises a number of sub-projects including, so far, the construction of a model of the world energy economy; regional and global models for investment planning in the copper and bauxite/aluminum industries, and research on the dynamics of commodity markets. (Ref. No. 671-09)

Promotion of Nontraditional Exports

A number of Latin American countries have introduced incentive schemes to expand exports and promote investment in export-oriented industries. A comparative review of this experience was carried out in cooperation with the Economic Commission for Latin America (ECLA), in which strategies and policies to promote nontraditional exports were evaluated, particularly those of Argentina, Brazil, Colombia, and Mexico. The papers were discussed at a conference in Santiago, Chile, in November 1976. (Ref. No. 671-10)

Agricultural Commodity Projections

In cooperation with the Ford Foundation, this study is developing a world model of major agricultural commodities (e.g., grains, soybeans, beef) in order to project future supply and demand. Beginning with a two region model (the US and the rest of the world) projections have been prepared to 1980. The model is now being expanded to cover 20 regions. (Ref. No. 671-23)

Linkage of Commodity and Country Models

This study is being undertaken in the context of Project Link, an econometric model of the world economy that is the result of a cooperative effort by private and official research centers in developed countries, the International Monetary Fund, the United Nations Centre for Development Planning Projections and Policies and the United Nations Conference on Trade and Development. The aim of the study is to introduce some 20 commodity models into the Link model, thus making it possible to estimate the impact of business fluctuations in developed countries on the prices and trade of primary commodities. The models will also shed light on the factors that affect the foreign exchange earnings of developing countries as well as the impact of commodity prices on inflation in developed countries. (Ref. No. 671-28)

Export Incentives in Developing Countries

Despite their frequent use in developing nations, export incentives have hitherto been studied only in general terms and in an aggregated industry format. This study is undertaking a more rigorous analysis of the subject through a cross-section investigation of the production of major export commodities and a time-series analysis of the effects of export promotion measures. It will evaluate the export promotion efforts of four developing countries (Brazil, Greece, Republic of Korea, and Pakistan) in a comparative framework. The results will be used to formulate recommendations on the scope and methods of export promotion in developing countries, particularly those under study. (Ref. No. 671-35)

Joint FAO/World Bank Near East/East Africa Meat Study

The oil-related income growth in the Near East is expected to generate a rapid increase in meat consumption in the future, which the area may not be able to supply. Consequently, the Near East is potentially a valuable export market for the neighboring meat producing countries of East Africa. This study will determine the size of the Near East meat deficit over the next decade and will analyze the prospects of successful penetration by the East African countries of the Near East meat market. (Ref. No. EPDCE01)

Fluctuations in Invisible Copper Stocks

"Inventories" of metals embodied in semi-fabricates, fabricates and finished products experience substantial variations during the business cycle, but are usually hidden in the reported statistics on metal consumption, and not included in reported stocks. The study is an attempt to estimate changes in these "invisible" stocks in the case of copper, and shows that they tend to decrease sharply during recession and to increase rapidly during recovery. It examines the implications for price forecasting. (Ref. Commodity Paper No. 27)

Commodity Price Stabilization and the Developing Countries: The Problem of Choice

The paper deals with the problem of choosing the primary commodities whose price stabilization at the international level would most benefit developing countries as exporters or importers. It examines the link between price stabilization and export revenue maximization and focuses on the economic welfare and income effects of price stabilization as criteria for choice. The empirical analysis covers a sample of 17 major primary commodities for which price stabilization through buffer stocks is technically feasible. (Ref. PO3X77)

Coffee, Tea, and Cocoa - Market Prospects and Development Lending

Coffee, tea and cocoa, which are among the most important export crops of the developing countries, face low price elasticities of demand. They are subject to short periods of boom conditions and long periods of oversupply. This book analyzes their market structure and prospects and describes the World Bank's lending policy for these crops. (Ref. No. EPDCE 03)

Futures Market and Developing Countries

Exports of primary products play an important role in the economy of many developing countries and their high price variability is a cause of national concern. In the case of agricultural products price volatility is amplified by production uncertainty. This project is a case study based on cocoa, demonstrating how producing countries can improve their welfare by an optimal hedging policy using futures markets. (Ref. No. EPDCE27)

Note: All non-RPO projects - Economic Analysis and Projections Department

III. Agriculture and Rural Development

Rural Development in Northeast Brazil

Development in Northeast Brazil has evolved with large numbers of peasants living in subsistence conditions alongside dynamic industrial sectors. This project was designed to assist Brazilian agencies in developing the necessary informational and analytical base for northeast development lending programs. Specifically, the study will analyze at the microeconomic level the restrictions that prevent resources from being channeled to the rural poor, evaluate the efficiency of farms of different sizes and tenure arrangements under various technological, geographic, and ecological conditions; and provide a data base to aid in the identification and implementation of rural development projects for the region. (Ref. No. 670-73)

Land Reform in Latin America

A number of Latin American countries have undertaken significant agrarian reforms through land distribution and tenure reorganization. This study seeks to determine the role land reform has played in reaching the development goals of raising output, achieving a more equitable distribution of income, and creating employment, and to assess how land reform programs may be made more effective. A variety of land reform programs are being reviewed, with particular emphasis on those of Mexico, Bolivia, Chile, Peru, and Venezuela. (Ref. No. 670-80)

Evaluation of the Lilongwe Land Development Program

The Lilongwe Land Development Program is a multifaceted program designed to improve the total fabric of rural life in the central region of Malawi. The problems and successes of this and other integrated rural development programs were examined in the Africa Rural Development Study, a research project (Ref. No. 670-18) now completed. The present study has been carried out to assess more precisely some of the Program benefits that were identified in the previous review and to determine the extent to which these benefits can be ascribed to the agricultural services provided under the Program. (Ref. No. 670-93)

Analytics of Change in Rural Communities

If rural development projects are to be the source of lasting and continuing improvements in rural living standards, they must be designed so that they help initiate a self-sustaining process of change. This requires a more comprehensive understanding of the role of rural areas in national economic growth, and of their economic structure, than exists at present. In this study of the Muda River Irrigation Project in Malaysia, formal models of household and regional economic change are developed to clarify the structure of the local economy. The analysis should also shed light on feasible time paths and strategies for alleviating rural poverty within the constraints imposed by national income generation and population growth. (Ref. No. 671-17)

Raising the Productivity of Small Farms

This study is part of a larger program being carried out in cooperation with the Food and Agriculture Organization (FAO) to obtain basic information on small farmers' development potential throughout the developing world. Focusing on the small farms of Tanzania it seeks to: 1) identify the constraints on improved production and income; 2) identify methods used by small farmers in the past to overcome these constraints; 3) assess the potential of small farmers for improved production and income if additional inputs were available to them. The study will develop recommendations regarding appropriate strategies for production, resource organization, information systems, credit arrangements, and general government support for small farms. (Ref. No. 671-22)

Simulation of Buffer Stocks

The benefits and costs to a developing country of holding buffer stocks of food grains are widely debated, but rarely quantatively assessed. This study will attempt to provide such an assessment of costs and benefits with specific regard to farmers, consumers, the government budget, and the general economic welfare. An international model has been constructed which examines the effects of stocks for a given probability distribution of annual world production and alternative storage rules. A national model examines the effects of stocks for probability distributions of annual production in the country, world price, alternative trade and storage rules and government policies to maintain a minimum level of consumption by the low income population. The stabilization effect is separately assessed using stochastic simulation. (Ref. No. 671-24)

Agricultural Pricing and Storage Policies in East Africa

Agricultural pricing and storage are central issues for development planning in East Africa. This study develops a quantitative approach to the analysis of these problems through the construction of a large-scale agricultural sector model of Zambia, along the lines of the CHAC model of Mexico (Ref. No. 670-16). The present model will be used to measure the possible tradeoffs between such policy goals as development in subsistence areas, price stabilization, increased food production for the domestic market, subsidization of urban consumers and improvement of international trade, and to clarify the options by establishing the effects on socio-economic groups who might benefit from, or bear the burden of, potential policy changes. (Ref. No. 671-29)

Management and Organization of Irrigation Projects

Present methods of analyzing irrigation projects rarely take account of the central importance of good organization and management. This study aims to establish a framework for evaluating the use of resources in the management and operation of Bank-assisted irrigation projects, by developing typologies and management criteria and applying them in selected case studies. (Ref. No. 671-34)

Price Intervention in Agriculture

Price intervention in the agricultural sector is a common instrument of government policy in developing countries. However, it is not always clear how government price intervention should be quantified in order to estimate its impact on income distribution. This study will develop a partial equilibrium methodology for quantifying the different effects of a package of agricultural price interventions. One of its main objectives is to compare the partial equilibrium framework with a general equilibrium approach to the same problem. (Ref. No. 671-39)

Country Case Studies of Agricultural Prices and Subsidies

This study seeks to provide the empirical basis on which to develop a uniform methodology for assessing the impact of agricultural policies in developing countries. Through a series of case studies in eight countries--Argentina, Arab Republic of Egypt, Kenya, Mexico, Pakistan, Portugal, Thailand, and Yugoslavia--it will examine the use and impact of administered prices, taxes, and subsidies in agriculture. The adequacy of each country's economic incentives in relation to its comparative advantage will also be analyzed. (Ref. No. 671-42)

The Consequences of Risk for Agricultural Policy

This project has two objectives: (1) to analyze whether accounting for risk improves the forecasting ability of agricultural project and sector models; and (2) to derive some of the broad policy implications of accounting for risk and its impact on the functioning of markets. The study examines the nature of competitive markets under risk, and their possible failure to lead to efficient prices (in the usual sense); analyzes different types of price forecasting behavior; and traces the implications of the findings for several areas of government policy. (Ref. No. 671-43)

Agricultural Innovation and Rural Development

The problem of effectively harnessing new technological possibilities to meet the needs of rural development is a highly complex one, involving far more than the provision and financing of an "appropriate" technology package. Using concepts embodied in the "systems approach", this study will develop a model portraying technological change in agriculture as a process of technology generation, selection, adaptation, adoption, and diffusion interacting with nontechnical factors to yield a variety of possible adjustment paths. The model should prove useful for designing appropriate farm technology packages; learning to manage the transfer of technologies; and identifying guidelines for the establishment of a policy for the generation and management of technological change as a continuing process. (Ref. No. 671-44)

Programming and Designing Investment: Indus Basin

Agriculture and irrigation project formulation often depends on implicit policy assumptions and on complex technical relationships rarely explored at the appraisal stage. This study aims to improve the design of projects by testing the sensitivity of optimum project design to the inclusion of objectives other than economic efficiency--especially income distribution--with an investment planning model for the Indus Basin that will quantify the tradeoffs between multiple welfare objectives in investment project design and agricultural development policy. (Ref. No. 671-45)

Distribution of Income Through the Extended Family System

In the World Bank's strategy for development of the Sahel, irrigation plays an important role as a means to expand useful employment and reduce the risk of crop failures and famine. However, the Bank is suffering from an almost complete lack of information regarding the beneficiaries of irrigation projects, and the effects of irrigation on the traditional pattern of task allocation among members of the family units. This study seeks to provide such information through case studies of four villages in the Senegal Valley. Specifically the study will observe the composition of work teams and the distribution of harvest proceeds. The results are expected to have operational significance for the design of other irrigation projects, especially in Senegal and Mauritania. (Ref. No. 671-57)

India: Impact of Agricultural Development on Employment and Poverty

This project aims to provide a better understanding of the policy and investment alternatives for alleviating poverty in rural India. Most studies of Indian agriculture have been descriptive rather than analytical, and have examined agricultural policies at the national and sometimes state level, but very rarely at lower levels. Here, a case-study approach is used, choosing a number of specific institutional-infrastructural-ecological situations, e.g. capitalist farming with well developed infrastructure; feudal and semi-feudal farming with poor infrastructure; areas where capitalist, feudal and peasant proprietorships coexist; and so on. Models will be constructed for the various different types of farms in each area in order to examine choices among investment activities which change the resources available (e.g. the supply of irrigation water) and among policies which affect product and factor prices. The object of the models is to quantify the impact of investments and policy changes on different socioeconomic groups, and thus to trace their likely distributional consequences. The project is intended to complement the work of the National Commission on Agriculture and will be carried out in collaboration with Indian research institutions. (Ref. No. 671-62)

World Food Policy

This study examined foodgrain supply and demand prospects of the developing countries through 1985 and explored investment magnitudes and policy requisites needed to overcome the foodgrain deficits projected for most of those countries. The study contributed to a decision of the Policy Review Committee to strengthen economic and sector work related to planning in the more vulnerable countries. (Ref. No. R106)

ERTS - World

This study applies remote sensing technology to a wide range of activities in project identification, preparation and supervision. These included providing assistance to the Government of Burma to improve the data base for pre-investment studies and agricultural project preparation, preparing a Land Cover - Land Use Association map of the land use survey work done for the Orissa State. Other activities included the preparation of a map for portions of Upper Volta based on recent socio-economic and topographic information collected through satellite imagery, and the compilation of a draft manual on the uses of remote sensing for development projects for distribution to prospective users of this technology. (Ref. No. R112)

ACC Rural Development Study

The ACC Rural Development Study was undertaken at the request of the Administrative Coordinating Committee of the UN. The purpose of the study was to assess the programs of the specialized agencies with respect to poverty-oriented rural development and make recommendations to the ACC for strengthening agency operations and improving interagency cooperation. (Ref. No. R113)

Small-Scale Fisheries and Rural Development

An initial study was undertaken with the following objectives: to provide a technical, socio-economic and administrative overview of small-scale fisheries in general and aquaculture in particular, to review past experiences in the rural setting; to draw conclusions on large- vs. small-scale fisheries, on appropriate technology, on nutritional impact, on integration into rural development projects/ programs and on strategies for development; and to investigate possible roles for the Bank.

Since rural development projects are by and large focused on those with some access to land, a follow-up study on aquaculture was undertaken as a modest contribution towards the search for non-agricultural productive employment possibilities. (Ref. No. R114)

Note: All non-RPO projects - Agriculture and Rural Development Department

IV. Industry

Scope for Capital-Labor Substitution in the Mechanical Engineering Industry

Two studies of planning methodology in the mechanical engineering industries (Ref. No. 670-24) b· the Bank's Development Research Center have shown the feasibility of implementing numerically solvable process-analysis models of mechanical engineering activities. This study extends the methodology to permit alternative production techniques to be specified and product differentiation to be incorporated. It analyzes the scope for capital-labor substitution in mechanical engineering activities and the extent of substitution between locally produced and imported mechanical engineering products. (Ref. No. 670-23)

Programming in the Manufacturing Sector

This research program deals with the problem of investment planning in the presence of economies of scale. On the basis of case-studies in a large number of countries, and of several industrial sub-sectors (fertilizer, forest industries, steel), a planning methodology has been developed that is useful for investment planning at the sub-sectoral level and for project identification. In addition to reports on the case-studies, the research program has resulted in methodological contributions. The planning methodology is described for practical use in a series of manuals. (Ref. No. 670-24)

Industrial Capacity Utilization in Selected Latin American Countries

Although abundant labor and scarcity of capital characterize the industrial sectors of many Latin American countries, studies indicate that capacity utilization is low. This study has ascertained the extent of underutilization of installed industrial capacity in several countries (Brazil, Chile, Colombia, Costa Rica, Peru and Venezuela). The causes of underutilizing have been investigated and subjected to theoretical and empirical tests. Macroeconomic calculations indicate that the direct and indirect effects of a uniform two-shift operation in industry are to raise GNP by 8% to 21% over existing levels, and per capita income is raised significantly. Total employment is increased 10% to 17%. There are also measurable improvements in the balance of payments in each of the countries. A final project report has been submitted and further publications will report the detailed results. (Ref. No. 670-25)

Industrial Policies and Economic Integration in Western Africa

Studies of industrial incentives in developing countries have so far concentrated on countries that have already established an industrial base. This research project examines the policies followed by four industrializing Western African nations: Ghana, Ivory Coast, Mali, and Senegal. Its purpose is to examine the choice of alternative strategies for economic growth in Western Africa, such as import substitution, export promotion and the expansion of intraregional trade through economic integration. Further, attention is given to the choice between the expansion of agriculture or industry in the individual countries. A comparison of the results for the four countries will also shed light on the possibilities for regional integration. (Ref. No. 670-87)

Industrial Capacity Utilization

The study analyzes the utilization of capital in manufacturing industries in Colombia, Israel, Malaysia, and the Philippines in order to test various propositions. Approximately 1,200 manufacturing plants have been examined in these four countries.

The methodology used develops and tests various econometric models, both country specific, and cross-country. The determinants of capital utilization include the capital-labor ratio, the scale of production, the relative price of capital and labor, shift work premia, seasonality in demand for the output and variations in the prices for inputs, the costs involved in noncontinuous (batch) plant operations, the market structure, plant location, management, and plant ownership. (Ref. No. 670-95)

Patterns of Industrial Development

Studies by Kuznets, Chenery and others have suggested that economic development, as measured by rising per capita income is associated with changes in the structure of the economy. This study concentrates on changes in the internal structure of the manufacturing sector associated with its growth, the growth of GNP, the spread of technology, and changes in international comparative advantage. It will test alternative descriptions of the development of industrial subsectors using data for a large number of countries over the last two decades within a multiple regression framework. (Ref. No. 671-05)

A Comparative Study of the Sources of Industrial Growth and Structural Change

Few attempts have been made in the past to establish explicit relationships between individual policy instruments, changes in the industrial structure, and economic performance. This study will develop the analytical framework required to articulate these relationships. The sources of industrial growth and structural change are being examined for each of eight countries (Colombia, Israel, Japan, Korea, Mexico, Norway, Taiwan and Turkey). A simulation model is presently being developed to assess the relative importance of universal and country specific influences on industrial structure and its evolution. In a subsequent phase, quantitative models for policy analysis will be constructed for several of the countries. (Ref. No. 671-32)

Appropriate Industrial Technology

Recent studies of capital-labor substitution in manufacturing industries have indicated that there is substantial scope for choosing factor proportions in the production of the commodities studied, though it appears that the techniques chosen are frequently not socially appropriate, and sometimes do not minimize production costs.

The objective of this study is to identify and assess the policy instruments available to stimulate the adoption of more appropriate techniques. Policy options for Bank operational departments and developing countries will be presented on the basis of available evidence. The study will also outline an agenda for further research where needed to support the tentative policy prescriptions. (Ref. No. 671-51)

Marketing Manufactured Exports

Bank research on export promotion has generally focused on price incentives. The present study will examine the institutional and other non-price aspects of the marketing of manufactured exports based on a case study of Colombia's clothing exports, which have increased dramatically since 1970. In particular, the study will identify the main obstacles to the growth of clothing exports in 1970 and the ways in which these difficulties have been at least partly overcome. (Ref. No. 671-56)

Small-Scale Enterprise

This study stems from the growing realization that, if employment opportunities and improved or cheaper goods and services are being sought for the poor, small-scale enterprises may represent a neglected potential which should be exploited. However, there is little systematic knowledge about the nature of this potential; the purpose of this study is to start to remedy that deficiency. Phase I of the study will consist of several parts: (a) a review of the literature, (b) case-studies of experiences in selected countries, and (c) a number of surveys of selected industries in urban and rural areas, exploring in depth the characteristics of the enterprises and the economic environment in which they operate. Subsequent phases will depend on the outcome of the first phase. (Ref. No. 671-59)

Analysis of Small-Scale Enterprises

This project serves as an umbrella for work on Malaysia and Brazil to prepare formal research papers based on work originally undertaken in the context of operational support. Thus, mission reports are being supplemented to produce a more in-depth analysis of factors determining the size distribution of firms in these two countries. (Ref. No. ECDND02)

State Manufacturing Enterprise in Turkey

The main purpose of the project is to provide a view of the role, objectives, problems and performance of public enterprise in a developing country. (Ref. No. R406A)

World Phosphate Survey

This study will compile and update a comprehensive phosphate manual covering phosphate rock reserves and resources; mining and fertilizer production costs; phosphate rock and fertilizer markets; as well as agronomic considerations and non-fertilizer uses of phosphates. (Ref. No. R403)

Fertilizer Research

This is an on-going research activity to maintain an up-to-date fertilizer data bank required for appraising Bank fertilizer projects and giving advice to the Bank Group on fertilizer and related topics. Primary emphasis is placed on the preparation of medium and long-term projections for fertilizer supply and demand by nutrient. Fertilizer marketing and distribution models as well as investment models are prepared in order to assist in projecting fertilizer production and marketing costs. In addition, new fertilizer technology and fertilizers are evaluated. (Ref. No. R401)

World Potash Survey

This study will review the world potash scene including potash resources, mining and refining costs, supply/demand balances and future price outlook for potash fertilizers. Apart from adding significantly to the Bank data base on fertilizers, the survey will provide background information for a current Bank appraisal (Ref. No. R401)

Note:	Analysis of Small-Scale Enterprises	- Development Economics Department
	All other non-RPO projects	- Industrial Projects Department

V. Transportation

Substitution of Labor and Equipment in Civil Construction

Relatively abundant labor supplies in many developing countries are likely to make labor-intensive techniques more appropriate for civil construction works. This research program is the final phase of a continuing study of the substitutability of labor for equipment in civil construction. It is expected to assist in the formulation of pragmatic guidelines for the planning, evaluation, and monitoring of labor-intensive civil construction projects in the developing world. Its results will be summarized in two handbooks designed for practical application. (Ref. No.670-26)

Highway Design Study: Phase II

World Bank assistance for highway development is largely directed to low-volume roads in lower-income, capital-scarce countries where the tradeoffs between initial construction costs and future maintenance and road-user costs may well dictate different highway design and maintenance strategies from those appropriate in North America and Europe. This study examines construction costs, vehicle operating costs, and road maintenance costs in several developing countries (Brazil, India, Kenya) and analyzes the tradeoffs among them.

Models are developed which determine the total transportation costs for large numbers of alternative designs and maintenance policies, and establish the lowest cost alternative. Designed as planning tools, they may be used at the pre-feasibility and feasibility stages of planning by government agencies and consultants. (Ref. No. 670-27)

Yemen Arab Republic Feeder Road Study

This study is the first in a series of research projects undertaken by the World Bank to develop systematic information for evaluating rural development projects involving feeder roads (see Ref. No. 670-71 and 670-14 on the following page).
The study areas comprise two regions of considerable agricultural potential in the Yemen Arab Republic currently served by low-standard transportation facilities: the Taiz-Turba region in the Southern Uplands and the Wadi Mawr region in the northern Tihama. Research consists primarily of a series of regional surveys of specified subareas within the road's area of influence before, during, and after construction. (Ref. No. 670-29)

Ethiopia Feeder Road Study

This research project, together with a project in the Yemen Arab Republic (see Ref. No. 670-29) was initiated in 1973 to quantify the contribution of feeder road investments to rural development. A socio-economic survey of the area influenced by a road improvement in the Kaffa province was conducted before construction of the road. It is hoped that the originally planned follow-up surveys can be realized as part of the program of the planned Monitoring and Evaluation Unit in the Ethiopian Highway Authority. The goal is to develop formulas relating the net value of agricultural production to varying levels of total road investment for areas of differing physical, social, and institutional endowments. (Ref. No. 670-71)

Port Pricing and Investment Policies in Developing Countries

While the Bank has legitimately been concerned with the financial viability of port investments, little systematic study has been made of the wide range of tactical and strategic aims in formulating port tariffs. This study explores the relationships between shipowners, exporters and importers, and the port authority to determine the total effects of various port pricing policies. The prime objective is to find a method of fixing port tariffs which maximizes benefits both to the port (in net revenue) and to domestic nationals. Optimum port tariffs are derived from the short run marginal costs of port operation. As this is not a familiar principle in port economics, the study demonstrates the appropriateness of marginal cost pricing for ports, and develops the main extensions of this principle to cover the circumstances of ports in developing countries. (Ref. No. 671-13)

Madagascar Feeder Road Study

This study is the third in a series of projects designed to quantify the contribution of feeder road investments to rural development (see Ref. No. 670-29 and Ref. No. 670-71). These studies are monitoring, for a period of six to ten years, the impact of rural road projects on the small local economies they serve. In the case of Madagascar both baseline and follow-up surveys have been completed. The analysis has established net project benefits applying two alternative methods: road user savings and producer's surplus. Analyses have been made of household and per capita income and consumption levels before and after completion of the road, and a number of additional socioeconomic indicators of the region's development have also been examined. (Ref. No. 671-14)

Economic Role of Railways

Despite heavy investment, railway projects have generally not yielded results consonant with appraisal expectations. A major reason is the difficulty of forecasting future railway traffic demands. This study will develop improved forecasting methods and analyze the role that railways should play in national transport policy, on the basis of a comparative analysis of the composition and trends of current transportation patterns in several developed and developing countries. In addition, the study will examine the commodity composition of shipments made by different modes of transportation; investigate the effects of government policies on rail traffic; and assess the role of rail in import/export trade and in the provision of passenger services. (Ref. No. 671-50)

Socio-Economic Impact Study: Brazil

This project consists of assisting Empresa Brasileira de Planejamento de Transportes (GEIPOT) in setting up concepts, plans and systems for the assessment and evaluation of the socio-economic impact of rural road investments. (Ref. No. R805)

Appropriate Vehicles

The aims of this study are to examine the problems of rural transport services in developing countries; to determine the possible need for non-conventional intermediate-technology vehicles; and to assess the availability of such vehicles or of research under way on the subject. (Ref. No. R809)

Feeder Road Model

The objective of this study is to further develop methods evolved in earlier years for the analysis of the economic impact of feeder roads on agricultural production. An improved computer model is developed for easier application. (Ref. No. ANTA 805)

Note: All non-RPO projects - Transportation Department

VI. Public Utilities

Standards of Reliability of Urban Electricity Supply

Up to now little work has been done to determine standards of reliability for the design of electric power systems on a more rational economic basis; most often, target reliability levels are based on past engineering practice and rules of thumb. This study will attempt to determine optimum reliability levels by developing a theory and methodology for estimating the economic costs of electric power outages suitable for developing countries, and applying the methodology in the field. In addition, the study will combine the outage cost results with a distribution system planning model and implement the whole on computer so that it could be used for optimizing the actual long-range plan for a distribution system. (Ref. No. 670-67).

Pricing and Investment in Telecommunications

The traditional approach to pricing and investment policy in telecommunications is based almost entirely upon technical and financial criteria, with economic analysis playing a minor role. The present project analyzes the nature of the benefits and the types of beneficiaries of telecommunications projects, the economic benefits and costs of such projects, and appropriate pricing strategies. Its objective is to assist telecommunications authorities and other planning bodies in determining the appropriate level of investment in telecommunications projects and the priorities assigned to competing demands within the sector. (Ref. No. 670-76)

Reduction in Wastewater from Public Hydrants

When piped water is provided to poor urban and rural communities it is usually dispensed through public hydrants. These are frequently uncontrolled, running continuously and wasting substantial amounts of water. This study will identify for developing countries those methods of dispensing water at public hydrants which have proved successful in reducing wastage and which afford ease of operation and maintenance. (Ref. No. 671-12)

Appropriate Technology for Water Supply and Waste Disposal

The objective of this study is to identify the appropriate technology for providing the urban poor and rural communities with socially and environmentally acceptable water supply and waste disposal services at a cost they can afford. The research will be directed to water supply and waste disposal (including reuse) although emphasis will be on the latter. Total economic costs rather than financial costs alone will be analyzed. (Ref. No. 671-46)

Urban Water Supply Standards

Secondary water distribution systems are commonly designed by "rule of thumb", which results in significant overdesign of networks to serve the urban poor. The objective of this study is to investigate the cost implications of variations in levels of service, so that informed judgments can be made on appropriate design criteria and optimum network phasing. Simple mathematical models have been developed, following field work on two Bank projects; these will be tested in further field studies. An interim report has been published (RES. 11). (Ref. No. R610).

Appropriate Technology for Handpumps

Handpumps drawing on shallow groundwater are the most common source of drinking water in rural areas in developing countries, but the failure rate of pumps is extremely high. "Maintenance free" pumps are an extremely expensive alternative and are still not entirely reliable. This study has concentrated on very simple technology that is appropriate to villagers' levels of skill. A prototype pump was set up in the Bank for demonstration purposes, and a report (EWT RES 9) submitted at the International Reference Centre for Water Supply's 1976 international workshop on handpumps. The features of the design are extreme simplicity, low first cost, and ease of servicing using components readily fabricated locally. Field and laboratory trials are being undertaken. A paper will shortly be published. (Ref. No. R612)

Water Supply to the Urban Poor

"Conventional" water supply systems are usually too expensive for the urban poor. Developing alternative, affordable, methods of providing this essential service poses a real challenge to designers. This paper, prepared to stimulate discussion of the topic at Bank staff seminars in 1976 and 1977, published by EWT (PUN 31). (Ref. No. R614)

Rural Water Supply Programs

An inter-agency committee, the Ad Hoc Committee on Rural Water Supply and Sanitation, has been established to identify ways and means of improving rural water supply. Part of the Bank's contribution to its work is a study of the factors which have led to successful rural water programs, including the institutional framework, the technical solutions adopted, and the ways in which the communities themselves have been involved. A report will shortly be published by EWT. (Ref. No. R615).

Wastewater Reuse in Industry and Agriculture

The objective of these two studies is to examine the possibilities and problems of reuse of wastewater and the application of Bank-financed projects in industry and agriculture. As the cost of water supply and disposal has been rising, industries have been reducing their consumption by recycling process water. This tendency requires that more attention be paid to constituents of industrial wastes which might inhibit reuse or increase health risks. Reclamation in agricultural use has a long history, but is not being exploited to its potential even in some water-short countries. The objective of the agricultural study is to review the technologies currently available, and to assess their public health implications. (Ref. Nos. R617 and R618)

Domestic Water Meters

Metering of domestic water supplies is a very effective way to reduce wasteful use, to allocate costs fairly and to increase water utility revenues. The cost and effectiveness of metering, however, vary widely, depending on the type and specification of the meter and the maintenance and other support facilities provided. The objective of this study is to review Bank experiences of metering programs and to recommend appropriate standards and specifications for application to future programs. (Ref. No. R619)

Reduction of Unaccounted-for Water

Water utilities in developing countries commonly cannot account for 30 to 50% of the water they produce. This may be due to actual physical losses or to administrative problems (inaccurate or missing meters, poor connection records, illegal connections, poor billing and collection procedures, etc.). The objective of this study is to review the Bank's experience in identifying and remedying the causes of high levels of unaccounted-for water, and to prepare guidelines for application to future projects. (Ref. No. R620)

Pipelines: State-of-the-Art

Pipelines--from large transmission mains to small house connections--account for a substantial portion of the investment in water supply and sewage disposal. The designer is faced with a wide variety of possible materials and laying techniques, many recently developed, and with a range of specifications. The objective of this study is to review the present state-of-the-art and to prepare a guideline for Bank staff on appropriate specifications and applications. (Ref. No. R621)

Rural Energy Study

The objective of the study is to examine past and current rural energy patterns in developing countries. It will propose methods for projecting rural energy needs, and examine commercial and non-commercial energy supply options to meet these needs over the next 20 years. (Ref. No. R609)

Note: All non-RPO projects - Energy, Water and Telecommunications Department

VII. Urbanization

Urban Public Finance and Administration

Little research has been done on municipal finance and tax systems in developing countries. Yet this area is of great importance to national and local governments in developing countries, as well as to the World Bank, in dealing with the problems of large and rapidly growing cities. This research project consists of a comparative analysis of selected features of local fiscal systems in eight cities: Ahmedabad and Bombay (India); Bogotá and Cartagena (Colombia); Jakarta (Indonesia); Kingston (Jamaica); Seoul (Republic of Korea); and Tunis (Tunisia). It will analyze patterns of expenditures and revenues, the adequacy of the overall municipal revenue structures, and the tradeoffs between revenue raising capacity and equity effects of the major financing instruments. The data collected will allow an evaluation of alternative strategies for financing municipal development. (Ref. No. 670-70)

Urban Land Use Policies: Taxation and Control

The aim of this study is to identify programs which would permit the cities of developing countries to expand public services at rates more nearly commensurate with the rapid growth of their populations. It is a multidisciplinary evaluation of important land development measures in three cities--Bogotá (Colombia) and Seoul and Gwangju (Republic of Korea). Special emphasis is placed on determining the reasons for land price increases, assessing the role of land taxation in urban development, and investigating the institutional structure within which land controls operate. (Ref. No. 670-98)

Pricing and Financing of Urban Public Services: Water Supply and Sewage Disposal

One of the most important questions of public policy in developing countries is how to finance the provision of public services in rapidly growing urban areas. This study considers this question for the case of water supply and sewage disposal in two cities--Cali (Colombia) and Nairobi (Kenya). It is an outgrowth of the Bank's research on urban public finance (Ref. No. 670-70), in which self-financing systems were identified as an important means of expanding urban public services and raising revenues for further expansion. (Ref. No. 671-18)

Urban Traffic Restraint (Singapore)

The Government of Singapore has put into effect a combination of policies aimed at reducing automobile traffic during periods of the day and in parts of the city that were formerly subject to congestion. Policies like these have been recommended by the Bank to its borrowers on the grounds that restraining private car traffic is often a prerequisite to achieving good bus service and reducing heavy investment in freeways, complex intersections, and road widening projects in built-up areas. The action in Singapore is the first application of area licensing in a major city and is thus of great interest to the Bank and to developing countries. This research project is designed to measure the impact of these policy measures through before-and-after observations and to collect basic data from which to predict the effects of similar policies in other cities. (Ref. No. 671-20)

Analyzing the Effects of Urban Housing Policies in Developing Countries

A knowledge of the workings of housing markets is necessary for the assessment of alternative housing policies, particularly in developing countries where housing resources are limited. This study has extended the Urban Institute Model to an analysis of the behavior of the main participants of the housing markets of large and growing cities of developing countries. The model will then be applied to case studies. (Ref. No. 671-37)

Strategic Planning to Accommodate Rapid Growth in LDC Cities ("The City Study")

Little is known about the impact of urban projects on intraurban development patterns, including residential and employment location, travel patterns, and the demand for public services. The principal objective of this study is to develop tools that can be used in the development and evaluation of projects and for the analysis of the spatial and economic impacts of policy interventions. The study will test existing models, designed primarily in developed countries, in cities of the developing world and, as necessary, will develop new ones, focusing on five components of the urban economy: housing, transportation, employment location, labor force and the public sector. (Ref. No. 671-47)

Evaluation of Urban Site and Services

Under this project site and services projects financed by the Bank in El Salvador, Senegal and Zambia are being monitored and evaluated by teams established in those countries under Bank auspices. Funding over the five years (1975-1980) that this will take place is shared between the Bank and the International Development Research Centre of Canada. Arrangements have recently been made to add a project in the Philippines. Preliminary results were discussed in a conference of researchers and project managers in Lusaka, Zambia in November, 1977.

Note: All non-RPO projects - Urban Projects Department

VIII.A Education

Education Finance and Income Distribution

Public education is usually financed from general budget revenues and education expansion places a heavy burden on the fiscal systems of developing countries. This study reviews the problems created by this situation, emphasizing the social equity aspects of the financing of education and the effects of educational expenditures on the distribution of income. Various forms of educational financing such as student loans, new tax policies, and local taxation are analyzed in order to determine their potential for carrying an increasing share of the financial burden. (Ref. No. 670-44)

Project Evaluation Methodology: Education Attainments

Until quite recently the evaluation of education projects assisted by the Bank dealt mainly with physical and administrative aspects. Increasing attention is now being given to the performance of the institutions and programs and to their effects on students. This study is designed to produce a methodology for evaluating learning in Bank education projects, derived from research on the measurement of educational attainments, including cognitive, psychomotor, behavioral, and attitudinal performance, as well as quantitative achievements. The method, presently being tested in Tanzania, incorporates repetitive cycles of testing and feedback of results to curriculum writers, and aims both at raising aggregate learning levels and at reducing instructional disadvantages for poverty groups. (Ref. No. 670-78)

Economic Development and Educational Reform

Most developing countries are either in the process of reforming their educational systems or are considering doing so. However, knowledge of the factors that contribute to successful educational reforms is scarce, and where it exists may not be readily accessible to countries other than those which have instituted the reforms.

This project will compile and analyze information on educational reform from several developed and developing countries (Chile, China, Cuba, India, Poland, Sweden, Tanzania, United States, and USSR) and compare the political, economic, and educational determinants of particular reforms across several of them. (Ref. No. 671-19)

Education and Rural Development in Nepal and Thailand

Although evidence indicates that more widespread education is associated with higher agricultural efficiency and lower population growth rates, there is virtually no information to indicate through which of its outcomes schooling may be affecting agricultural productivity and individual fertility; nor is there more than suggestive evidence that the correlation between education and these variables is at least partially causal. This study will explore these relationships by designing appropriate survey instruments, conducting surveys in Nepal and Thailand and drawing conclusions from the resulting data. (Ref. No. 671-49)

Economics of Educational Radio

In 1975 the Bank's Education Department initiated a review of experience with educational radio. The survey concluded that radio could be used to improve the quality of instruction at the elementary level and could serve as a low cost alternative to traditional means of providing secondary and higher education. This study is an outgrowth of the initial review; it will explore the economics of radio for distance learning through case studies of projects in Brazil, Israel, Kenya, and Korea. In addition, the study will assess the impact of in-school radio on student dropout and repetition rates through an examination of the Nicaragua Radio Mathematics Project. (Ref. No. 671-54)

Retention of Literacy/Numeracy Skills Among School Leavers

Much of the current educational thinking in developing nations is governed by the hypothesis that there is a threshold beyond which school leavers will retain the basic skills acquired in school. The study seeks to examine the relationship between duration of schooling, dropping out and the retention of skills acquired in school. Specific questions will be studied such as: What factors are associated with dropping out of school? What are the effects of dropping out at different levels of schooling on the levels of reading, writing, numeracy and other skills? The study's conclusions are expected to assist in formulating policies on the length, structure, and format of basic education as well as on the desirable length of compulsory education. The study should also provide insights concerning the application and administration of promotion policies and the design of primary education curricula and other programs with a bearing on the retention of skills among school leavers. If Phase I is successfully completed, subsequent phases (Case Studies and International Comparative Analysis) would be launched in collaboration with other agencies. (Ref. No. 671-55)

Textbook Availability and Educational Quality

Policy options for improving the quality of education in low-income countries are limited; some (e.g. reducing class sizes) are costly and of dubious efficacy. Several studies at least suggest that increasing the availability of textbooks (and other printed material) is a cost-effective approach to improving quality, and an increasing number of Bank education projects include a textbook component. The purposes of this research project are to check earlier findings on textbook effectiveness, to obtain quantitative estimates of how quality responds to textbook availability, and to attempt to identify ways of making textbooks available that will be most likely to be effective. The first phase of the project will support the analysis of existing survey data from Uganda and the conduct of an experiment on increasing textbook availability in Nicaragua. A possible second stage will extend the effectiveness studies to other countries and conditions. (Ref. No. 671-60)

Teacher Training and Student Achievement in Less Developed Countries

The objective of the study, which is being carried out by the Institute of International Education (Stockholm) is to assess research findings on the impact of teacher training on student achievement in LDC's. It contains four principal sections: (a) a review of major studies from the industrialized countries; (b) a discussion of the conceptual and methodological constraints in extrapolating findings from the developed countries to the LDC's; (c) an analysis of 32 studies from LDC's; and (d) conclusions and policy recommendations.

Basic Education in the Sahelian Countries

Building on Bank-financed studies to help prepare basic education plans for Mali and Mauritania, this research, conducted by UNESCO consultants, develops a methodology for the design and implementation of basic education programs in West Africa. A revised version of the final report 1/ was discussed at a meeting in Dakar in December 1976 of representatives of the six countries concerned and agencies such as UNESCO and the Bank.

Note: Both non-RPO projects - Education Department

1/ M. Botti, D. Carelli, and M. Saliba, "L'Education de Base dans les Pays du Sahel" (UNESCO Education Institute, Hamburg, November 1976).

VIII.B Employment

Labor Market in Malaysia

Malaysia has one of the highest rates of measured unemployment in Asia, unemployment being particularly apparent among secondary school-leavers. This study will explore the nature and course of this unemployment as well as analyze other aspects of labor market behavior such as income differentials and participation rates. The second part of the study will also serve as a component of the project listed next ("Labor Force Participation, Income and Unemployment"). (Ref. No. 670-43)

Labor Force Participation, Income and Unemployment

Improving the productivity of the urban poor requires knowledge of the operation of urban labor markets. This project consists of studies of employment and earnings in the "informal" sector of the Malaysian and Indian labor markets and the relationships among participation rates, individual earnings and household income. (Ref. No. 670-45)

Employment Models and Projections

Although a considerable amount of research is under way on labor force absorption and other aspects of employment in developing countries, a standard methodology for assessing trends in sectoral employment growth, the factors contributing to these trends, and the future employment outlook has yet to emerge. The objective of this study is to develop, apply, and evaluate such a methodology on the basis of case studies in India and Zambia. (Ref. No. 671-06)

Council for Asian Manpower Studies

As part of its efforts to assist the development of indigenous research capacity in member countries, the Bank is supporting a number of research projects undertaken by the Council for Asian Manpower Studies (CAMS), a regional association of Asian scholars engaged in policy-oriented research on the manpower and employment problems of Asian countries. The Bank funded projects focus on three areas: 1) the demand for labor; 2) the employment implications of different trade regimes; and 3) the development in Asian countries of ancillary firms (i.e., firms, usually small, that manufacture parts or provide services for large assembly plants). (Ref. No. 671-07)

Structure of Rural Employment, Income, and Labor Markets

Agriculture and rural development projects assisted by the Bank are usually directed toward improving the lot of farm households by a variety of means ranging from the construction of irrigation facilities to the provision of subsidized inputs. Many households in rural areas, however, have little or no access to land and are therefore not directly affected by such projects. Using data collected as part of the evaluation and monitoring of a project in Nigeria, this study will attempt to quantify the extent to which the Bank's agricultural projects also benefit landless or near-landless rural households who depend on wage employment as their main source of income. (Ref. No. 671-30)

A Comparative Analysis of Rural-Urban Labor Market Interactions

This research program focuses on the labor reallocation which often accompanies urbanization in the developing countries. The aim of the study is to shift research away from the conventional emphasis on measurement of rural-urban or interregional movement to analysis of means of effecting changes in the spatial, occupational, and industrial patterns of employment and income. Attention is therefore focused on the consequences of the labor reallocation associated with such changes for the structure of incomes and labor absorption. The study involved a conference on labor market interactions to discuss the linkages among distribution, migration, surplus labor, and poverty in developing countries. The results should be valuable for Bank policy and decision makers in developing countries, as earlier literature did not fully articulate an underlying model of the labor market. (Ref. No. 671-31)

Urban Labor Markets in Latin America

This study seeks to complement earlier Bank research on employment by developing aggregate yet detailed statistics on labor market structure and flows and by examining the relationship between the urban modern and informal sectors through case studies of Colombia and Peru. The research will serve as an illustrative model for country economic analysis of employment issues, and will improve understanding of urban labor market structure and behavior. (Ref. No. 671-48)

Occupational Structures of Industries

Current manpower forecasting for developing countries is based on data derived primarily from censuses and surveys of the 1950s and 1960s. This study will develop data for the 1970s from similar sources, which should prove useful for forecasting occupational structures of the 1980s or 1990s, and will attempt to refine existing forecasting methodologies by establishing coefficients between such variables as capital per worker and occupational structure, as well as between education and productivity. (Ref. No. 671-52)

Labor Markets

The workings of labor markets and their relationship with land and capital markets play a central role in the determination of income distribution. But current empirical knowledge is meagre and our theoretical understanding rests on shaky foundations. The purpose of the study was to provide an overview of theories of wage determination and employment in rural labor markets and the relationship of these markets with the formal and informal urban sectors. This overview was designed to identify key areas in which present knowledge is limited, and so provide guidelines for future research projects. (Ref. No. DRCID04)

Women in the Urban Labor Market: The Case of Tanzania

Most of the current published economic literature dealing with problems of urbanization in Africa has focused on the problems of male unemployment and underemployment. Few studies, if any, focusing on the problems affecting women have been undertaken. Although men and women face similar labor market problems in the urban environment, women face specific problems not shared by men; some of them associated with their life cycle commitments and others arising from their low status in society. The present study uses the 1971 labor force survey of Tanzania to (a) examine the characteristics of women in the urban labor market; and (b) ascertain whether there are sex differentials in employment status and earning as well as to explain, as adequately as possible, the reasons for the differences. (Ref. No. ECDPH52)

Korea Migration

The work done on this small project is related to the issues of population distribution and urban decentralization policies. It is a low cost attempt to analyze the determinants of population mobility and possible policies to affect internal migration. The output of this project, as of this date, consists of three papers in draft form on: (1) Markov-chain projections of intercity migration based on 41 locations; (2) simultaneous-equation econometric model of migration at city level analyzing separately in- and out-migration; (3) a quantitative analysis of the relationship between city population growth and the industrial composition of employment. The output of this small project is of direct value to the Korea Urban Sector Study in addition to contributing more generally to work on urban decentralization. (Ref. No. DEDRB22)

Wages in the Manufacturing Sector of Tanzania

Most econometric studies of wage structures use a limited sample taken from the entire urban labor market which limits the level of disaggregation and the number of independent variables. This study is unique in that a relatively large sample is drawn only from Tanzania's manufacturing sector permitting an in-depth assessment of a variety of conventional hypotheses and new hypotheses suggested by the study itself, regarding the operation of labor markets, the relationship of the personal characteristics of employees and their wages and, by integrating data on individuals with data on the firms for which they work, the relationships of firm characteristics and the level and structure of wages. (Ref. No. ECDER60)

Note: Labor Markets - Development Research Center
Other non-RPO projects - Development Economics Department

VIII.C. Population, Health and Nutrition

Population Growth and Rural Poverty

Many of the family planning programs instituted in the poorer developing countries have not resulted in a significant reduction in the rate of population increase. This study aims to assess the socioeconomic determinants of fertility and the economic cost and benefits of larger families for rural households through the detailed study of eight villages in India, Kenya, Nigeria and Sri Lanka. (Ref. No. 671-02)

Effects of Health and Nutrition Standards on Worker Productivity

In the course of Bank studies on labor productivity, nutritional and hookworm anemias, as well as caloric inadequacies, were identified as possible factors limiting the work output and physical capacity of agricultural and road construction laborers. This research project further examines these relationships through a case study of two populations of road construction workers in Kenya. These studies may have important implications for labor-intensive projects which employ large groups of undernourished and diseased workers. (Ref. No. 671-15)

Migration Patterns in West Africa

West Africa is one of the few regions of the world where relatively large-scale free movement across international boundaries still continues. Understanding the determinants and consequences of such migration is of direct relevance for the Bank's rural development and education projects. This study will examine migration streams both between and within nine countries in the area (Gambia, Ghana, Ivory Coast, Liberia, Mali, Senegal, Sierra Leone, Togo and Upper Volta). Both the characteristics of the migrants and their numbers will be examined. (Ref. No. 671-26)

Narangwal Population and Nutrition

This study will analyze fertility, family planning, health behavior, and the efficiency of service delivery systems using household data collected in Narangwal (Punjab), India. Groups of villages were provided with various combinations of health, family planning, and nutrition services and households in each group were observed over time. (Ref. No. 671-38)

International Review Group on Research in Population and Development

In collaboration with eight other agencies and foundations, the World Bank is co-sponsoring a group of experts to review social science research in population and development. Chaired by Dr. Carmen Miro, the group is reviewing the "state" of the art", assess the present use of social science research findings in policy making in population and development, and compile an inventory of the current institutional capacity for field research in social sciences for the major nations, regions, and subregions of the developing world. (Ref. No. 671-40)

El Salvador Health Study

This study is part of the Bank's evaluation effort of projects it has financed for urban sites and services and squatter area upgrading, and will assess the effect of such schemes on the health of low-income groups in two Salvadorean cities. The project is the Bank's first attempt to measure the health effects of urban projects. (Ref. No. 671-53)

Fertility Behavior in Rural Botswana

The objectives of this study are to identify and measure the socioeconomic correlates of fertility behavior in rural Botswana. This research, which is an extension of a preliminary analysis prepared for the Government of Botswana, deals with the socioeconomic determinants of fertility behavior and demographic characteristics in Botswana. The study is to be based on the Bank financed Botswana Rural Incom e Distribution Survey. (Ref. No. 671-61)

Case Studies of Family Planning Services

This work was undertaken to ascertain if an in-depth study on the causes of alleged success of the family planning programs in the Philippines, Indonesia, and Thailand was warranted. The data base for judging the success of the programs proved to be unreliable; and, therefore, the larger study was not pursued. (Ref. No. ECDPH40)

Population and Savings

This research deals with some of the basic conceptual and empirical issues concerning the micro-economic relationship between household size and composition, and savings in a life-cycle context. It comprises an attempt to model related behavior and suggest empirical avenues to test related hypotheses. One specific aspect of this behavior, viewing children as a vehicle for savings, is dealt with in the paper by Chernichovsky, "Fertility Behavior in Developing Economies: An Investment Approach." (Ref. No. ECDPH42)

Female Labor Force Participation and Fertility: Review of Empirical Evidence

This project was undertaken as part of the research on fertility determinants in the developing countries. Female labor force participation is thought to be one of the areas for policy intervention in the fertility field. Studies of the determinants of fertility are necessary for designing effective family planning. (Ref. No. ECDPH43)

Education and Fertility

This study is a review of the empirical evidence on the relationship between education and fertility. It reviews the evidence of the relationship between these variables on an aggregate and individual level. In addition, a model of fertility determination was developed and used to show how education affects fertility through a large number of intervening variables. (Ref. No. ECDPH45)

Experimentation in Family Planning

The study was undertaken to ascertain whether experimental efforts have led to the modification and improvement of the delivery of family planning services within regular programs. The study analyzed the methodology, the approaches tested, and the results obtained. It suggested guidelines for future experimental efforts in this field. (Ref. No. ECDPH46)

Food Price Intervention

Work on food price intervention and food delivery systems with a view to the improved nutrition of children is being done in connection with the Bellagio Workshop on Nutrition Oriented Food Policies sponsored by the Rockefeller Foundation. (Ref. No. DRCID03)

The McCormick Hospital Family Planning Program (Thailand)

The Population Projects Department has been preparing for publication a case study of the outstandingly successful family planning program in Chieng Mai province in Northern Thailand. The experience is of considerable international interest for three main reasons, i.e., (1) the program is conducted as a single-purpose activity, not as part of integrated health or other services, (2) the contraceptive method freely chosen by the large majority of clients has been a three-month injectable of wide potential application, and (3) the high acceptance rates attained, and pronounced demographic impact, appears to reflect a combination of rapidly changing standards of desired family size in a rural population experiencing strong socioeconomic development and the widespread availability of high-quality family planning services.

Note:	Food Price Intervention	- Development Research Center
	The McCormick Hospital Program	- Population Projects Department
	Other non-RPO projects	- Development Economics Department

IX. Public and Private Finance

Commercial Bank Behavior

Because of its size, its role in mobilizing deposit resources and its relatively wide geographic dispersion, the commercial banking system is the dominant financial institution in most developing countries and exerts a substantial influence on the allocation of resources. Yet, despite the policy importance of commercial banks, little is known about the determinants of their behavior and the effects of government policy on their actions. This study is investigating the commercial banking system of selected countries; a study of Brazil, now completed, evaluates the use of selective credit policies to determine how successful they have been in influencing the flows of commercial bank credit to the agricultural sector and to export oriented industries. A study of Sri Lanka, also completed, concentrates on the mobilization of resources by the banking system and on differences in the operations of expatriate and domestic banks. A case study of the commercial banking system in India is currently underway. (Ref. No. 671-25)

Gujerat Experiment

This is a study of banking innovations introduced by several Gujerat State institutions (Industrial Investment Corporation, Industrial Development Corporation and State Finance Corporation). They provide a package of services--entrepreneurial training, managerial and technical guidance and finance (including a part of equity capital)--and have successfully promoted a variety of small-medium enterprises during the last six to seven years. (Ref. No. ECDPF82)

The Syndicate Bank of India Study

The Syndicate Bank of India has introduced certain innovative schemes with regard to the mobilization of deposits from small savers as well as in the provision of credit to small enterprises in agriculture and industry. It is a unique bank: with its head office located in a village and its staff recruited from rural areas, it has experienced very rapid growth in the last fifteen years. This study is expected to be of some relevance to other LDCs; it would indicate the nature and characteristics of some of the financial innovations that are essential for viable credit transactions with the small enterprise sector. (Ref. No. ECDPF88)

Tax Evasion and Avoidance

The present study reviews the literature on tax evasion and avoidance and discusses its usefulness for designing an efficient tax system. It is found that evasion and avoidance of personal income taxation are widely prevalent in developing countries and that the tax revenue lost may be of the same order of magnitude as that actually collected. (Ref. No. ECDPF84)

The Incidence of the Corporation Income Tax

It is commonly agreed that a corporation income tax involves a double taxation of income from capital and discriminates against equity capital in the corporate sector, hence is neither equitable nor conducive to allocative and productive efficiency. Further, such a tax tends to affect the rate of capital formation and factor intensities adversely, and may not even serve its intended purpose of taxing income from equity capital. This paper argues on the basis of United States data that part of the burden of the corporate income tax is actually shared by labor, and that this result is probably true in most developing countries as well.

The Determinants of Savings Behavior -- A Survey of the Evidence

This paper evaluates the principal hypotheses regarding the determinants of savings behavior, paying particular attention to the motivations underlying the savings behavior of various socio-economic groups. The literature reviewed confirms the existence of a relationship between saving and income, but does not describe it unambiguously. The available evidence on the relationship between interest rates and household saving behavior is contradictory. Other determinants of saving behavior have been relatively neglected in the literature, and this emphasizes the need for more empirical work, preferably at a disaggregated level.

Household Savings in Sri Lanka

National accounts estimates of household savings in developing countries are notoriously unreliable, being derived as a residual, and with no information on how they are distributed between financial and tangible assets. This paper develops a procedure for estimating household savings within a system of social accounts, based on annual data for Sri Lanka over a 24-year period. Saving is defined as the change in earned surplus, and measured primarily from balance sheets as the change in the assets held by the household sector less the change in its liabilities. It is believed that this estimation method has general applicability to developing countries.

Savings Behavior in Rural India

Empirical evidence on the determinants of household savings in developing countries is sparse, especially for rural areas, which often account for 60 to 80% of the total population. This paper analyzes the savings behavior of rural households, using data for India, 1968-69 to 1970-71. The major findings of this study were: (i) the marginal propensity to save is an increasing function of income among small and medium farmers; (ii) the actual value of this propensity is a function of investment opportunity (expected rate of return on farm investment); and (iii) subsidized credit to rich farmers tends to depress their propensity to save. (Ref. No. ECDPF90)

Contractual Savings

This study focuses on the impact of social security institutions on saving and its allocation and on wealth distribution. A preliminary comparative study of the pattern of the household sectors' financial savings suggests the following hypotheses: (a) social security savings seem to have promoted the growth as well as the stability of such saving; (b) since these liabilities are of a longer-term nature, they have provided medium- and long-term finance for projects of long gestation,; (c) they have tended to reduce the degree of concentration in the distribution of wealth and income. A second study tests these hypotheses for Malaysia and its results suggest that they are empirically sound. (Ref. No. ECDPF85)

Resource Mobilization in Developing Countries

This study examines ways of improving domestic resource mobilization, allocation and use. It finds that in many developing countries the tax system is by and large proportional in its impact and causes inefficiencies in the production structure, and that pricing policies for public sector utilities involve subsidies to those who do not need them. Financial structure policies have often resulted in a fragmented money and capital market, while Central Banks have concentrated only on regulatory policies to the exclusion of measures to promote the development of the financial structure. On the basis of these characteristics, recommendations with respect to tax-expenditure, pricing, and financial structure policies and institutions are made.

On Monetary Data and Analysis

There is a growing recognition in the developing countries of the usefulness of flow-of-funds analysis as a technique of financial planning, and for identifying policies for monitoring financial balance. However, in the developing countries, the only reliable data that can be used for this type of analysis related to monetary developments and the balance of payments. This paper is concerned with money supply analysis, or analysis of the flow-of-funds through the banking system, discussing its use in both short-run policy formulation and in medium-term financial planning.

Some Project Issues in Indexation of Financial Contracts

This paper discusses the possible effects of indexing financial contracts on the mobilization and allocation of savings and on the viability of financial institutions in a period of inflation. It also explores the justification for indexing Bank lending operations in agriculture and industry. It concludes that indexation policy involves fairly high administrative costs and may also strengthen inflationary expectations, but can be useful in countries likely to experience high and variable inflation. Second, its success crucially depends on (a) its acceptance by the government as a desirable means of insulating the structure of interest rates against inflation; (b) its application to major medium- and long-term financial instruments for savings mobilization and credit allocation, on the basis of a general price index for the country in question; and (c) the adoption of complementary policies in the exchange and tax systems.

Public Enterprise Research

The objective of this project is to examine a set of hypotheses that are best described by the general proposition that the performance of such enterprises is dependent upon organizational and managerial structure and the socioeconomic environment within which they operate. For its conceptual base, the study will rely on a modification of the structure-behavior-performance paradigm of the field of industrial organization. In particular, structure would need to embrace environmental features, including organizational and supervisory constraints; behavior would include the response of firms to non-market (regulatory and bureaucratic) forces and constraints; and performance would have to take special cognizance of social objectives often imposed on public enterprises.

The study will be conducted in two phases: the first, exploratory phase, will survey the existing material, conduct pilot studies in selected enterprises in two to four countries (from among Egypt, India, Yugoslavia, Italy and France), and further develop the research design. The second phase would extend the sample after taking due account of the results of the exploratory phase. Given the nature of the subject, an important characteristic of the proposed study is that it will rely on both quantitative and qualitative data and information, and the conclusions to be reached will thus rely on both quantitative analysis and the "weight of evidence" approach. (Ref. No. ECDPF91)

Note: All projects - Development Economics Department

X. Tourism

Tourism Incentives Study

This study analyzes the economic returns from tourism expansion, discusses the justifications for granting special incentives to investors in hotels, and assesses the relative cost-effectiveness of different incentive measures. (Ref. No. R701)

Social Impact Study

This study will examine the non-economic impacts of tourism development, which have frequently been used as counter-arguments to projects otherwise justified on economic grounds, and determine whether there are means to take account of such factors in the design of projects. (Ref. No. R707)

Integration of Women in Development

The objective of this study is to examine the effects of tourism development on the roles of women in Zihuatanejo, Mexico, where the Bank has financed a tourism project. The impacts of urbanization and community development on the status of employment of women and family living patterns are also analyzed. (Ref. No. R708)

Review of the Literature Relating Climatic Characteristics to Tourism Development Potential

This study was undertaken to provide the Tourism Department with guidelines regarding how climatic characteristics affect (a) the selection of areas for tourism development in a given region or country; and (b) the design of tourism resorts in selected areas. (Ref. No. R709)

Note: All projects - Tourism Projects Department

APPENDIX B

Evaluation of Projects Completed During FY77

Eight research projects have been evaluated over the past year. The first of these was begun in the early 1970s to help improve the methods of project appraisal used in Bank operations (670-08). One of its main objectives was to derive short-cut, practical methods of estimating shadow prices, and to examine the sensitivity of shadow prices to assumptions about growth and the impact of policy; another was to continue research on the shadow price of capital and on the application of alternative project evaluation procedures. A diverse collection of published papers has resulted, several of which are judged to have made significant contributions to the general understanding of shadow pricing techniques. These influenced the preparation of Economic Analysis of Projects 1/ and subsequent operational guidelines. However, the project did not directly provide practical guidance on which short-cut estimation methods should actually be used in particular circumstances. The question of how much difference it makes to use one estimation method rather than another needs further empirical work in the operational context. The project yielded reasonably good value for money, but would have been more cost-effective had more time been devoted to following up potentially useful theoretical advances.

The second project was a study of the effects of agricultural mechanization on employment, output and productivity, undertaken by two well-known Indian academic institutions (670-14). This project gathered a great deal of field data and helped to dispel some of the fears about the labor-displacing effects of agricultural mechanization in the Indian context, but overall it fell short of expectations. The methods used to analyze the data were too rigid to yield findings which could illuminate policy choices. The project suffered from lack of agreement about the time which key local researchers would contribute, and from inadequate Bank participation. An exhaustive and decisive review at an intermediate stage would have been worthwhile.

Studies of the impact on income distribution of public expenditures on education (670-44), begun in 1971, have helped illuminate a key policy question: the likely effects on poverty

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1/ Squire, Lyn, and Herman G. van der Tak, Economic Analysis of Projects, Baltimore and London, Johns Hopkins University Press for the World Bank, 1975.

of gradualist measures such as the provision of basic services. The research concluded that widely available primary education demonstrably helps to redistribute income from the rich to the poor. However, the provision of public education at higher levels may only help to increase social equity if education pricing, financing and tax policies are explicitly designed to this end. Otherwise, middle income students tend to be subsidized by the poor as well as by the very rich. The project has also shown that student loans are not an efficient means of changing either the supply and structure of a country's educated manpower, or the social composition of its student body. Partly because the principal researcher combined work on this project with Bank operational activities, the results have directly influenced the Bank's education policy and sector work. They have also influenced Bank research on the income distributional impact of services other than education. The results are reported in four Bank Staff Working Papers (157, 182, 216 and 268) and an Occasional Paper. 1/

A fourth project, undertaken at the Federal University of Brasilia and M.I.T., has developed general equilibrium planning models of Brazil to measure the macroeconomic impact of alternative policy instruments on growth and income distribution (670-69). This research was highly innovative and its results are widely recognized to be at the forefront of professional work in this area. As such, they have helped to reveal that models of this kind unfortunately have only limited power as decision-making tools. Though the data presentation and other analytical work done in the course of model construction are thought likely to be useful in Bank regional economic work, the models themselves are not, nor have they assisted Brazilian policy-making. The results of the project have had a catalytic effect on other modeling work inside and outside the Bank: the particular economy-wide approach to analysis of policy options has proved less useful than anticipated, and different approaches are now being explored.

The fifth project to be evaluated was intended to provide a better understanding of the interrelationships between fertility, labor supply and other socioeconomic characteristics, by undertaking household surveys of the rural poor in Northeast Brazil (670-99). It was structured in two phases. The first set out to develop and test survey instruments and procedures in a pilot application to 200 families; the results were to shape the design of the second phase, which was to be on a much larger scale. By the end of the first phase, the accomplishments were small relative to expectations. This was partly

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1/ Public Expenditures on Education and Income Distribution in Colombia, World Bank Occasional Paper No. 18, Baltimore and London, The Johns Hopkins University Press, 1974, 74 pp.

for unavoidable reasons (for example, floods interfered with field work), but largely because insufficient attention had been given in design and approval to a precise definition of objectives. Unforeseen demands on the Bank staff directing the project meant that consultants had to be employed to take over; some of them lacked the experience to do this. The project also suffered from lack of sustained interest on the part of the local research institutions and government agencies with which it was hoped to collaborate. The second phase survey was therefore never carried out and the project has been discontinued.

One of a group of studies on urban labor markets analyzed the reasons for differences in household income levels in a Brazilian city (670-90). The researchers received very good cooperation in Brazil and were given access to valuable survey data. The evaluation panel considered that the findings of this study well justified the expenditure on it, although the message they held for Bank operations was negative and cautionary. The results show that--particularly for the extremely poor--the relationships between employment and income distribution are far more complex than has commonly been imagined, and cannot be captured by conventional "human capital" analysis. The project has identified several areas which need further work; among them are aspects of family income (e.g. transfer income) which could not be analyzed for lack of data.

A small research project on public utility pricing and investment (671-11) was evaluated as part of a longer-term work program on the application of economic analysis to public utility pricing and investment decisions (traditionally based largely on financial and technical criteria). This project consisted of two studies, one a case study of electricity pricing in Thailand; the other a more theoretical paper on alternative definitions of marginal cost (Bank Staff Working Paper 259). In general, Bank analytical work on marginal cost pricing, supported by this and other research projects and reflected in policy papers, has had a wide impact on operational staff. A number of Bank borrowers have expressed interest in incorporating marginal cost principles in tariffs, and are studying the implications of so doing, though as yet few have actually taken action.

The last project to be evaluated was research leading to the production of an "Urbanization Primer for Design of Sites and Services Projects" (671-16). This document, produced by consultants, provides a logical and comprehensive planning framework, which was a useful advance at the time it was written. However, it has some serious deficiencies. The researchers had only limited previous experience in developing countries, and were reluctant at first to consider design standards below a certain level. Some of their design specifications can be

questioned on technical grounds. The manual is rather difficult to read; an article distilling its contents is to be produced within the Bank. This is another project where collaboration with consultants, eminent in their field, demanded a great deal of staff time to produce results applicable to Bank operations.

APPENDIX

WORLD BANK RESEARCH PROGRAM

Table 1: RESEARCH COMMITTEE MEMBERS

H. B. Chenery (Chairman), Vice President, Development Policy

B. Balassa, Consultant, Development Research Center

B. A. de Vries, Industrial Policy Adviser, Industrial Development and Finance Department

V. Dubey, Chief Economist, Europe, Middle East and North Africa Regional Office

J. Holsen, Chief Economist, Latin America and the Caribbean Regional Office

E.V.K. Jaycox, Director, Urban Projects Department

B. B. King, Director, Development Economics Department

E. Lerdau, Director, Latin America and the Caribbean Regional Office, Country Programs Department II

I.M.D. Little, Acting Research Adviser, Development Policy Staff

R. Picciotto, Director, South Asia Projects Department

H. G. van der Tak, Director, Projects Advisory Staff

H. Vergin, Assistant Director, Programming and Budgeting Department

E. B. Waide, Chief Economist, South Asia Regional Office

WORLD BANK RESEARCH PROGRAM

Table 2: FINANCIAL STATUS OF CURRENT AND RECENTLY COMPLETED RESEARCH PROJECTS
(US$'000)

Category/Title	Project Code	Department Responsible	FY76 (Actual)	FY77 (Actual)	Total to Date a/	FY78 (Authorized) b/	Remainder of Total Authorization c/
I. Development Policy and Planning							
A. General/Planning	-	-	-	-	-	-	-
B. Income Distribution							
Short-run and Long-run Influences upon Income Distribution	670-06	DRC	6.9	10.7	171.6	5.0	-
Growth and Income Distribution in Brazil	670-69	DRC	4.3	-	114.7	-	-
Evaluation of Latin American Data on Income Distribution	670-83	DRC	70.6	9.9	154.6	-	-
Growth, Employment, and Size Distribution of Income	670-84	DRC	72.8	-	209.5	-	-
Urban Income Distribution in Latin America	670-85	DRC	85.0	-	193.0	-	-
Employment and Income Distribution in Malaysia	670-94	DRC	12.5	-	63.9	-	-
Distributive Impact of Public Expenditures	670-96	DRC/DED	25.2	14.9	174.3	-	-
Evaluation of Asian Data on Income Distribution	671-08	DRC	51.7	40.0	106.1	58.7	-
Income Distribution in Thailand	671-36	DRC	12.2	25.6	37.8	5.2	-
Indirect Estimation of the Size Distribution of Income	671-41	DRC	2.4	17.6	20.0	-	-
Sub-total			343.6	118.7	1,245.5	68.9	
C. Growth/Country Economic Analysis/Development Strategy							
Development Strategies in Semi-Industrial Countries	670-01	DRC	12.7	0.7	135.0	1.3	-
International Model	670-07	DRC	2.6	-	39.6	-	-
Project Appraisal and Shadow Prices	670-08	CPSVP	2.9	-	73.6	-	-
International Comparison Project	670-68	EPD	127.1	203.0	604.2	-	-
Prototype Models for Country Analysis	670-86	DRC	122.9	96.8	243.9	119.0	33.0
Commercial Bank Behavior	671-25	DED	35.2	4.9	40.1	5.0	4.9
Social Accounts and Development Models	671-27	DRC	41.4	62.4	103.8	103.7	-
A General Algebraic Modeling System	671-58	DRC	-	-	-	40.0	45.0
Small Enterprise Financing: Role of Informal Credit Markets	671-65	DED	-	-	-	-	43.1
Research Support for the World Development Report	671-66	EPD	-	-	-	50.0	-
Capital Market Imperfections and Economic Development	671-69	DED	-	-	-	28.2	10.1
Sub-total			344.8	367.8	1,240.2	347.2	136.1
Total Section I			688.4	486.5	2,485.7	416.1	136.1

Category/Title	Project Code	Department Responsible	FY76 (Actual)	FY77 (Actual)	Total to Date a/	FY78 (Authorized) b/	Remainder of Total Authorization c/
II. International Trade and Finance							
Natural Resources and Planning: Issues in Trade and Investment	671-09	DRC	65.9	54.9	140.9	24.2	-
Promotion of Non-Traditional Exports	671-10	LCN	3.9	35.0	42.0	-	-
Agricultural Commodity Projections	671-23	EPD	8.1	-	50.0 d/	1.9	-
Linkage of Commodity and Country Models	671-28	EPD	27.5	30.0	57.5	43.0	-
Export Incentive in Developing Countries	671-35	DRC	44.8	52.1	96.9	80.1	-
Marketing Manufactured Exports	671-56	DED	-	-	-	17.9	14.6
Effects of Increased Imports of Manufactured Goods from Developing Countries	671-67	EPD	-	-	-	-	100.8
Key Institutions and Expansion of Manufactured Exports	671-68	DED	-	-	-	29.2	63.8
Total Section II			150.2	172.0	387.3	196.3	179.2
III. Agriculture and Rural Development							
Agriculture Mechanization Study in India	670-14	AGR	-	-	90.1	-	-
Rural Development in Northeast Brazil	670-73	DRC	55.1	44.0	369.2	8.9	-
Land Reform in Latin America	670-80	DED	2.5	-	55.8	-	-
Development Strategies for Smallholder Agriculture in Yugoslavia	670-89	AGR	2.0	0.8	33.1	-	-
Evaluation of Lilongwe Land Development Program	670-93	EAP	0.9	2.5	24.8	-	-
The Analysis of Change in Rural Communities	671-17	DRC	76.7	46.6	181.1	27.8	-
Raising the Productivity of Small Farms	671-22	AGR	15.0	-	30.0	-	-
Simulation of Buffer Stocks	671-24	DED	5.4	10.9	27.5	13.7	-
Agricultural Pricing and Storage Policies in East Africa	671-29	DRC	43.4	49.3	92.7	-	-
Management and Organization of Irrigation Projects	671-34	AGR	35.4	25.0	60.4	98.1	-
Price Intervention in Agriculture	671-39	DRC	2.4	2.8	5.2	-	-
Country Case Studies of Agricultural Prices and Subsidies	671-42	AGR	-	189.1	189.1	16.1	-
Consequences of Risk for Agricultural Policy	671-43	DRC	-	25.4	25.4	22.6	-
Agricultural Innovation and Rural Development	671-44	AGR	-	54.1	54.1	15.6	-
Programming and Designing Investment: Indus Basin	671-45	DRC	-	53.4	53.4	115.0	101.6
Distribution of Income through the Extended Family System	671-57	WA2	-	-	-	165.3	10.0
India: Impact of Agricultural Development on Employment and Poverty: Phase I	671-62	DRC	-	-	-	18.3	7.2
Food Deficits of Target Groups	671-64	AGR	-	-	-	27.5	12.3
Total Section III			238.6	503.9	1,291.9	528.9	131.1
IV. Industry							
Scope for Capital-Labor Substitution in the Mechanical Engineering Industry	670-23	DED	8.5	8.0	121.8	-	-
Programming in the Manufacturing Sector	670-24	DED	36.5	28.5	200.1	13.5	-
Industrial Capacity Utilization in Selected Latin American Countries	670-25	IDF	-	-	50.0	12.5	-
Industrial Policies and Economic Integration in West Africa	670-87	DRC	12.2	3.0	87.6	6.0	-
Industrial Capacity Utilization	670-95	DED	-	-	58.2	-	-
Patterns of Industrial Development	671-05	DED	27.7	17.2	55.9	0.1	-
A Comparative Study of the Sources of Industrial Growth and Structural Change	671-32	DED	56.5	42.6	99.1	49.3	3.1
Appropriate Industrial Technology	671-51	DED	-	-	-	24.0	2.8
Small-Scale Enterprise Development	671-59	DED	-	-	-	112.0	57.2
Total Section IV			141.4	99.3	672.7	217.4	63.1

Category/Title	Project Code	Department Responsible	FY76 (Actual)	FY77 (Actual)	Total to Date a/	FY78 (Authorized) b/	Remainder of Total Authorization c/
V. Transportation							
Substitution of Labor and Equipment in Civil Construction	670-26	TRP	101.7	101.4	955.4	-	-
Highway Design Study, Phase II	670-27	TRP	55.1	115.4	451.6	125.0	28.0
Yemen Arab Republic Feeder Road Study	670-29	TRP	-	-	53.2	-	-
Ethiopia Feeder Road Study	670-71 e/	TRP	-	-	20.9 e/	-	-
Port Pricing and Investment Policies for Developing Countries	671-13	TRP	16.9	6.2	34.5	-	-
Madagascar Feeder Road	671-14	TRP	55.9	14.2	102.2	2.3	-
Economic Role of Railways	671-50	TRP	-	10.8	10.8	20.7	-
Total Section V			229.6	248.0	1,628.6	148.0	28.0
VI. Public Utilities							
Standards of Reliability of Urban Electricity Supply	670-67	EWT	12.1	64.6	114.5	12.0	-
Pricing and Investment in Telecommunications	670-76	EWT	4.9	-	33.4	-	-
Public Utility Pricing and Investment	671-11	EWT	6.9	-	23.2	-	-
Reduction in Waste Water	671-12	EWT	13.5	-	27.9	-	-
Appropriate Technology for Water Supply and Waste Disposal	671-46	EWT	-	168.1	168.1	388.7	23.0
Total Section VI			37.4	232.7	367.1	400.7	23.0
VII. Urbanization and Regional Development							
Urban Public Finance and Administration	670-70	DED	-	3.4	70.3	10.3	-
Urban Land Use Policies: Taxation and Control	670-98	DED	2.3	-	25.3	-	-
Standards for Site and Service Projects	671-16	URB	15.1	-	58.6	-	-
Pricing and Financing of Urban Public Service: Water Supply and Sewage Disposal	671-18	DED	22.8	1.8	59.5	0.6	-
Urban Traffic Restraint (Singapore)	671-20	URB	122.6	7.3	262.7	-	-
Analyzing the Effects of Urban Housing Policies in Developing Countries	671-37	DED	10.0	22.2	32.2	-	-
Strategic Planning to Accommodate Rapid Growth in Cities of Developing Countries ("City Study")	671-47	DED	-	30.4	30.4	305.6	253.0
Total Section VII			172.8	65.1	539.0	316.5	253.0
VIII. Population and Human Resources							
A. Education							
Education Finance and Income Distribution	670-44	EDC	-	-	33.1	-	-
Project Evaluation Methodology: Education Attainments	670-78	EDC	18.7	12.7	97.0	-	-
Economic Development and Educational Reform	671-19	DED	28.1	2.4	40.0	2.9	-
Ability Characteristics as Factors of Production	671-33	DRC	7.3	-	7.3	-	-
Education and Rural Development in Nepal and Thailand	671-49	DED	-	30.4	30.4	55.4	24.9
Occupational Structures of Industries	671-52	EDC	-	-	-	40.0	33.6
Economics of Educational Radio	671-54	EDC	-	4.0	4.0	57.0	-
Retention of Literacy/Numeracy Skills Among School Leavers	671-55	EMP/EPD	-	1.9	1.9	41.1	-
Textbook Availability and Educational Quality	671-60	EDC/DED	-	-	-	28.1	18.2
Sub-total			54.1	51.4	213.7	224.5	76.7

Category/Title	Project Code	Department Responsible	FY76 (Actual)	FY77 (Actual)	Total to Date a/	FY78 (Authorized) b/	Remainder of Total Authorization c/
B. Labor and Employment							
Labor Market in Malaysia	670-43	DED	9.6	-	50.3	-	-
Labor Force Participation, Income and Unemployment	670-45	DED	48.4	18.2	112.1	10.0	-
Labor Market in a Rapidly Growing Economy	670-90	DED	2.2	-	31.4	-	-
Employment Models and Projections	671-06	DED	77.0	24.1	142.1	3.1	-
Council for Asian Manpower Studies (CAMS)	671-07	DED	25.0	-	50.0	-	-
Migration Patterns in West Africa	671-26	DED	28.4	13.1	41.5	19.5	-
Structure of Rural Employment, Income, and Labor Markets	671-30	DED	12.7	8.6	21.3	60.9	17.8
A Comparative Analysis of Rural-Urban Labor Market Interactions	671-31	DED	22.2	0.4	22.6	3.0	1.0
Urban Labor Markets in Latin America	671-48	DED	-	5.5	5.5	38.1	-
Labor Migration and Manpower in the Middle East and North Africa	671-63	DED/EMP	-	-	-	41.5	88.0
Sub-total			225.5	69.9	476.8	176.1	106.8
C. Population and Health							
Economic Aspects of Household Fertility Behavior and Labor Supply in Northeast Brazil	670-99	DED	3.7	0.2	42.7	-	-
Population Growth and Rural Poverty	671-02	DED	25.3	13.7	60.4	2.1	-
Maximizing the Usefulness of Household Surveys	671-03	DED	-	2.4	16.7	-	-
Effects of Health and Nutrition Standards of Worker Productivity	671-15	TRP	24.1	13.6	38.3	-	-
Narangwal Population and Nutrition	671-38	DED	53.5	61.1	114.6	75.0	25.0
International Review Group on Research in Population and Development	671-40	DED	20.0	-	20.0	-	-
El Salvador Health Study	671-53	DED	-	-	-	27.0	30.0
Socio-Economic Aspects of Fertility Behavior in Rural Botswana	671-61	DED	-	-	-	53.6	28.4
Case Studies of Determinants of Recent Fertility Decline	671-70	DED	-	-	-	10.0	70.0
Sub-total			126.6	91.0	292.7	167.7	153.4
Total Section VIII			406.2	213.6	984.5	568.3	336.9
IX. Other f/			-	19.4	72.1	55.8	-
Grand Total			2,064.6	2,039.2	8,427.6	2,848.0	1,150.4

a/ Sum of expenditures, FY1972-FY1977. Research projects completed during or prior to FY76 have been omitted from this table for simplicity of presentation. For financial information on such projects, please consult World Bank Research Program, January 13, 1977, Appendix Table 2.
b/ Research Committee authorizations as of November 1, 1977. Authorizations include overprogramming to allow for normal intervals between authorizations and disbursements. The budget authorization for FY78 is $2,430,000.
c/ FY79 and beyond.
d/ Includes financing from the General Contingency budget in FY75.
e/ After FY74, Project 670-71 has been financed from IDA Credit No. Cr. 416-ET, July 5, 1973.
f/ Includes studies in the country concentration exercise completed in 1976, and provision for travel and conferences.

NOTE: The above figures include expenditures for consultant fees, consultant and staff travel, and contractual services, but not salaries of Bank staff.

DEPARTMENT CODES

Development Policy Staff

DED - Development Economics Department
DRC - Development Research Center
EPD - Economic Analysis and Projections Department

Central Projects Staff

AGR - Agriculture and Rural Development Department
EDC - Education Department
EWT - Energy, Water, and Telecommunications Department
IDF - Industrial Development and Finance Department
TRP - Transportation Department
URB - Urban Projects Department
CPSVP - Projects Advisory Staff

Regional Offices

EAP - Eastern Africa, Projects Department
EMP - Europe, Middle East and North Africa, Projects Department
LCN - Latin America and Caribbean Regional Office
WA2 - Western Africa, Country Programs Department II

WORLD BANK RESEARCH PROGRAM

Table 3: COUNTRY REFERENCE OF EXTERNAL RESEARCH PROJECTS AND PARTICIPATING INDIVIDUALS AND INSTITUTIONS

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Argentina	670-01	Development Strategies in Semi-Industrial Countries	D. Schydlowsky (Center for Latin American Studies, Boston University, USA); J. Berlinski (Di Tella Institute, Buenos Aires)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois,USA)
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R.ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-42	Country Case Studies of Agricultural Prices and Subsidies	L. Reca
Bolivia	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima
	670-80	Land Reform in Latin America	Land Tenure Center, University of Wisconsin (USA)
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
Botswana	671-46	Appropriate Technology for Water Supply and Waste Disposal	M. D. Blackmore
	671-61	Socio-Economic Aspects of Fertility Behavior in Rural Botswana	Botswana Central Statistics Office; R. Lucas (Boston University,USA); E. Mueller (University of Michigan, USA)
Brazil	670-25	Industrial Capacity Utilization in Selected Latin American Countries	Federal University of Pernambuco, Pernambuco; P. Rosenstein-Rodan and D. Schydlowsky (Center for Latin American Studies, Boston University,USA); Fundação Getúlio Vargas, Rio de Janeiro
	670-27	Highway Design Study, Phase II	Transport Planning Agency (GEIPOT), Brasilia; University of Texas (USA)
	670-44	Education Finance and Income Distribution	Fundação IBGE - Instituto Brasileiro de Geografia e Estadística, Rio de Janeiro; C. Mclure (Rice University, USA); G. Sahota (Vanderbilt University, USA)
	670-67	Standards of Reliability of Urban Electricity Supply	Overseas Consultancy Service (UK); W. G. Scott (Commonwealth Associates,Inc.,USA); Compania Paranaense de Energia Elétrica (COPEL), Curitiba
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Fundação Getúlio Vargas, Rio de Janeiro
	670-69	Growth and Income Distribution in Brazil	L. Taylor (Massachusetts Institute of Technology, USA); E. M. Bacha and Francisco Lopez (Federal University of Brasilia, Brasilia)
	670-73	Rural Development in Northeast Brazil	Superintendência do Desenvolvimento do Nordeste (SUDENE), Recife
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Brazil (cont'd.)	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
	670-90	Labor Market in a Rapidly Growing Economy	Centro de Planejamento Regional (CEDEPLAR), Belo Horizonte; Metropolitan Planning Board (PLAMBEL), Belo Horizonte
	670-99	Economic Aspects of Household Fertility Behavior and Labor Supply in Northeast Brazil	Superintendência do Desenvolvimento do Nordeste (SUDENE), Recife
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-25	Commercial Bank Behavior	Fundação Getúlio Vargas, Rio de Janeiro
	671-35	Export Incentives in Developing Countries	Mauricio Barata de Paula Pinto (Fundação Instituto de Pesquisas Economicas, Sao Paulo)
Chile	670-25	Industrial Capacity Utilization in Selected Latin American Countries	P. Rosenstein-Rodan and D. Schydlowsky (Center for Latin American Studies, Boston University, USA); Instituto Latinoamericano de Planificación Económica y Social, Santiago
	670-80	Land Reform in Latin America	Land Tenure Center, University of Wisconsin (USA)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
	671-19	Economic Development and Educational Reform	C. Calvo, M. Carnoy (Stanford University, USA)
China, Republic of	670-01	Development Strategies in Semi-Industrial Countries	T. H. Lee (Joint Commission on Rural Reconstruction, Taipei); K. Liang
	670-84	Growth, Employment and Size Distribution of Income	J. Fei, G. Ranis, G. Fields (Economic Growth Center, Yale University, USA); W. Kuo (Economic Planning Council, Taipei)
	671-07	Council for Asian Manpower Studies (CAMS)	K. Liang (National Taiwan University); C. Liang (National Changchi University)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	W. Kuo (National Taiwan University, Taipei)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. S. Ng
Colombia	670-01	Development Strategies in Semi-Industrial Countries	D. Schydlowsky (Center for Latin American Studies, Boston University, USA)
	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima
	670-25	Industrial Capacity Utilization in Selected Latin American Countries	P. Rosenstein-Rodan and D. Schydlowsky (Center for Latin American Studies, Boston University, USA)
	670-44	Education Finance and Income Distribution	B. Nunez (Instituto Colombiano de Especialización Técnica en el Exterior (ICETEX), Bogotá); C. Mc Lure (Rice University, USA); G. Sahota (Vanderbilt University, USA)

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Colombia (cont'd.)	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office,UNSO); Departamento Administrativo Nacional de Estadística (DANE),Bogotá
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-84	Growth, Employment, and Size Distribution of Income	J. Fei, G. Ranis and G. Fields (Economic Growth Center, Yale University, USA)
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
	670-95	Industrial Capacity Utilization	Fundación para la Educación Superior y el Desarrollo (FEDESARROLLO), Bogotá
	670-96	Distributive Impact of Public Expenditures	Compañía Colombiana de Datos, Bogotá
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R.ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-18	Pricing and Financing of Urban Public Services: Water Supply and Sewage Disposal	R. Bird (University of Toronto,Canada); L.K. Hubbell (University of Missouri, Kansas City,USA); C. E. Mc Lure (Rice University, USA)
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	J. de Melo (Georgetown University, USA)
	671-47	Strategic Planning to Accommodate Rapid Growth in Cities of Developing Countries ("City Study")	Corporación Centro Regional de Población (CCRP), Bogotá
	671-48	Urban Labor Markets in Latin America	A. Berry (University of Toronto, Canada)
	671-56	Marketing Manufactured Exports	D. Morawetz (Australian National University, Australia)
	671-59	Small Scale Enterprise Development	José F. Excandon
Costa Rica	670-76	Pricing and Investment in Telecommunications	Instituto Costarricense de Electricidad, San José; M. Tristán (University of Costa Rica, San José)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Cuba	671-19	Economic Development and Educational Reform	M. Carnoy, J. Wertheim (Stanford University, USA)
Ecuador	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima
	670-25	Industrial Capacity Utilization in Selected Latin American Countries	P. Rosenstein-Rodan and D. Schydlowsky (Center for Latin American Studies, Boston University, USA)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
Egypt	670-24	Programming in the Manufacturing Sector	Organization for Chemical Industries, Cairo
	671-42	Country Case Studies of Agricultural Prices and Subsidies	S. Janakiram; Chung Chi Lu
El Salvador	671-53	El Salvador Health Study	Fundación Salvadoreña de Desarrollo y Vivienda Mínima (FSDVM), San Salvador

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Ethiopia	670-71	Ethiopia Feeder Road Study	Institute of Development Research, National University, Addis Ababa
	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
Gambia	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France); K. Swindell (University of Birmingham, UK)
Ghana	670-87	Industrial Policies and Economic Integration in West Africa	D. Stryker (Tufts University, USA); S. Pearson and G. Nelson (Food Research Institute, Stanford University, USA)
	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. Iwugo; A. Wright
Greece	671-35	Export Incentives in Developing Countries	E. Voloudakis (Center for Planning and Economic Research, Athens)
Guatemala	671-46	Appropriate Technology for Water Supply and Waste Disposal	M. Elmendorf; P. Buckles; R. Caceres (Centro Mesoamericano de Estudios, Guatemala City)
Honduras	670-26	Substitution of Labor and Equipment in Civil Construction	Ministry of Communications, Public Works and Transport, Tegucigalpa; GITEC, Düsseldorf, F. R. Germany
	670-83	Evaluation of Latin America Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Hong Kong	671-07	Council for Asian Manpower Studies (CAMS)	R. Hsia (University of Hong Kong)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
India	670-24	Programming in the Manufacturing Sector	Ministry of Chemicals and Fertilizers, Fertilizer Association of India, Fertilizer Corporation of India, New Delhi
	670-26	Substitution of Labor and Equipment in Civil Construction	Scott, Wilson, Kirkpatrick & Partners, London, UK; Director General, Border Roads, New Delhi; Ministry of Transport, New Delhi; Central Water & Power Commission, New Delhi; State Public Works Department
	670-27	Highway Design Study, Phase II	Central Road Research Institute, New Delhi; Ministry of Transport, New Delhi
	670-45	Labor Force Participation, Income and Unemployment	Bombay University, Bombay
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Central Statistical Organization, New Delhi
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA
	671-06	Employment Models and Projections	R. Krishna (Planning Commission, New Delhi)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)

Country	Project Code	Title	Participating Individual(s) and Institution(s)
India (cont'd.)	671-19	Economic Development and Educational Reform	P. Panchamukhi (University of Bombay)
	671-25	Commercial Bank Behavior	Indian Institute of Management, Ahmedabad
	671-30	Structure of Rural Employment, Income and Labor Markets	K. Bardhan
	671-38	Narangwal Population and Nutrition	Johns Hopkins University, USA - C. Taylor, R. S. S. Sarma, R. Parker, A. Kielmann, N. Kielmann
	671-46	Appropriate Technology for Water Supply and Water Disposal	National Environmental Engineering Research Institute, Nagpur
Indonesia	670-24	Programming in the Manufacturing Sector	Food and Agriculture Organization (FAO), Rome; PUSRI, Jakarta
	670-26	Substitution of Labor and Equipment in Civil Construction	Directorate of Water Resources Development, Jakarta; Highways Department, Jakarta; Scott, Wilson, Kirkpatrick & Partners, London, UK
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	671-07	Council for Asian Manpower Studies (CAMS)	Hidayat (Padjadjaran University)
	671-15	Effects of Health and Nutrition Standards on Worker Productivity	M. Latham and M. Brooks (Cornell University, USA); Nutrition Research Institute, Bogor
	671-46	Appropriate Technology for Water Supply and Waste Disposal	S. Soesanto (National Institute of Health Research and Development, Jakarta)
Iran	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Bank Markazi Iran, Tehran
Israel	670-01	Development Strategies in Semi-Industrial Countries	Z. Sussman (Bank of Israel, Jerusalem)
	670-95	Industrial Capacity Utilization	Hebrew University, Jerusalem
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	M. Fraenkel (Bank of Israel, Jerusalem)
Ivory Coast	670-87	Industrial Policies and Economic Integration in West Africa	D. Stryker (Tufts University, USA); T. Monson (Centre Ivoirien de Recherche Economique et Sociale, Abidjan)
	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Jamaica	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
Japan	671-07	Council for Asian Manpower Studies (CAMS)	K. Odaka (Hitosubashi University)
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	T. Watanabe (University of Osaka, Japan)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	Nihon Suido Consultants, Tokyo
Kenya	670-26	Substitution of Labor and Equipment in Civil Construction	International Labour Office, Geneva, Switzerland; Scott, Wilson, Kirkpatrick & Partners, London, UK; Ministry of Works, Nairobi

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Kenya (cont'd.)	670-27	Highway Design Study, Phase II	Ministry of Works, Nairobi; Transport & Road Research Laboratory, UK
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Central Bureau of Statistics, Nairobi
	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA
	671-15	Effects of Health and Nutrition Standards on Worker Productivity	M. Latham and M. Brooks (Cornell University, USA); Ministry of Works, Nairobi; Kenyetta General Hospital, Nairobi
	671-18	Pricing and Financing of Urban Public Services: Water Supply and Sewage Disposal	R. Bird (University of Toronto, Canada); L. K. Hubbell (University of Missouri, Kansas City, USA); C. E. Mc Lure (Rice University, USA)
	671-42	Country Case Studies of Agricultural Prices and Subsidies	Peter McLoughlin Associates, Inc. (Canada)
Korea	670-01	Development Strategies in Semi-Industrial Countries	K. S. Kim (Korea Development Institute, Seoul)
	670-03	Patterns of Demand and Savings in the Development Process	Bank of Korea, Seoul
	670-06	Short-run and Long-run Influences upon Income Distribution	I. Adelman (University of Maryland, USA); Korea Development Institute, Seoul
	670-23	Scope for Capital-Labor Substitution in the Mechanical Engineering Industry	Korean Institute of Science and Technology, Seoul
	670-24	Programming in the Manufacturing Sector	Korean Institute of Science and Technology, Seoul
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Bank of Korea; Economic Planning Board; Ministry of Construction, Seoul
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	670-86	Prototype Models for Country Analysis	Korea Development Institute, Seoul
	671-07	Council for Asian Manpower Studies (CAMS)	W. Hong (Korea Development Institute, Seoul); S. Hwan Ban (Seoul National University)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, H. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-30	Structure of Rural Employment, Income and Labor Markets	C. Y. Ahn (Choong Ang University, Seoul); National Agricultural Economic Research Institute, Seoul
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	K. S. Kim (Korea Development Institute, Seoul)

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Korea (cont'd.)	671-35	Export Incentives in Developing Countries	S. T. Suh (Korea Development Institute, Seoul)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	D. M. Kim (City College of Seoul, Seoul)
Lesotho	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
Liberia	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Madagascar	671-14	Madagascar Feeder Road Study	Swiss Federal Institute of Technology, Zurich; Bureau Central d'Études Pour les Equipements d'Outre-Mer, Paris, France; Fonds d'Aide at de Coopération, Paris, France
Malawi	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); National Statistical Office, Zomba
	670-93	Evaluation of Lilongwe Land Development Program	B. Kinsey (School of Development Studies, University of East Anglia, UK)
Malaysia	670-24	Programming in the Manufacturing Sector	World Pulp and Paper Program, Food and Agricultural Organization (FAO), Rome
	670-43	Labor Market in Malaysia	Survey Research Malaysia, Kuala Lumpur
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Department of Statistics, Kuala Lumpur
	670-94	Employment and Income Distribution in Malaysia	S. Anand (St. Catherine's College, Oxford); Economic Planning Unit; Department of Statistics, Kuala Lumpur
	670-96	Distributive Impact of Public Expenditures	Lai ah Hoon (University of Malaysia, Kuala Lumpur); P. Heller (University of Michigan, USA); Eastern Market Assessment Survey Company, Kuala Lumpur; Department of Statistics and various ministries, Kuala Lumpur
	671-07	Council for Asian Manpower Studies (CAMS)	University of Malaysia, Kuala Lumpur
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-27	Social Accounts and Development Models	J. Round (University of Warwick, UK); Department of Statistics, Kuala Lumpur; Economic Planning Unit, Kuala Lumpur
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. S. Ng
Mali	671-26	Migration Patterns in West Africa	J. Conde (OECD Development Center, Paris, France)

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Mexico	670-03	Patterns of Demand and Savings in the Development Process	Secretaría de la Presidencia, Mexico City
	670-67	Standards of Reliability of Urban Electricity Supply	Overseas Consultancy Service (UK); W. G. Scott (Commonwealth Associates,Inc.,USA)
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Dirección General de Estadística, México City; Banco de Mexico, Mexico City
	670-80	Land Reform in Latin America	Centro de Investigaciones Agrarias, Mexico City; Land Tenure Center, University of Wisconsin (USA)
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	M. Syrquin (Bar Ilan University, Israel)
	671-40	International Review Group on Research in Population and Development	C. Miro; El Colegio de México, Mexico City
	671-42	Country Case Studies of Agricultural Prices and Subsidies	Y. Plessner (Hebrew University, Israel)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	F. Miller
Nepal	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-49	Education and Rural Development in Nepal and Thailand	New ERA, Kathmandu; L. Lau (Stanford University, USA); M. Lockheed (Educational Testing Service, USA)
Nicaragua	671-46	Appropriate Technology for Water Supply and Waste Disposal	M. Elmendorf; C. Pineo
	671-54	Economics of Educational Radio	P. Suppes (Stanford University, USA)
	671-60	Textbook Availability and Educational Quality	P. Suppes (Stanford University, USA)
Nigeria	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA
	671-30	Structure of Rural Employment, Income, and Labor Markets	Northern Projects Monitoring and Evaluation Unit, Kaduna
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. Iwugo; P. Oluwande

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Pakistan	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Statistics Division, Ministry of Finance, Planning and Economic Affairs, Islamabad
	671-35	Export Incentives in Developing Countries	M. Khan (Pakistan Development Institute, Karachi)
	671-42	Country Case Studies of Agricultural Prices and Subsidies	C. Gotsch (Stanford University, USA)
	671-45	Programming and Designing Investment: Indus Basin	Water and Power Development Administration, Karachi
Panama	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Paraguay	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
Peru	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima; Inter-American Development Bank, Washington, D.C., USA
	670-25	Industrial Capacity Utilization in Selected Latin American Countries	P. Rosenstein-Rodan and D. Schydlowsky (Center for Latin American Studies, Boston University, USA); Acuerdo de Cartagena, Lima
	670-80	Land Reform in Latin America	Fundación para el Desarrollo Nacional, Lima; Land Tenure Center, University of Wisconsin (USA)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
	671-48	Urban Labor Markets in Latin America	Universidad Católica Peruana, Lima; P. and C. Brennan
Philippines	670-24	Programming in the Manufacturing Sector	World Pulp and Paper Program, Food and Agriculture Organization (FAO), Rome
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); National Census and Statistics Office, Manila
	670-84	Growth, Employment, and Size Distribution of Income	J. Fei, G. Ranis, G. Fields (Economic Growth Center, Yale University, USA)
	670-95	Industrial Capacity Utilization	National Economic Development Authority, Manila
	671-07	Council for Asian Manpower Studies (CAMS)	J. Encarnacion, Jr. (University of the Philippines, Manila)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Portugal	671-42	Country Case Studies of Agricultural Prices and Subsidies	Gulbenkian Foundation, Oeiras (F. Estacio and C. Lebão)
Romania	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Central Statistical Board, Bucharest
Senegal	670-87	Industrial Policies and Economic Integration in West Africa	D. Stryker (Tufts University, USA); B. Horton (Tufts University, USA)
	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
	671-57	Distribution of Incòme through the Extended Family System	J. Mogey (Boston University, USA): Société Nationale des Etudes de Developpement (SONED), Dakar; Société d'Amenagement et d'Exploitation des Terres du Delta, Dakar
Sierra Leone	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Singapore	670-01	Development Strategies in Semi-Industrial Countries	A. Tan (University of Singapore); O. Hock
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-20	Urban Traffic Restraint (Singapore)	Singapore Road Transport Action Committee, Government of Singapore, Singapore; United Nations Environment Programme (UNEP); United States Department of Transportation
Somalia	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
Spain	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Instituto Nacional de Estadística, Madrid
Sri Lanka	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); National Census and Statistics Office,Colombo
	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA; Sri Lanka Centre for Development Studies (Marga Institute), Colombo
	671-07	Council for Asian Manpower Studies (CAMS)	N. Karunatilake (Central Bank)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
Sudan	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	B. M. Elhassan (University of Khartoum, Khartoum)
Swaziland	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
Syria	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Central Bureau of Statistics, Damascus

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Tanzania	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany); M. Kinunda (Commissioner of National Education, Dar es Salaam); Institute of Education, University of Dar es Salaam
	671-19	Economic Development and Educational Reform	T. Maliyamkono (University of Dar es Salaam)
	671-22	Raising the Productivity of Small Farms	K. Friedrich (Food and Agriculture Organization, Rome); Tanzania Rural Development Bank, Dar es Salaam; University of Dar es Salaam
Thailand	670-24	Programming in the Manufacturing Sector	World Pulp and Paper Program, Food and Agriculture Organization (FAO), Rome
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO): National Economic and Social Development Board; Ministry of Commerce, Bangkok
	671-07	Council for Asian Manpower Studies (CAMS)	N. Akrasanee (Thammasat University, Bangkok)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-11	Public Utility Pricing and Investment	West Virginia University (USA)
	671-36	Income Distribution in Thailand	C. Chiswick (Stanford University, USA)
	671-42	Country Case Studies of Agricultural Prices and Subsidies	T. Bertrand (Johns Hopkins University, USA)
	671-49	Education and Rural Development in Nepal and Thailand	L. Lau (Stanford University, USA); M. Seetisarn (Chiang Mai University)
Togo	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Tunisia	670-70	Urban Public Finance and Administration	R. Prud'homme
	670-91	Benefits of Schooling for Workers	University of Tunis, Tunis
Turkey	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	M. Celasun (Middle East Technical University, Ankara)
Upper Volta	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Uruguay	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Banco Central del Uruguay, Montevideo
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
Venezuela	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima
	670-25	Industrial Capacity Utilization in Selected Latin American Countries	P. Rosenstein-Rodan and D. Schydlowsky (Center for Latin American Studies, Boston University, USA); Oficina de Coordinación y Planificación (CORDIPLAN), Caracas

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Venezuela (cont'd)	670-80	Land Reform in Latin America	Centro de Estudios del Desarrollo, Caracas; Fundación para la Capacitación e Investigación Aplicada a la Reforma Agraria, Caracas; Land Tenure Center, University of Wisconsin (USA)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-85	Urban Income Distribution in Latin America	Joint Studies on Latin American Economic Integration (ECIEL); P. Musgrove (Brookings Institution, USA); R. Ferber (University of Illinois, USA)
Yemen Arab Republic	670-29	Yemen Arab Republic Feeder Road Study	Central Planning Organization, San'a; Swiss Federal Institute of Technology (Switzerland)
Yugoslavia	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Federal Institute for Statistics, Belgrade
	670-89	Development Strategies for Smallholder Agriculture in Yugoslavia	Institute of Agricultural Economics, Belgrade
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-42	Country Case Studies of Agricultural Prices and Subsidies	ULG Consultants (Warwick) Ltd., UK; Economic Consultants, Ltd., UK
Zambia	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); W. Murray (United Nations Statistical Office, UNSO); Central Statistical Office, Lusaka
	671-06	Employment Models and Projections	M. McPherson (Harvard University, USA)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. Iwugo

NOTE: Affiliation given for individual consultants applies to time period of execution of project.

WORLD BANK RESEARCH PROGRAM

Table 4: REPORTS FROM RESEARCH PROJECTS COMPLETED IN 1977

Project Title	Project Code	Reports
Project Appraisal and Shadow Prices	670-08	B. Balassa, "Estimating the Shadow Price of Foreign Exchange in Project Appraisal." World Bank Reprint Series No. 15. 1974. C. Blitzer, "Development and Income Distribution in a Dual Economy: A Dynamic Simulation Model for Zambia" (mimeo, March 1975). C. Blitzer, On the Social Rate of Discount and Price of Capital in Cost-Benefit Analysis. World Bank Staff Working Paper No. 144, February 1973. C. Blitzer, P. Dasgupta, and J. Stiglitz, "Project Evaluation and the Foreign Exchange Constraint." (mimeo, April 1976). M. Bruno, "Resource Allocation over Time and the Real Exchange Rate," paper prepared for International Meeting of Directors of Development Research and Training Institutes, Belgrade, August 1972. P. Diamond, "Financial Issues in Benefit Cost Analysis" (mimeo). R. Eckaus, "Financial and Other Problems of Implementing Cost Benefit Analysis." (mimeo, March 1974). D. Lal, Adjustments for Trade Distortions in Project Analysis. World Bank Staff Working Paper No. 128, March 1972. D. Lal, Employment, Income Distribution and a Poverty Redressal Index. World Bank Staff Working Paper No. 129, March 1972. D. Lal, On Estimating Income Distribution Weights for Project Analysis. World Bank Staff Working Paper No. 130, March 1972. D. Lal, "Project Evaluation and the Theory of the Second Best." (mimeo, September 1973). D. Lal, Methods of Project Analysis: A Review. World Bank Staff Occasional Paper No. 16, 1974. D. Lal, "On Estimating Certain Intertemporal Parameters for Project Analysis," (mimeo). A. Manne, "On the Efficiency Price of Capital in a Dual Economy," paper prepared for International Meeting of Directors of Development Research and Training Institutes, Belgrade, August 1972.
Agricultural Mechanization Study in India	670-14	D. K. Desai and C. Gopinath, Impact of Farm Tractorization on Productivity and Employment. Ahmedabad: Indian Institute of Management, March 1975. A. S. Kahlon, Impact of Mechanization on Punjab Agriculture with Special Reference to Tractorization. Ludhiana: Punjab Agricultural University, January 1975.
Economies of Scale and Tariff Levels	670-22	G. Pursell, "Economies of Scale and Tariff Levels" (mimeo, August 1972).
Labor Market in Malaysia	670-43	D. Mazumdar, "Education and Employment in Urban Malaysia" (mimeo, August 1975). D. Mazumdar and S. Asher, "The Problem of Unemployment in Penninsular Malaysia" (mimeo, May 1974).
Education Finance and Income Distribution	670-44	J.-P. Jallade, "The Financing of Education: An Examination of Basic Issues." World Bank Staff Working Paper No. 157, July 1973. J.-P. Jallade, "Student Loans in Developing Countries: An Evaluation of the Colombian Performance." World Bank Staff Working Paper No. 182, June 1974. J.-P. Jallade and Mats Hultin, "Costing and Financing Education in LDCs: Current Issues." World Bank Staff Working Paper No. 216, May 1975. J.-P. Jallade, Public Expenditures on Education and Income Distribution in Colombia. World Bank Occasional Paper No. 18, 1974.

Project Title	Project Code	Reports
Education Finance and Income Distribution	670-44 (continued)	J.-P. Jallade, "Basic Education and Income Inequality in Brazil: The Long-Term View." World Bank Staff Working Paper No. 268, June 1977. J.-P. Jallade, "Education Finance and Income Distribution in Latin America," paper prepared for IDB-sponsored seminar on Education Finance in Latin America, Washington, D.C., November 1976.
Growth and Income Distribution in Brazil	670-69	E. M. Bacha and L. Taylor, "The Unequalizing Spiral: A First Growth Model for Belindia." Quarterly Journal of Economics 90 (May 1976). F. J. Lysy and L. Taylor, "A Computable General Equilibrium Model for the Functional Income Distribution" (mimeo, 1977). L. Taylor, editor. Models of Growth and Distribution in Brazil. (forthcoming, 1978).
Pricing and Investment in Telecommunications	670-76	R. J. Saunders and J. J. Warford, "Telecommunications Pricing and Investment in Developing Countries." Energy, Water, and Telecommunications Department Report No. PUN 30, June 1977.
Labor Market in a Rapidly Growing Economy	670-90	D. D. Dornas, "Absorption of Female Labor: The Case of Belo Horizonte," Urban and Regional Report No. 76-12, May 1976. J. R. Machado, "Labor Absorption in the Modern Service Sector of Belo Horizonte: A Summary," Urban and Regional Report No. 76-11, July 1976. C. M. deMedeiros, "Labor Absorption and General Characteristics of the Civil Construction Sector in Belo Horizonte," Urban and Regional Report No. 76-9, August 1976. T. W. Merrick, "Employment and Earnings in the Informal Sector in Brazil: The Case of Belo Horizonte." Journal of Developing Areas 10 (April 1976). A. M. Sant'Anna, T. W. Merrick, and D. Mazumdar, "Income Distribution and the Economy of the Urban Household: The Case of Belo Horizonte," World Bank Staff Working Paper No. 237, June 1976. J. A. deSilva, "The Commercial Sector in the Belo Horizonte Labor Market," Urban and Regional Report No. 76-10, August 1976.
Industrial Capacity Utilization	670-95	R. Betancourt, "An Economic Analysis of Capital Utilization" (mimeo, November 1973). H. Hughes, "Capital Utilization in Manufacturing in Developing Countries." World Bank Staff Working Paper No. 242, September 1976. D. Lim, "Capital Utilization in West Malaysian Manufacturing" (mimeo, October 1974). F. Thoumi, "Fixed Capital Utilization in Colombian Manufacture" (mimeo, n.d.). G. Winston, "The Theory of Capital Utilization and Idleness." World Bank Staff Working Paper No. 176, April 1974.
Economic Aspects of Household Fertility Behavior	670-99	D. Chernichovsky, "A Preliminary Investigation on the Socio-Economic Determinants of Differentials in Observed Fertility in Three Municipalities in Northeast Brazil" (mimeo, December 1974). D. Chernichovsky and R. Moran, "Report on Research Project on Fertility and Labor Supply Among Low Income Rural Families in Northeast Brazil" (mimeo, December 1976). A. L. O. deAlmeida, "Report on the Northeastern Brazil Rural Household Survey Pilot Project--Caico and Florania" (mimeo, July 1974). A. L. O. deAlmeida, "Influence of Monetization of Rural Activities on Family Size" (mimeo, June 1976). A. L. O. deAlmeida, "Share-Tenancy and Family Size in the Brazilian Northeast." National Bureau of Economic Research Working Paper No. 200, August 1977. A. L. O. deAlmeida, "Parceria e tamanho do familia no Nordeste Brasileiro." Pesquisa e Planejamento Economico 7 (August 1977).

Project Title	Project Code	Reports
Maximizing Usefulness of Household Surveys	671-03	D. Freedman and E. Mueller, "Employment and Time Use Module" (mimeo, August 1975).
		D. Freedman and E. Mueller, A Multi-Purpose Household Questionnaire: Basic Economic and Demographic Modules. Washington, D.C.: World Bank, 1977.
Public Utility Pricing and Investment	671-11	D. Anderson, "Study of Electricity Tariffs in Thailand," Public Utilities Report No. RES 4, December 1974.
		R. Saunders, J. Warford and P. Mann, "Alternative Concepts of Marginal Costs for Public Utility Pricing: Problems of Application in the Water Supply Sector." World Bank Staff Working Paper No. 259, May 1977.
Reduction in Waste Paper	671-12	International Reference Center for Community Water Supply, "Public Standposts for Developing Countries" (mimeo).
Standards for Site and Services Projects	671-16	H. Caminos and R. Goethert, Urbanization Primer for Design of Site and Services Projects. Washington, D.C.: World Bank, 1976.

APPENDIX

WORLD BANK RESEARCH PROGRAM

Table 5: RESEARCH INSTITUTIONS DOCUMENTS EXCHANGE PROGRAM

List of Participating Institutions

EASTERN AFRICA

1. Institute of Development Research, National University, Addis Ababa, Ethiopia
2. Institute for Development Studies, University of Nairobi, Kenya
3. National University of Somalia, Mogadisho, Somalia
4. Economic and Social Research Council, National Council for Research, Khartoum, Sudan
5. Economic Research Bureau, University of Dar es Salaam, Tanzania
6. Institute for African Studies, University of Zambia, Lusaka, Zambia

WESTERN AFRICA

1. Association of African Universities, Accra, Ghana
2. Institute of Statistical, Social and Economic Research, University of Ghana, Legon, Ghana
3. Centre Ivoirien de Recherches Economiques et Sociales, Université d'Abidjan, Ivory Coast
4. Economic Development Institute, University of Nigeria, Enugu, Nigeria
5. Institute for Agricultural Research, Zaria, Nigeria
6. Nigerian Institute of Social and Economic Research, University of Ibadan, Nigeria
7. Société Africaine d'Etudes et de Développement, Ouagadougou, Upper Volta

EAST ASIA AND PACIFIC

1. Bureau of Agricultural Economics, Canberra, Australia
2. Research School of Pacific Studies, Australian National University, Canberra, Australia
3. Bogor Agricultural University, Bogor, Indonesia
4. Institute for Regional Economic Research, Andalas University, Indonesia
5. Institute of Economic Research, Hitotsubashi University, Tokyo, Japan
6. Overseas Economic Cooperation Fund, Tokyo, Japan
7. Korea Development Institute, Seoul, Korea
8. University of Malaya, Kuala Lumpur, Malaysia
9. Development Academy of the Philippines, Makati, Philippines
10. University of the Philippines, Quezon City, Philippines
11. Chulalongkorn University, Bangkok, Thailand

SOUTH ASIA

1. Bangladesh Academy for Rural Development, Comilla, Bangladesh
2. Bangladesh Institute of Development Studies, Dacca, Bangladesh
3. Bureau of Economic Research, Dacca, Bangladesh
4. Center for Studies in Social Sciences, Calcutta, India
5. Council for Social Development, New Delhi, India
6. Department of Economics, Bombay University, India
7. Gokhale Institute of Politics and Economics, Poona, India
8. Indian Institute of Foreign Trade, New Delhi, India
9. Indian Institute of Management, Ahmedabad, India
10. Institute for Social and Economic Change, Bangalore, India
11. Institute of Economic Growth, University of Delhi, India
12. National Council of Applied Economic Research, New Delhi, India
13. Reserve Bank of India, Economics Department, Bombay, India
14. Agricultural Projects Services Centre, Kathmandu, Nepal
15. Centre for Economic Development and Administration, Kathmandu, Nepal
16. Industrial Services Center, Kathmandu, Nepal
17. Planning Commission, Government of Pakistan, Islamabad, Pakistan
18. Sri Lanka Academy of Administrative Studies, Colombo, Sri Lanka
19. Sri Lanka Centre for Development Studies (Marga Institute), Colombo, Sri Lanka

EMENA

1. United Nations Industrial Development Organization, Vienna, Austria
2. Vienna Institute for Development, Austria
3. Center for Development Studies, University of Antwerp, Belgium
4. Ministry of Finance, Nicosia, Cyprus
5. Planning Commission, Planning Bureau, Nicosia, Cyprus
6. Center for Development Research, Copenhagen, Denmark
7. Institute of National Planning, Cairo, Egypt
8. Institut de Recherches en Economie de la Production, Paris, France
9. OECD Development Centre, Paris, France
10. Friedrich-Ebert-Stiftung Forschungsinstitut, Bonn, Germany
11. German Development Institute, Berlin, Germany
12. IFO-Institut für Wirtschaftsforschung, Department for Development Studies, Munich, Germany
13. Institute for Scientific Cooperation, Tubingen, Germany
14. Institut für Allgemeine Überseeforschung, Hamburg, Germany
15. Research Institute for International Techno-economic Cooperation, Aachen, Germany
16. South Asia Institute, University of Heidelberg, Germany
17. Greek Productivity Center, Athens, Greece
18. Institute for World Economics, Hungarian Academy of Sciences, Budapest, Hungary
19. Bank Markazi Iran, Tehran, Iran

EMENA (continued)

20. Economic Research Institute, University of Tehran, Iran
21. David Horowitz Institute for the Research of Developing Countries, Tel Aviv University, Israel
22. FINAFRICA, Centro per l'assistenza finanziaria ai Paesi Africani, Milan, Italy
23. Istituto di Studi per lo Sviluppo Economico, Naples, Italy
24. Scuola di Sviluppo Economico, Rome, Italy
25. Institut National de Statistique et d'Economie Appliquée, Secretariat d'Etat au plan et au Développement Régional, Rabat, Morocco
26. Institute of Social Studies, Resource Development Department, The Hague, Netherlands
27. Institute of the Tilburg University, Tilburg, Netherlands
28. Chr. Michelsen Institute, Bergen, Norway
29. Central School of Planning & Statistics, Research Institute for Developing Countries, Warsaw, Poland
30. Centro de Estudos de Economia Agraria, Fundação Calouste Gulbenkian, Oeiras, Portugal
31. Escuela Superior de Técnica Empresarial Agrícola, Department of Social Sciences, Cordoba, Spain
32. Institute for International Economic Studies, University of Stockholm, Sweden
33. Research Policy Program, University of Lund, Lund, Sweden
34. Centre d'Etudes et de Recherches Economiques et Sociales, Tunis, Tunisia
35. Middle East Technical University, Ankara, Turkey
36. Turkish Scientific & Technical Documentation Centre, Ankara, Turkey
37. Ekonomski Institut, Zagreb, Yugoslavia
38. The International Center for Public Enterprises, Titova, Yugoslavia
39. National Bank of Yugoslavia, Research Department, Belgrade, Yugoslavia
40. Institute of Economic Sciences, Belgrade, Yugoslavia

LATIN AMERICA AND CARIBBEAN

1. Instituto de Desarrollo Económico y Social, Buenos Aires, Argentina
2. Instituto de Estudios Políticos para América Latina, Buenos Aires, Argentina
3. Library of Instituto Torcuato di Tella, Buenos Aires, Argentina
4. Instituto de Investigaciones Socio-económicas, Universidad Católica Boliviana, La Paz, Bolivia
5. Fundação Instituto de Pesquisas Economicas, Cidade Universitaria, Sao Paulo, Brazil

LATIN AMERICA AND CARIBBEAN (continued)

6. Instituto Brasileiro de Economia, Department of Statistics & Econometrics, Rio de Janeiro, Brazil
7. Universidad Católica de Chile, Centro de Estudios de Planificación Nacional (CEPLAN), Santiago, Chile
8. Corporación de Investigaciones Económicas para Latinoamérica, Santiago, Chile
9. Fundación para la Educación Superior y el Desarrollo (FEDESARROLLO), Bogota, Colombia
10. Instituto de Investigaciones, Escuela de Ciencias Económicas y Sociales, University of Costa Rica, San Jose, Costa Rica
11. Programa Centroamericano de Ciencias Sociales, Consejo Superior Universitario, San Jose, Costa Rica
12. University of the West Indies, Kingston, Jamaica
13. Dirección de Estudios Económicos, Secretaría de la Presidencia, Mexico City, Mexico
14. Instituto de Investigaciones Económicas, Universidad Nacional Autónoma de México, Mexico City, Mexico
15. Programa Académico de Ciencias Sociales, Pontificia Universidad Católica del Peru, Lima, Peru

CANADA

1. Institute for International Cooperation, Ottawa
2. International Development Research Centre, Ottawa
3. University of Western Ontario, London, Ontario

UNITED STATES

1. UNCTAD Library, United Nations, New York

Updating Report on World Bank Research Program

June 19, 1979

Office of the Vice President, Development Policy

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Document of the World Bank

UPDATING REPORT ON WORLD BANK RESEARCH PROGRAM

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UPDATING REPORT ON WORLD BANK RESEARCH PROGRAM: 1978

THE ROLE OF RESEARCH IN THE BANK

External Reviews

1.1 Since FY78 a review of the Bank's research activities has been underway, conducted by a series of external panels. 1/ Specialized panels have examined Bank research in the areas of Agriculture and Rural Development; Commodities; Energy, Water and Telecommunications; Income Distribution and Employment; Industrial Development and Trade; and Transportation. In turn, an overall panel, the General Research Advisory Panel, has undertaken a general review of Bank research based in part on the findings of the specialized panels. The various panel reviews provide an evaluation of past research and make recommendations on the objectives of Bank research, relationships with research institutions in developing countries and the size and balance of the research program.

1.2 The final reports of the specialized panel on Income Distribution and Employment was sent to the Board for information on June 6, 1978. 2/ The reports of the remaining five specialized panels have now been completed, and are being distributed to the Board together with this report.

1.3 The General Research Advisory Panel has completed its discussions. The panel's report will be submitted by September and will be scheduled for Board discussion, at which time the reports of the specialized panels may also be discussed.

1.4 In view of the substantial volume of material on Bank research that will be generated through these various panel reports, the present report does not include an extended narrative discussion. It is intended primarily to update the statistical and factual material on Bank research which is regularly provided to the Board.

1/ World Bank Research Program, R78-18, January 23, 1978, p.5.

2/ Report of the Research Advisory Panel on Income Distribution and Employment, (Sec M78-493).

Evaluation

1.5 Independently of the external reviews, an internal survey was conducted in November and December 1977, to review the Bank's research in major areas. The survey was conducted by several small panels, each chaired by a member of the Research Committee. These surveys indicated that the most serious constraint on the execution and absorption of research by the Bank is staff time. The review also generated ideas for better dissemination of research results to operating staff, as well as proposals for integrated research programs in individual areas. The results of the internal survey were discussed at the Research Committee, and were also communicated to the General Research Advisory Panel.

1.6 Apart from these reviews by research area the program of project by project evaluation of complete research projects has continued. Four projects were evaluated in 1978; the results are summarized in Appendix B.

1.7 Several of these research projects are beginning to influence Bank operations. A recently completed study has developed a coherent economic framework for analyzing port pricing and investment decisions. The principal output from the research is a book recently published under Bank auspices. 1/ Workshops and seminars have been held within the Bank to introduce projects staff to the basic approach suggested by the research. Under the auspices of a staff working party, a consultant is currently assessing the costing and accounting systems that would be needed to apply the suggested marginal cost principles in actual situations. Another project undertook an empirical examination of the housing market in the Republic of Korea. This analysis appears to have had an effect on discussions of housing policy within Korea. A third project had as its objective the design of a multi-purpose household questionnaire covering standard economic and demographic topics. The project responds to requests from projects staff for assistance in designing survey instruments, needed for the monitoring and evaluation of urban and rural development projects. The finalized questionnaire is now available for this purpose.

1/ Esra Bennathan and A. A. Walters, Port Pricing and Investment Policy for Developing Countries. New York: Oxford University Press, 1979. A World Bank Research Publication.

1.8 A variety of lessons were drawn by the panels evaluating these projects. Two of the evaluation panels noted the importance of periodic reviews of the progress and objectives of a research project while it was underway. In one case an interim review would probably have resulted in the cancellation of an exercise that had become more difficult as a result of organizational changes. In the second case an interim review resulted in a switch in the direction of research which was clearly beneficial. In the case of one project the collaborating agency insisted, for security reasons, that it control all access to the data it was to provide. This made analysis by Bank researchers extremely difficult. The evaluation panel noted that there were currently no formal arrangements within the Bank for guaranteeing the security of data sets owned by other agencies and suggested that such procedures be instituted to permit greater use of such data by the Bank.

Allocation of Resources to Research

1.9 In FY78, total resources devoted to research amounted to approximately $9.4 million (in FY78 dollars). 1/ This figure has been calculated after allocating to research its share of the overhead costs divided between the fourteen program categories used in the Bank's budgetary presentation. This figure may be compared with other program categories, approximately $23 million for country economic and sector work together and $14 million for operational review and policy work. Of the total of $9.4 million about $2.2 million is accounted for by the "external" expenditure (consultant, travel, data processing) authorized by the Research Committee for the projects it has approved. The remainder, which is mainly the cost of staff-time (plus the cost of consultants not financed by the "external" research budget) was about equally divided between research projects approved by Research Committee and other 'in-house' research (which also includes preparatory work on proposals to be submitted to the Committee). 2/ These proportions vary between the Development Policy Staff (DPS) and the Central Projects Staff (CPS), with the latter typically devoting a larger proportion of staff resources to departmental studies than the former.

1.10 As in previous reports, Tables 1.1 and 1.2 (on pages 5 and 6) give two breakdowns of (a) "external" expenditure from the research budget; and (b) staff allocated to research: one by department and the other by subject matter. Table 1.1 distinguishes between

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1/ This excludes expenditure on routine commodity analysis and projections, but includes commodity work conducted under the External Research Program.

2/ In round figures 66 manyears, at a unit cost, including allocated overhead and support services, of $108,000.

Research Committee approved projects, departmental studies and a third miscellaneous ("other") category. This last category primarily consists of research preparation and some very small studies. Since a subject-matter breakdown is not available, this category is excluded from Table 1.2.

1.11 The 'external' expenditure on projects approved by the Research Committee (RPO projects) can be traced from the inception of the program. As the chart on page 8 shows, the level of such expenditure stayed more or less constant at around $2.5 million (in FY78 dollars) between FY73 and FY76 and declined to about $2.4 million in FY77 and FY78. For FY79 the chart shows the level of authorization rather than expenditure. This includes an element of overprogramming to allow for the normal interval between authorization and disbursement. The present estimate of external expenditure for FY79 (as shown in the FY80 budget documents) is that it will remain at about $2.4 million (in FY78 dollars). The chart also shows the mix of expenditure on projects according to the year in which they were initiated. As a rough rule of thumb, one-third of the expenditure in a given year is on new projects, one-third on projects from the previous year and the remaining third on older projects. In FY78 there were 13 projects completed, and 24 new starts.

1.12 In the first research report in 1973, informal guidelines for the allocation of external expenditure funds were set forth by sector for fiscal years FY75 through FY78. As final expenditure figures for FY78 are now available, actual expenditure for the period in question is compared with the guidelines in Table 1.3 on page 7. The allocation of projects to the various categories is inevitably arbitrary; nonetheless, the correspondence between guidelines and actual expenditure, which was not intended to be exact in the first place, is fairly close.

Table 1.1: FY78 RESOURCES DEVOTED TO RESEARCH: PROFILE BY DEPARTMENT
(expenditures in $'000; manpower in man-years)

Department	Research Committee Approved Projects			Departmental Studies		Other	
	"External" Exp.	Manpower		Manpower		Manpower	
		Prof.	Asst.	Prof.	Asst.	Prof.	Asst.
DPS							
Development Research Center	464.4	9.4	7.6	0.8	0.1	2.1	1.0
Economic Analysis and Projections /a	57.2	0.6	-	0.4	0.8	0.4	-
Development Economics	727.5	15.3	11.4	2.4	1.3	7.8	1.4
Office of Vice President, Development Policy	39.0	-	-	-	-	-	-
Policy Planning and Program Review	-	0.2	-	-	-	-	-
Total DPS	1,288.1	25.5	19.0	3.6	2.2	10.3	2.4
CPS							
Agricultural and Rural Development	148.1	1.5	0.4	6.3	1.1	0.5	-
Transportation	108.0	3.2	-	0.6	-	0.6	-
Urban Projects	4.8	0.3	-	0.2	-	0.3	-
Energy, Water and Telecommunications	366.4	1.9	-	2.3	-	0.5	-
Education	110.4	0.6	-	2.1	-	-	-
Industrial Projects	12.5	-	-	2.1	-	0.5	-
Tourism Projects	-	-	-	0.4	-	-	-
Office of the Vice Pres., Projects Staff	10.7	-	-	-	-	0.7	-
Other CPS	-	-	-	0.6	-	b/	-
Total CPS	760.9	7.5	0.4 1/	14.6	1.1	3.1	-
Regional Offices	180.0	0.3	-	b/	-	1.4	-
TOTAL	2,229.0	33.3	19.4	18.2	3.3	14.8	2.4

1/ Note: Professional manpower includes the time of Young Professionals and of Consultants not financed from the External Research Budget.

a/ Excluding routine work on Commodity Analysis and Projections (approximately 12.9 manyears).
b/ Less than 0.1 staff year.

Table 1.2: FY78 RESOURCES DEVOTED TO RESEARCH: PROFILE BY FUNCTIONAL CATEGORY
(expenditures in $'000; manpower in man-years)

Category	Research Committee-Approved Projects			Departmental Studies	
	"External" Exp.	Manpower		Manpower	
		Prof.	Asst.	Prof.	Asst.
Income Distribution	70.5	1.1	0.9	0.4	0.2
Growth/Country Economic Analysis	238.2	3.5	2.3	1.1	0.7
International Finance and Trade	114.1	1.9	2.2	0.3	0.2
Agriculture and Rural Development	476.0	6.0	2.7	6.6	1.1
Industry	177.7	7.2	6.7	2.4	-
Transportation	83.5	3.2	-	0.6	-
Energy, Water and Telecommunications	366.4	1.9	0.7	2.3	-
Urbanization	191.2	4.1	2.0	0.2	-
Education	214.2	1.3	0.5	2.2	0.1
Labor and Employment	141.1	2.2	1.1	1.1	0.7
Population, Nutrition, and Health	117.1	0.7	0.3	0.6	0.3
Tourism	-	-	-	0.4	-
Other	39.0	0.2	-	-	-
TOTAL	2,229.0	33.3	19.4	18.2	3.3

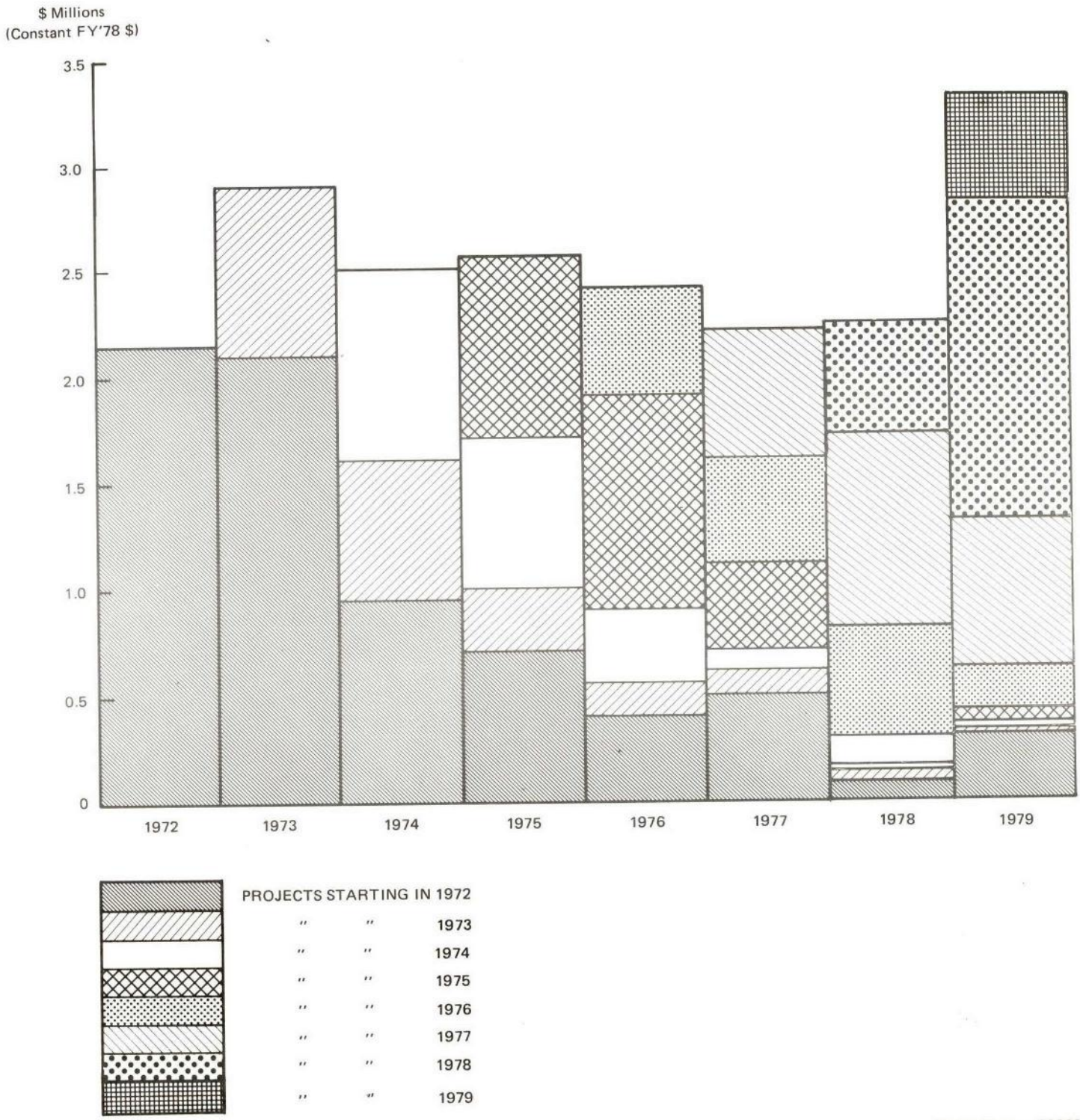
Table 1.3

External Expenditure FY75 to FY78, Compared to Guidelines
(Percentage of external expenditure)

Category		Guidelines	Actual 1/
IA.	General Planning	1.0	-
IB.	Income Distribution	14.0	11.4
IC.	Growth/Country Economic Analysis	10.0	13.4
II.	International Finance and Trade	4.0	6.4
III.	Agriculture and Rural Development	20.0	17.9
IV.	Industry	10.0	6.5
V.	Transportation	10.0	11.0
VI.	Energy, Water and Telecommunications	5.0	8.1
VII.	Urbanization	10.0	7.8
VIIIA.	Education	5.0	4.6
VIIIB.	Labor and Employment	5.0	7.5
VIIIC.	Population, Nutrition, and Health	5.0	4.7
	Others	1.0	0.7
		100.0	100.0

1/ Actual for FY75 to FY78 (in constant dollars)

EXTERNAL RESEARCH EXPENDITURE
FY 1972 – 1979
(ACTUAL 1972 – 1978; AUTHORIZATION 1979)



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Appendix A

Brief Description of Projects Active During FY78

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Note: A fuller description of projects approved by the Research Committee (those with reference numbers in the 67- series) will be found in World Bank Research Program, Abstracts of Current Studies, October 1978. At the end of each section, the departments responsible for other ("non-RPO") projects are listed.

APPENDIX A

Brief Descriptions of Projects Active During FY78

I. DEVELOPMENT POLICY AND PLANNING

I,B Income Distribution

Evaluation of Latin American Data on Income Distribution

A major limitation of empirical work on income distribution and the relationship between inequality, poverty, and development is the poor quality of the available information. This study is part of a broad program of work to improve the data base for the systematic study of distributional problems (also see Ref. No. 671-08). The study will identify for each country in Latin America a recent data set suitable for the analysis of patterns of income distribution, and use these data to present a detailed picture of the various aspects of income distribution. (Ref. No. 670-83)

Distributive Impact of Public Expenditures

Public expenditures are known to have a substantial impact on income distribution, but information as to the mechanisms at work is meager. Previous investigations have often been limited by their need to rely on statistics compiled for other purposes; their restrictive assumptions and the highly aggregated nature of their results have been major drawbacks. This project assessed the effects of public expenditures on the distribution of income in Colombia and Malaysia. The study identified major public expenditures allocable by specific households; classified these expenditures by income distribution, ethnic group, and other factors; explored the determinants of household demand for certain government services; and compared results for the two countries. (Ref. No. 670-96)

Evaluation of Asian Data on Income Distribution

This study was designed to parallel the research project on the "Evaluation of Latin American Data on Income Distribution" (see Ref. No. 670-83) and is part of a work program aimed to improve the data base in this area. The basic research objective is to analyze patterns of income distribution in nine countries of the region: Republic of China (Taiwan), Hong Kong, India (for the States of Gujarat and Maharashtra only), Malaysia, Nepal, Philippines, Singapore, Sri Lanka, and Thailand. Particular attention will be paid to the nature of rural-urban differences in income distribution and the relationship between income and various labor force characteristics. (Ref. No. 671-08)

Income Distribution in Thailand

This study will identify the forces affecting the distribution of household income within a country by applying techniques of statistical inference and economic analysis to a nationwide survey conducted in the early 1970s of some 14,000 households in Thailand. Specifically, it explores the relationship between the earning power of individuals, labor force participation, and household income. The human capital earnings function is extended to incorporate the behavior of two important groups of non-wage earning labor force participants: the self employed and unpaid family workers. (Ref. No. 671-36)

Household Incomes and Expenditures in Mexico (Phase 1)

This study is designed to improve the orientation and quality of anti-poverty projects in Mexico, which already receive much of World Bank lending to Mexico and will absorb part of the expected increase in petroleum revenues. Phase I is designed to identify the poor and the extent and causes of poverty, and to estimate the costs of reducing income disparities. The study will also increase the general understanding of income distribution in developing countries: whereas most previous studies in this field have been cross-sectional, comparing the distribution in different countries, or limited to observations within a single year, the Mexican data permit the analysis of distributional trends over time. This will help to elucidate the causes of change that are suggested by theory and cross-section analysis. Policies for reducing poverty will be analyzed in a later phase. (Ref. No. 671-76.)

I.C. Country Economic Analysis/Development Strategy

Development Strategies in Semi-Industrial Countries

This study examines the incentives for import substitution and export promotion in six semi-industrial countries (Argentina, Colombia, Israel, Korea, Singapore, Taiwan) in order to analyze the effects of alternative incentive policies on resource allocation, trade and economic growth. Government tax, credit and expenditure policies, as well as tariffs, subsidies and other incentives are examined in order to assess net incentives to individual industries and to export and import-substituting activities. The country studies will be followed by a comparative analysis of the experience of the six countries. (Ref. No. 670-01)

International Model

This study will develop a model to examine the adjustment of developing countries to changes in the international economic situation, including changes in the level of protection in these countries and elsewhere; changes in the rate of growth of developed countries; and changes in oil prices. The model examines the relations between five regions of the world economy, Africa, Asia, Latin America, the Middle East and the developed countries. Each developing country is represented by an activity analysis model; the developed countries are represented by a trade welfare function. The model has been solved using a fixed point algorithm capable of solving large general equilibrium systems. (Ref. No. 670-07)

International Comparison Project

Although considerable progress has been made in standardizing statistical methodologies for estimating national aggregates, the conversion of these to a common international base of valuation is still being made at official exchange rates which do not satisfactorily reflect the differences in price levels among different countries.

The International Comparison Project (ICP), initiated by the United Nations in 1968, is designed to provide detailed comparisons of national products by expenditure categories in terms of relative quantities and relative prices. These comparisons will permit a more accurate determination of the relative purchasing power of currencies and the real gross domestic product per capita of different countries. (Ref. No. 670-68)

Prototype Models for Country Analysis

This research project aims to improve the Bank's country economic models program by developing a quantitative framework that addresses a broader range of issues in development policy than has been possible so far. These include the effects of alternative development strategies on employment creation and income distribution, the traditional-modern production dichotomy, and issues of investment allocation. The study will enable the Bank and its member countries to better assess the distributive aspects of economic growth and development policy and will permit country economic analysis to take full advantage of the expanding data base of most countries. (Ref. No. 670-86)

Social Accounts and Development Models

Macroeconomic analysis of development has been restricted mainly to two-gap models of resource needs and input-output models of industrial structure. These approaches are inadequate for studying the effects of policies concerned with employment generation, income distribution and eradication of poverty. This study aims to provide the basis for a new generation of macroeconomic models that will permit analysis of the tradeoffs between alternative policy goals such as growth and redistribution. It focuses simultaneously on the causes of poverty and inequality and their measurement, and on the determination of both prices and quantities in a model framework. At present the study involves the construction of a Social Accounting Matrix (SAM) for Malaysia and the development of an economy-wide model based on the SAM. (Ref. No. 671-27)

Research Support for the World Development Report

The principal objective of this project is to refine and improve a fifteen-region global model, which has been developed to explore the growth potentialities of the developing countries under alternative assumptions about international developments and domestic management. The model encompasses a variety of economic and technological constraints on development. The growth of individual (multi-country) regions will be described by submodels, and some 20 groups of internationally traded products will be differentiated. (Ref. No. 671-66)

Growth, Poverty and Basic Needs: Development Policies in Sri Lanka, Kerala and Punjab

This comparative analysis of the course of development in three low income areas is designed to improve understanding of conflicts and complementarities between the growth of overall output and the eradication of poverty. Different basic needs have been satisfied by different means and over different time sequences in these areas. Whereas the Punjab, at one end of the spectrum, has relied mainly on accelerated economic growth to alleviate poverty, Sri Lanka, at the other, has relied on subsidies and public services to achieve a fairly high level of basic needs satisfaction at low income levels. The study will yield information useful for the design of policies and projects relating to basic needs in general, and for the program and policy work of the Bank in the South Asia region. (Ref. No. 671-72)

Aggregative Models of Dualism and Development: An Overview

This internal research activity is exploratory and has wide scope. Its main purpose is to formulate research problems in the general area of construction, analysis and application of macroeconomic models for developing countries. The work has involved a survey of the theory of economic development in dual economies, addressed the characteristics of aggregative models of distribution and employment and analyzed the links in them between inflation, investment and distribution in the short run. Much of this work has focussed on issues of growth and distribution in Brazil. (Ref. No. DRCIDO2)

External Borrowing, Economic Growth and Debt Servicing Capacity

This research examines theoretical and empirical aspects of the accumulation of external debt by developing countries, and yields policy implications which are useful for both borrowing nations and lending agencies. Reports cover issues such as optional borrowing policies, factors affecting the decisions of commercial lenders and the effects of policies on debt servicing capacity. An empirical index of debt servicing capacity is being estimated in cooperation with the Programming and Budgeting Department.

Short Term Macro-Policy in India

This project examines the power of monetary and fiscal policy instruments to increase output and curb inflation, using a two sector macro-economic model of the Indian economy. It demonstrates that a shortfall in agricultural output raises food prices and decreases nominal demand for non-agricultural goods unless the money supply is allowed to increase. The increase, however, engenders a rise in the aggregate price level. The paper also discusses some simulation experiments with this model.

A Statistical Analysis of the Dynamics of Economic Growth in Iran: 1959-73

From 1959 to 1973, the Iranian economy grew fairly quickly, but unevenly. The non-agricultural sectors expanded rapidly, while the share of the government in real consumption and investment rose dramatically. Sluggish growth in real agricultural output, coupled with a rise in private real consumption expenditures, induced a rise in agricultural imports and relative prices. Following a decade of price stability, the rate of inflation increased after 1970, when the money supply began to increase rapidly as the government spent its growing oil revenue. This rise in the money supply was the primary impetus to inflation, since the demand for real cash balances did not increase as rapidly.

Note: Macro-Policy in India and Dynamics of Economic Growth in Iran: Development Economics Department.

Other non-RPO projects: Development Research Center.

II. International Trade

Natural Resources and Planning: Issues in Trade and Investment

A systematic framework for the compilation of data and analysis of commodity markets is needed for the Bank's periodic evaluation of the world economic situation and the prospects of developing countries. The aim of this study is to provide the methodology and the data format to analyze global supply and demand conditions of important natural resources and resource-based secondary commodities. It comprises a number of sub-projects including, so far, the construction of a model of the world energy economy; regional and global models for investment planning in the copper and bauxite/aluminum industries, and research on the dynamics of commodity markets. (Ref. No. 671-09)

Promotion of Nontraditional Exports

A number of Latin American countries have introduced incentive schemes to expand exports and promote investment in export-oriented industries. A comparative review of this experience was carried out in cooperation with the Economic Commission for Latin America (ECLA), in which strategies and policies to promote nontraditional exports were evaluated, particularly those of Argentina, Brazil, Colombia, and Mexico. The papers were discussed at a conference in Santiago, Chile, in November 1976 and four country studies have been prepared. (Ref. No. 671-10)

Agricultural Commodity Projections

In cooperation with the Ford Foundation, this study developed a world model of major agricultural commodities (e.g., grains, soybeans, beef) to project future supply and demand. Beginning with a two region model (the US and the rest of the world) projections have been prepared to 1980. (Ref. No. 671-23)

Linkage of Commodity and Country Models

This study was undertaken in the context of Project Link, an econometric model of the world economy resulting from a cooperative effort by private and official research centers in developed countries, the International Monetary Fund, the United Nations Centre for Development Planning Projections and Policies and the United Nations Conference on Trade and Development. The aim of the study was to introduce some 20 commodity models into the Link model, thus making it possible to estimate the impact of business fluctuations in developed countries on the prices and trade of primary commodities. The models shed light on the factors that affect the foreign exchange earnings of developing countries as well as on the impact of commodity prices on inflation in developed countries. (Ref. No. 671-28)

Export Incentives in Developing Countries

Despite their frequent use in developing nations, export incentives have hitherto been studied only in general terms and in an aggregated industry format. This study is undertaking a more rigorous analysis of the subject through a cross-section investigation of the production of major export commodities and a time-series analysis of the effects of export promotion measures. It will evaluate the export promotion efforts of four developing countries (Brazil, Greece, Republic of Korea, and Pakistan) in a comparative framework. The results will be used to formulate recommendations on the scope and methods of export promotion in developing countries, particularly those under study. (Ref. No. 671-35)

The Penetration of Industrial Country Markets by Imports of Manufactures from Developing Countries

Potential exports of manufactures by developing countries depend critically on the import policies of the industrialized countries. This program of studies will calculate actual market penetration of industrialized country markets by developing country exports of manufactures, and analyze the economic, social and political factors which result in protection against developing country imports. The studies' objectives are to help identify promising sectors for export expansion by developing countries, and are expected to assist Bank project and program staff in advising developing country clients on prospects for manufactured exports prospects. (Ref. Nos. 671-66 and 671-67)

Key Institutions and Expansion of Manufactured Exports

This project will build on staff studies and the findings of related projects to fill gaps in what is known about the promotion of manufactured exports, and prospects for increasing their value over time. First it will examine the roles of institutions in the marketing and related aspects of finished goods produced for export by locally-owned firms in developing countries, studying the learning process of these firms in linking production to consumer demand abroad. Second, it will assess the prospects for specific manufactured exports, based on interviews with key participants, including large retail and trading firms in developed countries. It also aims to identify information sources to improve World Bank projections of manufactured exports. (Ref. No. 671-68)

International Trade Policy for the Development of Bangladesh

Carried out in cooperation with the Government of Bangladesh, this study will provide the basis for an international trade policy to promote the country's development over the next five to ten years. Its objectives are: (1) to measure resource scarcity by estimating current and future shadow prices for major factors and products, (2) to measure sectoral comparative advantage in the form of domestic resource costs of foreign exchange, and (3) to prepare and evaluate trade policy alternatives, particularly export promotion policy. (Ref. No. 671-75)

III. Agriculture and Rural Development

Rural Development in Northeast Brazil

Development in Northeast Brazil has evolved with large numbers of peasants living in subsistence conditions alongside dynamic industrial sectors. This project was designed to assist Brazilian agencies in developing the necessary informational and analytical base for Northeast development lending programs. Specifically, the study analyzes at the microeconomic level the restrictions that prevent resources from being channeled to the rural poor, evaluates the efficiency of farms of different sizes and tenure arrangements under various technological, geographic, and ecological conditions and provides a data base to aid in the identification and implementation of rural development projects for the region. (Ref. No. 670-73)

Evaluation of the Lilongwe Land Development Program

The Lilongwe Land Development Program is a multifaceted program designed to improve the total fabric of rural life in the central region of Malawi. The problems and successes of this and other integrated rural development programs were examined in the Africa Rural Development Study, a research project (Ref. No. 670-18) now completed. The present study has been carried out to assess more precisely some of the Program benefits that were identified in the previous review and to determine the extent to which these benefits can be ascribed to the agricultural services provided under the Program. (Ref. No. 670-93)

Analytics of Change in Rural Communities

If rural development projects are to be the source of lasting and continuing improvements in rural living standards, they must be designed so that they help initiate a self-sustaining process of change. This requires a more comprehensive understanding of the role of rural areas in national economic growth, and of their economic structure, than exists at present. In this study of the Muda River Irrigation Project in Malaysia, formal models of household and regional economic change are developed to clarify the structure of the local economy. The analysis should also shed light on feasible time paths and strategies for alleviating rural poverty within the constraints imposed by national income generation and population growth. (Ref. No. 671-17)

Simulation of Buffer Stocks

The benefits and costs to a developing country of holding buffer stocks of food grains are widely debated, but rarely quantatively assessed. This study will attempt to provide such an assessment of costs and benefits with specific regard to farmers, consumers, the government budget, and the general economic welfare. An international model has been constructed which examines the effects of stocks for a given probability distribution of annual world production and alternative storage rules. A national model examines the effects of stocks for probability distributions of annual production in the country, world price, alternative trade and storage rules, and government policies to maintain a minimum level of consumption by the low income population. The stabilization effect is separately assessed using stochastic simulation. (Ref. No. 671-24)

Agricultural Pricing and Storage Policies in East Africa

Agricultural pricing and storage are central issues for development planning in East Africa. This study develops a quantitative approach to the analysis of these problems through the construction of a large-scale agricultural sector model of Zambia, along the lines of the CHAC model of Mexico (Ref. No. 670-16). The present model will be used to measure the possible tradeoffs between such policy goals as development in subsistence areas, price stabilization, increased food production for the domestic market, subsidization of urban consumers and improvement of international trade, and to clarify the options by establishing the effects on socio-economic groups who might benefit from, or bear the burden of, potential policy changes. (Ref. No. 671-29)

Management and Organization of Irrigation Projects

Present methods of analyzing irrigation projects rarely take account of the central importance of good organization and management. This study aims to establish a framework for evaluating the use of resources in the management and operation of Bank-assisted irrigation projects, by developing typologies and management criteria and applying them in selected case studies. (Ref. No. 671-34)

The Consequences of Risk for Agricultural Policy

This project has two objectives: (1) to analyze whether accounting for risk improves the forecasting ability of agricultural project and sector models; and (2) to derive some of the broad policy implications of accounting for risk and its impact on the functioning of markets. The study examines the nature of competitive markets under risk, and their possible failure to lead to efficient prices (in the usual sense); analyzes different types of price forecasting behavior; and traces the implications of the findings for several areas of government policy. (Ref. No. 671-43)

Agricultural Innovation and Rural Development

The problem of effectively harnessing new technological possibilities to meet the needs of rural development is a highly complex one, involving far more than the provision and financing of an "appropriate" technology package. Using concepts embodied in the "systems approach", this study will develop a model portraying technological change in agriculture as a process of technology generation, selection, adaptation, adoption, and diffusion,interacting with nontechnical factors to yield a variety of possible adjustment paths. The model should prove useful for designing appropriate farm technology packages; learning to manage the transfer of technologies; and identifying guidelines for the establishment of a policy for the generation and management of technological change as a continuing process. (Ref. No. 671-44)

Programming and Designing Investment: Indus Basin

Agriculture and irrigation project formulation often depends on implicit policy assumptions and on complex technical relationships rarely explored at the appraisal stage. This study aims to improve the design of projects by testing the sensitivity of optimum project design to the inclusion of objectives other than economic efficiency--especially income distribution--with an investment planning model for the Indus Basin that will quantify the tradeoffs between multiple welfare objectives in investment project design and agricultural development policy. (Ref. No. 671-45)

Distribution of Income Through the Extended Family System

In the World Bank's strategy for development of the Sahel, irrigation plays an important role as a means to expand useful employment and reduce the risk of crop failures and famine. However, the Bank is suffering from an almost complete lack of information regarding the beneficiaries of irrigation projects, and the effects of irrigation on the traditional pattern of task allocation among members of the family units. This study seeks to provide such information through case studies of four villages in the Senegal Valley. Specifically the study will observe the composition of work teams and the distribution of harvest proceeds. The results are expected to have operational significance for the design of other irrigation projects, especially in Senegal and Mauritania. (Ref. No. 671-57)

India: Impact of Agricultural Development on Employment and Poverty

This project aims to provide a better understanding of the policy and investment alternatives for alleviating poverty in rural India. Most studies of Indian agriculture have been descriptive rather than analytical, and have examined agricultural policies at the national and sometimes state level, but very rarely at lower levels. Here, a case-study approach is used, choosing a number of specific institutional-infrastructural-ecological situations, e.g. capitalist farming with well developed infrastructure; feudal and semi-feudal farming with poor infrastructure; areas where capitalist, feudal and peasant proprietorships coexist; and so on. Models will be constructed for the various different types of farms in each area in order to examine choices among investment activities which change the resources available (e.g. the supply of irrigation water) and among policies which affect product and factor prices. The object of the models is to quantify the impact of investments and policy changes on different socioeconomic groups, and thus to trace their likely distributional consequences. The project is intended to complement the work of the National Commission on Agriculture and will be carried out in collaboration with Indian research institutions. (Ref. No. 671-62)

Projections of the Extent of Food Deficits of Target Groups under Alternative Policy Programs

Large segments of the populations of developing countries may continue to consume at levels below minimum nutritional standards even if aggregate food supplies are sufficient to cover average nutritional needs. This study measures the impact of changes in income distribution and in food prices on the availability of major food commodities to consumers at different income levels. Using data from eight large foodgrain importing countries, it makes projections under alternative policy scenarios of the aggregate amounts of food required, the amounts which would need to be redistributed to satisfy the assumed requirements of low income groups, and the implications for domestic production and imports. The results demonstrate the extent to which malnutrition is a widespread and serious phenomenon and suggest that in many developing countries food distribution and intervention schemes will continue to be necessary. (Ref. No. 671-64)

Evaluation of Food Distribution Schemes

Little is known about the effectiveness of food distribution and intervention schemes in reaching poor consumers, about how to judge their required scale, or how to project their costs and benefits under different circumstances. This project includes a study of the operational aspects of current systems, an empirical analysis of the costs (fiscal and economic) and benefits of different types of food distribution schemes, and an assessment of alternative methodologies for evaluating food distribution schemes and basic needs programs in nutrition. (Ref. No. 671-80)

ERTS-World

This study applies remote sensing technology to a wide range of activities in project identification, preparation and supervision. Projects included assistance to Malaysia on alternative cost effective methods of compiling land use data for Peninsular Malaysia, and the preparation of a land cover-land use map of the Fez area, Morocco. Other activities included preparation of two land cover-land use association studies of kharif and rabi crops in Sheikhupura District, Punjab, Pakistan, based on field observations and contemporaneous satellite imagery. The Bangladesh Analytical Map Series has been prepared based on satellite remote sensing. A manual is being prepared on the uses of remote sensing in development projects. (Ref. No. R112)

Foodgrain Strategies - Prospects and Issues

This study focuses on the policy issues and the past performance of international and country programs in providing food security. It explores alternative food security proposals and their relationships to rural development. It examines the feasibility of private and public holdings of buffer stocks, and their effects on production; issues in resource allocation for growth in food production and distribution; and the implications of food security for rural and national planning. (Ref. No. R121)

Root and Tuber Foodcrops

This study examines the production and use of major root crops and their potential in development--especially with respect to their function as basic food sources for large numbers of the rural poor. The study notes the wide range of end uses for these crops and concludes that their role in Bank-supported rural development could be expanded, if more research is done on their production and utilization. (Ref. No. R122)

Fisheries: Development Prospects and Problems

This study assesses the present state of fisheries activity in developing countries, with a particular focus on small-scale fisheries, examining their potential contribution to rural development. It will provide policy recommendations for the Bank on fisheries development for the rural poor. (Ref. No. R128)

Agricultural Project Appraisal System (APAS)

This joint activity of the Agricultural and Rural Development Department and the Computing Activities Department is designed to develop a computerized system for the financial and economic analysis of agriculture and rural development projects. The system provides the opportunity to explore options in project design with relatively little additional time and effort by the project analyst. (Ref. No. R129)

Analysis of Risk in Projects

This study is to develop and test a methodology for the analysis of risk in agricultural projects, taking into account risk effects arising from lack of robustness in farm models, difficulties in quantifying parameters, and variability in the physical performance of a project due to unexpected events. (Ref. No. R133)

Field Mechanization and Rural Development

This study examines the combination of technical hardware, institutional arrangements and policy instruments best suited to the mechanization of agricultural field operations in a range of typical developing country situations. It builds on previous Bank research into agricultural technology and tractorization in India and Pakistan and also involves a case study of the Philippines.

CB Display/Project Processor

This activity aims to develop a simple, efficient computer-based system to calculate rates of return and net present values of agriculture and rural development projects. The first phase is developing a sub-program entitled CB/DISPLAY which performs sensitivity analysis on project benefit and cost streams. Subsequent phases will create a more comprehensive system, which inter alia performs the basic manipulation of raw data or submits data sets to existing programs for further processing.

Costs of Agricultural Credit Operations

This study, which focuses on India, examines the real cost of providing institutional credit to farmers. It shows that the average direct costs of formal sector agricultural credit in India range from 16-20% of loan amounts outstanding. Indirect costs are more difficult to measure but may approximate 1% of loan amounts outstanding. Farmers in India pay about 12% p.a. for formal sector credit; this implies a sizeable subsidy to borrowers. Larger farmers have greater effective access than smaller farmers to formal sector credit and thereby capture the bulk of the subsidy. The study also examines measures to reduce the costs of such credit.

Agricultural Production and Factor Use under Uncertainty

This research project deals with the impact of variations in price or output on planned production levels and input use, and the implications for farm policies. Aspects covered include the demand for pesticides and the relationships between farm size, risk aversion, fertilizer demand and the adoption of high yielding varieties. The role of contingency commodity markets in stabilizing farm outputs and input use is also addressed.

Note: Agricultural Production and Factor Use under Uncertainty: Development Research Center.
Other non-RPO projects: Agricultural and Rural Development Department.

IV. Industry

Scope for Capital-Labor Substitution in the Mechanical Engineering Industry

Two studies of planning methodology in the mechanical engineering industries (Ref. No. 670-24) by the Bank's Development Research Center have shown the feasibility of implementing numerically solvable process-analysis models of mechanical engineering activities. This study extends the methodology to permit alternative production techniques to be specified and product differentiation to be incorporated. It analyzes the scope for capital-labor substitution in mechanical engineering activities and the extent of substitution between locally produced and imported mechanical engineering products. (Ref. No. 670-23)

Programming in the Manufacturing Sector

This research program deals with the problem of investment planning in the presence of economies of scale. On the basis of case-studies in a large number of countries, and of several industrial sub-sectors (fertilizer, forest industries, steel), a planning methodology has been developed that is useful for investment planning at the sub-sectoral level and for project identification. In addition to reports on the case-studies, the research program has resulted in methodological contributions. The planning methodology is described for practical use in a series of manuals. (Ref. No. 670-24)

Industrial Policies and Economic Integration in Western Africa

Studies of industrial incentives in developing countries have so far concentrated on countries that have already established an industrial base. This research project examines the policies followed by four industrializing Western African nations: Ghana, Ivory Coast, Mali, and Senegal. Its purpose is to examine the choice of alternative strategies for economic growth in Western Africa, such as import substitution, export promotion and the expansion of intraregional trade through economic integration. Further, attention is given to the choice between the expansion of agriculture or industry in the individual countries. A comparison of the results for the four countries will also shed light on the possibilities for regional integration. (Ref. No. 670-87)

Patterns of Industrial Development

Studies by Kuznets, Chenery and others have suggested that economic development, as measured by rising per capita income, is associated with changes in the structure of the economy. This study concentrates on changes in the internal structure of the manufacturing sector associated with its growth, the growth of GNP, and changes in international comparative advantage. A data bank has been established. The study will test alternative descriptions of the development of industrial subsectors using data for a large number of countries over the last two decades within a multiple regression framework. (Ref. No. 671-05)

A Comparative Study of the Sources of Industrial Growth and Structural Change

Few attempts have been made in the past to establish explicit relationships between individual policy instruments, changes in the industrial structure, and economic performance. This study will develop the analytical framework required to articulate these relationships. The sources of industrial growth and structural change are being examined for each of eight countries (Colombia, Israel, Japan, Korea, Mexico, Norway, Taiwan and Turkey). A simulation model has been developed to assess the relative importance of universal and country-specific influences on industrial structure and its evolution. In a subsequent phase, quantitative models for policy analysis will be constructed for several of the countries. (Ref. No. 671-32)

Appropriate Industrial Technology

Recent studies of capital-labor substitution in manufacturing industries have indicated that there is substantial scope for choosing factor proportions in the production of the commodities studied, though it appears that the techniques chosen are frequently not socially appropriate, and sometimes do not minimize production costs. By conducting a survey and evaluation of past micro studies, this project examines the consequences of adopting the most socially appropriate of those techniques that are embodied in existing equipment, considers the possible existence of technical constraints to adopting these techniques, and analyzes other reasons why they are often not adopted in practice. It also considers the role of capital goods producers as agents for stimulating use of more appropriate techniques. (Ref. No. 671-51)

Marketing Manufactured Exports

Bank research on export promotion has generally focused on price incentives. The present study will examine the institutional and other non-price aspects of the marketing of manufactured exports, based on a case study of Colombia's clothing exports, which have increased dramatically since 1970. In particular, the study will identify the main obstacles to the growth of clothing exports in 1970 and the ways in which these difficulties have been at least partly overcome. (Ref. No. 671-56)

Small-Scale Enterprise

This study stems from the growing realization that, if employment opportunities and improved or cheaper goods and services are being sought for the poor, small-scale enterprises may represent a neglected potential which should be exploited. Several countries have initiated small enterprise policies, and the Bank has produced its own issues and policy papers on the subject. There were also a number of studies made in the early '60s, though there has been little systematic updating of the state of the art since then. The purpose of this study is to provide such an updating and to reduce some of the uncertainties underlying these policies. Phase I of the study will consist of several parts: (1) a review of the literature, (2) case-studies of experiences in selected countries, and (3) a number of surveys of selected industries in urban and rural areas, exploring in depth the characteristics of the enterprises and the economic environment in which they operate. Subsequent phases will depend on the outcome of the first phase. (Ref. No. 671-59)

Managerial Structures and Practices: Public Manufacturing Enterprise

Government-owned and managed enterprises form a substantial and growing segment of the industrial sector in a number of developing countries. The purpose of this research is to identify those characteristics of managerial structure and of the policy environment that are consistent with the efficiency and growth of such enterprises. The project draws on organization theory and management science to study, by extensive interviewing, several industries in Egypt, India and Yugoslavia. The study is largely designed to strengthen the Bank's ability to deal with managerial and other issues in lending to the public sector. (Ref. No. 671-71)

Appropriate Industrial Technology (Phase II)

This follows a study on appropriate choice of technology (Ref. No. 671-51), which indicated that employment and income originating in a typical developing country's manufacturing sector could be greatly increased without additional investment if appropriate technologies were chosen. The present project is a case study of technology choice in the production of blended cotton textiles. Efficient engineering alternatives will be delineated, and the effects of operating inefficiencies and alternative industrial organization patterns on technology choice will be considered. The case study has an explicit operational focus: it involves both research and operational staff, and seeks to reconcile their conflicting views on choice of technology within a specific context. (Ref. No. 671-77)

The Sources of Growth and Productivity Change: A Comparative Analysis

A better understanding of the sources of growth and of the influence of policy on development is important to the World Bank. The present study is a historical and comparative analysis of industrialization and growth in the Republic of Korea and Turkey (with a third country to be added later). It will extend the methodology of comparative analysis and the data base developed in the project on "Sources of Industrial Growth and Structural Change" (Ref. No. 671-32) to allow a more formal policy-oriented examination of industrialization processes. Within the framework of a general equilibrium model, it will link demand-oriented analysis to an analysis of the sources of growth from the factor side. The effects of alternative policies will be analyzed and the economy-wide analysis will be complemented with micro-studies of selected sub-sectors (in a proposed extension of the present project). (Ref. No. 671-79)

Fertilizer Research

An up-to-date data bank on fertilizer is required for appraising Bank fertilizer projects and advising the Bank on fertilizer and related topics. Primary emphasis is placed on the preparation of medium- and long-term projections for fertilizer supply and demand by nutrient. Fertilizer marketing and distribution models as well as investment models are prepared, to assist in projecting fertilizer production and marketing costs. In addition, new fertilizer technology and fertilizers are evaluated. (Ref. No. R401)

World Phosphate Survey

This study will compile and update a comprehensive manual covering phosphate rock reserves and resources, mining and phosphate fertilizer production costs, phosphate rock and fertilizer markets, as well as agronomic considerations, non-fertilizer uses of phosphates and demand and supply prospects. (Ref. No. R402/403)

World Potash Survey

This study of the world potash market covered potash resources, mining and refining costs, supply/demand balances and the price outlook for potash fertilizers. Apart from adding significantly to the Bank data base on fertilizers, the survey provided background information for a Bank appraisal. (Ref. No. R404)

Pulp and Paper Profile

This study aims to establish benchmarks for the appraisal of projects in the pulp and paper industry. It will summarize information on the raw materials outlook, major trends in production and trade, representative investment and production costs, the international structure of the industry and world market price factors. (Ref. No. R405A)

State Manufacturing Enterprise in a Mixed Economy (The Turkish Case)

This study assesses the role of state enterprise in promoting manufacturing growth in Turkey and reviews the performance of half a dozen major state industries. It suggests certain reforms to improve the performance of public enterprise, and examines the probable growth pattern under a policy more strongly supportive of private enterprise. (Ref. No. R406A)

Note: All non-RPO Projects: Industrial Projects Department.

V. TRANSPORTATION

Substitution of Labor and Equipment in Civil Construction

Relatively abundant labor supplies in many developing countries are likely to make labor-intensive techniques more appropriate for civil construction works. This research program is in the final phase of a continuing study of the substitutability of labor for equipment in civil construction. Its results are being summarized in two handbooks designed to guide planning, evaluation, and monitoring of labor-intensive civil construction projects in the developing world. (Ref. No. 670-26)

Highway Design Study (Phase II)

World Bank assistance for highway development is largely directed to low-volume roads in lower-income, capital-scarce countries where the trade-offs between initial construction costs and future maintenance and road-user costs may well dictate different highway design and maintenance strategies from those appropriate in North America and Europe. In collaboration with leading research institutions a major program of basic research is being conducted in three countries (Kenya, Brazil, India) to provide a fundamentally new data base for estimating the economic benefits and costs of alternative highway design and maintenance standards. Empirical data are being systematically collected and analyzed to delineate the physical and economic interrelationships of road design, deterioration, maintenance and road user costs for both paved and unpaved roads on a more rigorous statistical basis than has heretofore been possible.

Models are developed which determine the total transportation costs for large numbers of alternative designs and maintenance policies, and establish the lowest cost alternative. Designed as planning tools, they are being used at the feasibility stages of planning by government agencies and consultants; they are also being used by Bank staff in project appraisals. Currently based on the Kenya study and existing literature, the models are being revised as new data become available from Brazil, India and other research. (Ref. No. 670-27)

Yemen Arab Republic Feeder Road Study

This study is the first in a series of research projects undertaken by the World Bank to develop systematic information for evaluating rural development projects involving feeder roads (see Ref. No. 670-71 and 671-14 following). The study areas comprise two regions of considerable agricultural potential in the Yemen Arab Republic currently served by low-standard transportation facilities: the Taiz-Turba region in the Southern Uplands and the Wadi Mawr region in the northern Tihama. Research consists primarily of a series of regional surveys of specified subareas within the road's area of influence before, during, and after construction. (Ref. No. 670-29)

Ethiopia Feeder Road Study

This research project, second in a series of three (see Ref. No. 670-29 and 671-14), was initiated in 1973 to quantify the contribution of feeder road investments to rural development. A socio-economic survey of the area influenced by a road improvement in the Kaffa province was conducted before construction of the road. It is hoped that the originally planned follow-up surveys can be realized as part of the program of the planned Monitoring and Evaluation Unit in the Ethiopian Highway Authority. The goal is to develop formulas relating the net value of agricultural production to varying levels of total road investment for areas of differing physical, social, and institutional endowments. (Ref. No. 670-71)

Madagascar Feeder Road Study

This study is the third in a series of projects designed to quantify the contribution of feeder road investments to rural development (see Ref. No. 670-29 and Ref. No. 670-71). These studies are monitoring, for a period of six to ten years, the impact of rural road projects on the small local economies they serve. In the case of Madagascar both baseline and follow-up surveys have been completed. The analysis has established net project benefits applying two alternative methods: road user savings and producer surplus. Analyses have been made of household and per capita income and consumption levels before and after completion of the road, and a number of additional socioeconomic indicators of the region's development have also been examined. Based on the results of the three studies and on relevant Bank Project experience, a computer package (Rural Roads RRPACK) for establishing producer surplus and user savings based project returns has been developed. (Ref. No. 671-14)

Economic Role of Railways

Despite heavy investment, railway projects have generally not yielded results consonant with appraisal expectations. A major reason is the difficulty of forecasting future railway traffic demands. This study will develop improved forecasting methods and analyze the role that railways should play in national transport policy, on the basis of a comparative analysis of the composition and trends of current transportation patterns in several developed and developing countries. In addition, the study will examine the commodity composition of shipments made by different modes of transportation; investigate the factors governing modal choice in developing countries; and assess the role of rail in the provision of passenger services. (Ref. No. 671-50)

Appropriate Vehicles

The main objectives of the study are to identify and encourage the development and adoption of technologically more appropriate vehicles for rural transport. Following the very good response from numerous developing country institutions to compilation of a catalogue on "Appropriate Technology in Rural Development: Vehicles Designed for On and Off Farm Operations" (Phase I of the study), further work is being done in updating and expanding the catalogue on the basis of comments and data received from various sources in developing and developed countries.(Ref. No. 3809)

Economics of Railway Subsidization

This project assessed the economic reasons for railway subsidies, and undertook five case studies of European countries. The reasons for the financial aid to railways appeared to be mainly political and social rather than economic, and there seems to have been no clear assessment of the benefits and costs of subsidization. (Ref. No. R812)

Railway Paper

This paper examines the problems that confront railways and railway projects assisted by the Bank. It offers guidelines on the economic role of railways, operational and institutional difficulties, financial performance, the case for subsidization, and for the rationalization and closure of lines. (Ref. No. R814)

Maintenance Performance in Highway Projects

This project investigates the factors that affect highway maintenance programs. The success of these programs depends largely on human factors and has been highly variable. The Bank's portfolio of highway maintenance projects has been reviewed including a closer examination of specific projects in Korea, Paraguay, Niger and Guinea. The report was circulated to the Board April 26, 1979. (Ref. No. P811)

Note: All non-RPO projects: Transportation Department.

VI. Public Utilities

Pricing and Investment in Telecommunications

The traditional approach to pricing and investment policy in telecommunications is based almost entirely upon technical and financial criteria, with economic analysis playing a minor role. The present project analyzes the nature of the benefits and the types of beneficiaries of telecommunications projects, the economic benefits and costs of such projects, and appropriate pricing strategies. Its objective is to assist telecommunications authorities and other planning bodies in determining the appropriate level of investment in telecommunications projects and the priorities assigned to competing demands within the sector. (Ref. No. 670-76)

Appropriate Technology for Water Supply and Waste Disposal

The objective of this study is to identify the appropriate technology for providing the urban poor and rural communities with socially and environmentally acceptable water supply and waste disposal services at a cost they can afford. The research will be directed to water supply and waste disposal (including reuse) although emphasis will be on the latter. Total economic costs rather than financial costs alone will be analyzed. (Ref. No. 671-46)

Petroleum and Gas in Non-OPEC Developing Countries

This project updates projections of petroleum production and consumption and associated investment for oil-importing developing countries. It provides essential background information for the Oil and Gas Lending Program of the Bank for the development of domestic energy supplies in these countries (PUN-35). (Ref. No. R602)

Rural Energy Study

A Pilot Exercise in Colombia was designed to develop a practical approach for identifying, preparing and implementing rural energy projects and programs, mainly using local expertise. The first phase involved qualitative studies in selected rural areas, the second the preparation of rural energy equipment and implementation of pilot projects. A study on Energy for Development developed methods of forecasting the demand for energy, and particularly for non-commercial fuels which are the predominant energy source in rural areas of developing countries. It also examines basic energy needs. (Ref. No. R609)

Design of Low-Cost Water Distribution Systems

Designers of water distribution systems have lacked simple analytical tools to test the implications for system costs of alternative designs. Secondary distribution networks have therefore often been designed by rule of thumb, using standards that are inappropriately costly, particularly where service to the urban poor is concerned. Secondary distribution systems in several urban areas in developing countries were analyzed, and simple mathematical models developed which permit predictions of total pipe length, average diameter and network cost, given decisions on variables such as per capita usage and spacing of public standpipes or hose connections. (Ref. No. R610)

Development of PVC Well Screens for Local Fabrication in Developing Countries

This project has developed and is testing a well screen for use in rural water projects that can be manufactured in developing countries at a lower cost than those presently used. (Ref. No. R612)

Reduction for Unaccounted-for Water

Research was conducted to develop a manual for the identification of various causes of unaccounted for water, to determine the financial effects and reduce losses. The final report was unsatisfactory and has not been released. (Ref. No. R620)

Pipelines: State of Art

This study reports on the state of the art in the design and construction of large diameter pipelines. It analyzes the Bank's experience with irrigation and petroleum pipelines as well as those for municipal water supply and sewerage, and recommends procedures to be followed in future projects, reflecting present technological developments. (Ref. No. R621)

A Preliminary Study on Energy Needs and Possibilities for the Poor of the Developing Countries

An extensive review of the literature on the energy consumption patterns of the urban and rural poor, supply and conservation options and energy strategies, was undertaken to define areas in which further research is needed to assist the provision of basic energy services to the poor. (Ref. No. R622)

Note: All non-RPO projects: Energy, Water and Telecommunications Department

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VII. Urbanization

Urban Public Finance and Administration

Little research has been done on municipal finance and tax systems in developing countries. Yet this area is of great importance to national and local governments in developing countries, as well as to the World Bank, in dealing with the problems of large and rapidly growing cities. This research project consists of a comparative analysis of selected features of local fiscal systems in eight cities: Ahmedabad and Bombay (India); Bogotá and Cartagena (Colombia); Jakarta (Indonesia); Kingston (Jamaica); Seoul (Republic of Korea); and Tunis (Tunisia). It will analyze patterns of expenditures and revenues, the adequacy of the overall municipal revenue structures, and the tradeoffs between revenue raising capacity and equity effects of the major financing instruments. The data collected will allow an evaluation of alternative strategies for financing municipal development. (Ref. No. 670-70)

Pricing and Financing of Urban Public Services: Water Supply and Sewage Disposal

One of the most important questions of public policy in developing countries is how to finance the provision of public services in rapidly growing urban areas. This study considers this question for the case of water supply and sewage disposal in two cities--Cali (Colombia) and Nairobi (Kenya). It is an outgrowth of the Bank's research on urban public finance (Ref. No. 670-70), in which self-financing systems were identified as an important means of expanding urban public services and raising revenues for further expansion. (Ref. No. 671-18)

Urban Traffic Restraint (Singapore)

The Government of Singapore has put into effect a combination of policies aimed at reducing automobile traffic during periods of the day and in parts of the city that were formerly subject to congestion. Policies like these have been recommended by the Bank to its borrowers on the grounds that restraining private car traffic is often a prerequisite to achieving good bus service and reducing heavy investment in freeways, complex intersections, and road widening projects in built-up areas. The action in Singapore is the first application of area licensing in a major city and is thus of great interest to the Bank and to developing countries. This research project is designed to measure the impact of these policy measures through before-and-after observations and to collect basic data from which to predict the effects of similar policies in other cities. (Ref. No. 671-20)

Strategic Planning to Accommodate Rapid Growth in LDC Cities ("The City Study")

In LDC cities, relatively little is known about the impact of urban projects on intraurban development patterns, including residential and employment location, travel patterns, and the demand for public services. The principal objectives of this study are to estimate the potential magnitude of these impacts and to develop tools that can be used in the development and evaluation of projects and for the analysis of the spatial and economic impacts of policy interventions. The study will test existing models in Bogota and Cali, Colombia and, as necessary, will develop new ones, focusing on five components of the urban economy: housing, transportation, employment location, labor force, and public finance. (Ref. No. 671-47)

VIII. Population and Human Resources

VIII.A Education

Project Evaluation Methodology: Education Attainments

Until quite recently the evaluation of education projects assisted by the Bank dealt mainly with physical and administrative aspects. Increasing attention is now being given to the performance of the institutions and programs and to their effects on students. This study is designed to produce a methodology for evaluating learning in Bank education projects, derived from research on the measurement of educational attainments, including cognitive, psychomotor, behavioral, and attitudinal performance, as well as quantitative achievements. The method, presently being tested in Tanzania, incorporates repetitive cycles of testing and feedback of results to curriculum writers, and aims both at raising aggregate learning levels and at reducing instructional disadvantages for poverty groups. The method was tested in Tanzania, and a review of this experience concluded that it had contributed to developing local expertise at low cost. The project has now been successfully concluded with four one-day Bank staff seminars. (Ref. No. 670-78)

Economic Development and Educational Reform

Most developing countries are either in the process of reforming their educational systems or are considering doing so. However, knowledge of the factors that contribute to successful educational reforms is scarce, and where it exists may not be readily accessible to countries other than those which have instituted the reforms.

This project will compile and analyze information on educational reform from several developed and developing countries (Chile, China, Cuba, India, Poland, Sweden, Tanzania, United States, and USSR) and compare the political, economic, and educational determinants of particular reforms across several of them. The reports from USSR, Cuba and Sweden have recently been issued as staff working papers, and a draft monograph has been prepared (Ref. No. 671-19)

Education and Rural Development in Nepal and Thailand

Although evidence indicates that more widespread education is associated with higher agricultural efficiency and lower population growth rates, there is virtually no information to indicate through which of its outcomes schooling may be affecting agricultural productivity and individual fertility; nor is there more than suggestive evidence that the correlation between education and these variables is at least partially causal. This study is exploring these relationships by designing appropriate survey instruments, conducting surveys in Nepal and Thailand and drawing conclusions from the resulting data. (Ref. No. 671-49)

Economics of Educational Radio

In 1975 the Bank's Education Department initiated a review of experience with educational radio. The survey concluded that radio could be used to improve the quality of instruction at the elementary level and could serve as a low cost alternative to traditional means of providing secondary and higher education. This study is an outgrowth of the initial review; it will explore the economics of radio for distance learning through case studies of projects in Brazil, Israel, Kenya, Korea and Malawi. In addition, the study will assess the impact of in-school radio on student dropout and repetition rates through an examination of the Nicaragua Radio Mathematics Project. (Ref. No. 671-54)

Retention of Literacy/Numeracy Skills Among School Leavers

Much of the current educational thinking in developing nations is governed by the hypothesis that there is a threshold beyond which school leavers will retain the basic skills acquired in school. The study seeks to examine the relationship between duration of schooling, dropping out and the retention of skills acquired in school. Specific questions will be studied such as: What factors are associated with dropping out of school? What are the effects of dropping out at different levels of schooling on the levels of reading, writing, numeracy and other skills? The study's conclusions are expected to assist in formulating policies on the length, structure, and format of basic education as well as on the desirable length of compulsory education. The study should also provide insights concerning the application and administration of promotion policies and the design of primary education curricula and other programs with a bearing on the retention of skills among school leavers. Phase I, recently completed, developed methodology for examining the retention of basic skills. This is being used in phase II which eventually will consist of several country studies. The first of these (Egypt) was started in October-November, 1978 (Ref. No. 671-55)

Textbook Availability and Educational Quality

Policy options for improving the quality of education in low-income countries are limited; some (e.g. reducing class sizes) are costly and of dubious efficacy. Several studies at least suggest that increasing the availability of textbooks (and other printed material) is a cost-effective approach to improving quality, and an increasing number of Bank education projects include a textbook component. The purposes of this research project are to check earlier findings on textbook effectiveness, to obtain quantitative estimates of how quality responds to textbook availability, and to attempt to identify ways of making textbooks available that will be most likely to be effective. The first phase of the project will support the analysis of existing survey data from Uganda and the conduct of an experiment on increasing textbook availability in Nicaragua. A second stage will extend the effectiveness studies to eight other countries in Latin America. (Ref. No. 671-60)

Educational and Other Determinants of Farm Household Response to External Stimuli

This project has objectives similar to those of two others, on"The Structure of Rural Incomes, Employment and Labor Markets" (Ref. No. 671-30) and "Education and Rural Development in Nepal and Thailand" (Ref. No. 671-49). Its end product will include an improved methodology for the construction of sectoral, regional or country models for the appraisal of agricultural projects. Using data from a sample of farm households in Thailand observed over time, the study will attempt an empirical examination of the determinants of changes in the consumption, production and migration behavior of farm households, and will investigate the way in which their response characteristics are modified by changes in the underlying environment. The determinants to be considered include the degree of literacy, levels of nutrition and health, availability and type of agricultural extension and proximity to markets. External changes include factor and product prices, capital and land endowments, and the availability of credit and irrigation. (Ref. No. 671-78)

VIII. B Employment

Labor Force Participation, Income and Unemployment

Improving the productivity of the urban poor requires knowledge of the operation of urban labor markets. This project consists of studies of employment and earnings in the "informal" sector of the Malaysian and Indian labor markets and the relationships among participation rates, individual earnings and household income. (Ref. No. 670-45)

Employment Models and Projections

Although a considerable amount of research is under way on labor force absorption and other aspects of employment in developing countries, a standard methodology for assessing trends in sectoral employment growth, the factors contributing to these trends, and the future employment outlook has yet to emerge. The objective of this study is to develop, apply, and evaluate such a methodology on the basis of case studies in India and Zambia. (Ref. No. 671-06)

Council for Asian Manpower Studies

As part of its efforts to assist the development of indigenous research capacity in member countries, the Bank has been supporting a number of research projects undertaken by the Council for Asian Manpower Studies (CAMS), a regional association of Asian scholars engaged in policy-oriented research on the manpower and employment problems of Asian countries. The Bank-funded projects have focused on three areas: 1) the demand for labor; 2) the employment implications of different trade regimes; and 3) the development in Asian countries of ancillary firms (i.e., firms, usually small, that manufacture parts or provide services for large assembly plants). (Ref. No. 671-07)

Structure of Rural Employment, Income, and Labor Markets

Agriculture and rural development projects assisted by the Bank are usually directed toward improving the lot of farm households by a variety of means ranging from the construction of irrigation facilities to the provision of subsidized inputs. Many households in rural areas, however, have little or no access to land and are therefore not directly affected by such projects. Using data collected as part of the evaluation and monitoring of a project in Nigeria, this study will attempt to quantify the extent to which the Bank's agricultural projects also benefit landless or near-landless rural households who depend on wage employment as their main source of income. (Ref. No. 671-30)

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A Comparative Analysis of Rural-Urban Labor Market Interactions

This research program focuses on the labor reallocation which often accompanies urbanization in the developing countries. The aim of the study is to shift research away from the conventional emphasis on measurement of rural-urban or interregional movement to analysis of means of effecting changes in the spatial, occupational, and industrial patterns of employment and income. Attention is therefore focused on the consequences of the labor reallocation associated with such changes for the structure of incomes and labor absorption. The study involved a conference on labor market interactions to discuss the linkages among distribution, migration, surplus labor, and poverty in developing countries. The results should be valuable for Bank policy and decision makers in developing countries, as earlier literature did not fully articulate an underlying model of the labor market. (Ref. No. 671-31)

Urban Labor Markets in Latin America

This study seeks to complement earlier Bank research on employment by developing aggregate yet detailed statistics on labor market structure and flows, and by examining the factors underlying the structure of wages and the relationship between different sub-labor markets through case studies of Colombia and Peru. The research will serve as an illustrative model for country economic analysis of employment issues, and will improve understanding of urban labor market structure and behavior. (Ref. No. 671-48)

Occupational Structures of Industries

Current manpower forecasting for developing countries is based on data derived primarily from censuses and surveys of the 1950s and 1960s. This study will develop data for the 1970s from similar sources, which should prove useful for forecasting occupational structures of the 1980s or 1990s, and will attempt to refine existing forecasting methodologies by establishing coefficients between such variables as capital per worker and occupational structure, as well as between education and productivity. (Ref. No. 671-52)

Labor Migration and Manpower in the Middle East and North Africa

Little is currently known about the economic consequences of labor migration in the Middle East and North Africa, although about 2 million persons migrated in this region in 1975. This study will prepare projections of manpower supply and demand for 1975-85 using computer simulation manpower-planning models. Projections will be for 8 major sectors and 7 broad occupational groups. The study will also examine the economic implications of and prospects for future labor movements. (Ref. No. 671-63)

Wage Structure and Wage Determination in Tanzania

This study uses a relatively large sample, drawn from Tanzania's manufacturing sector, to analyze the operation of labor markets. It examines the relationship between personal characteristics of employees and their wages and, by integrating data on individuals with data on the firms for which they work, the relationship between firm characteristics and the level and structure of the wages they pay. (Ref. No. ECDER60)

Theory of Wages and Unemployment in a Poor Agrarian Economy - India

Using data from a large-scale survey of rural West Bengal, this study develops simple theoretical models of wage employment determination, incorporating factors ignored in standard theories, and generates hypotheses about variations in wage rates. It explains why wages are generally higher where demand is expanding and where household dependency ratios are high, and why wages are generally lower for women, lower caste workers, landed casual farm workers and for all agricultural workers where land distribution is highly unequal. One variation of the model is used to analyze inter-season adjustments in labor hiring and the relationship between permanent labor contracts and the tightness of the peak season labor market. (Ref. No. ECDER61)

Analysis of Wage Structure and its Determinants in Colombia

This project examined the determinants of wage structure in Colombia, at household and interindustry levels, as a contribution to a program of research on labor markets in Latin America. Characteristics of firms were found to play an important role in determining average remuneration in Colombian manufacturing industries. Spatial factors contributed relatively little to wage differentials. (Ref. No. ECDER62)

Factor Markets, Farm Size and Productivity

The project examines the nature of capital markets in rural India. Sources and uses of credit are described, as are changes over a 20 year period. The second aspect of the project concerns the role of credit in the firm-household nature of farms. Models are being developed and will be tested with Indian household data. (Ref. No. ECDER63)

Industrial Technology and Employment in the People's Republic of China

This paper reviews current evidence on employment in China, and the policies pursued to increase labor absorption in agriculture and industry. In the 1950s, China suffered from considerable unemployment in urban and rural areas, but appears to have made major steps towards achieving a fully and productively engaged labor force. Increased labor absorption in rural areas was the main achievement, reflecting a rise in economically productive labor-intensive inputs into agriculture and farm support activities (including rural industries). Industrial policies, on the other hand, have generally acted to increase capital intensity--though there is no evidence of involuntary unemployment in cities.

Imperfect Rural Capital and Labor Markets

Factor markets are often interrelated--for example, tenants deal with landlords who are also money lenders. Bargaining power in one market may be reflected into a different one. Such market situations have implications for policy, since interventions in one market will affect the equilibrium in others. Present research on these relationships is theoretical, but it is expected that future work on them will be substantially empirical. (Ref. No. DRCID06)

Note: Imperfect Rural Capital and Labor Markets:
Development Research Center.
Other non-RPO projects: Development Economics Department

VIII.C. Population, Health and Nutrition

Population Growth and Rural Poverty

Many of the family planning programs instituted in the poorer developing countries have not resulted in a significant reduction in the rate of population increase. This study aims to assess the socioeconomic determinants of fertility and the economic cost and benefits of larger families for rural households through the detailed study of eight villages in India, Kenya, Nigeria and Sri Lanka. (Ref. No. 671-02)

Migration Patterns in West Africa (completed)

West Africa is one of the few regions of the world where relatively large-scale free movement across international boundaries still continues. Understanding the determinants and consequences of such migration is of direct relevance for the Bank's rural development and education projects. This study examines migration streams both between and within nine countries in the area (Gambia, Ghana, Ivory Coast, Liberia, Mali, Senegal, Sierra Leone, Togo and Upper Volta). Both the characteristics of the migrants and their numbers are examined. (Ref. No. 671-26)

Narangwal Population and Nutrition

This study analyzes fertility, family planning, health behavior, and the efficiency of service delivery systems using household data collected in Narangwal (Punjab), India. Groups of villages were provided with various combinations of health, family planning, and nutrition services and households in each group were observed over time. A preliminary report, "The Integration of Health and Family Planning: The Narangwal Experience" has been prepared. (Ref. No. 671-38)

International Review Group on Research in Population and Development

In collaboration with eight other agencies and foundations, the World Bank is co-sponsoring a group of experts to review social science research in population and development. Chaired by Dr. Carmen Miro, the group has reviewed the "state of the art", and is assessing the present use of social science research findings in policy making in population and development, and compiling an inventory of the current institutional capacity for field research in social sciences for the major nations, regions, and subregions of the developing world. The study is close to completion. (Ref. No. 671-40)

El Salvador Health Study

This study is part of the Bank's evaluation of projects it has financed for urban sites and services and squatter area upgrading, and will assess the effect of such schemes on the health of low-income groups in a Salvadorean city. The project is the Bank's first attempt to measure the health effects of urban projects. (Ref. No. 671-53)

Fertility Behavior in Rural Botswana

The objectives of this study are to identify and measure the socioeconomic correlates of fertility behavior in rural Botswana. This research, which is an extension of a preliminary analysis prepared for the Government of Botswana, deals with the socioeconomic determinants of fertility behavior and demographic characteristics in Botswana. The study is to be based on the Bank financed Botswana Rural Income Distribution Survey. (Ref. No. 671-61)

Case Studies of Determinants of Recent Fertility Decline in Sri Lanka and South India

Fertility declines of the magnitude recently observed in Si Lanka and Kerala are virtually unprecedented in poor populations. Between 1969 and 1974 the Sri Lanka birth rate declined from 37 to 27 births per thousand; in Kerala it fell to 28. In both areas, changes in marriage patterns were largely responsible. This study aims to understand these fertility declines and to study the determinants of age at marriage, using household sample survey data. (Ref. No. 671-70)

Kenya - Health, Nutrition and Worker Productivity Studies

The relationship of health and nutrition to the productivity of Kenyan road workers, and that of parasitic infections to the growth of children, have both been investigated by a previous World Bank research project (Ref. No. 671-15). This study extends the earlier research. It will survey health and nutritional factors, determine the effects of different caloric intakes on work output, and evaluate alternative feeding and parasite control programs. (Ref. No. 671-73)

The Economics of Schistosomiasis

Schistosomiasis is a tropical parasitic infection that now victimizes about 250 million people in 71 developing countries. Moreover, with the development of irrigated agriculture, dams and fisheries, the habitat of the vector snails is increasing. This problem has had to be faced in 30 Bank-financed development projects since 1971. Control programs are generally expensive and impose heavy demands on scarce health resources. The study is concerned with the design of the most economical strategy of control, using molluscicides and chemotherapy in irrigated agricultural development. It has developed an optimization model to assess the workings of control methods over time, based on data from control programs in Puerto Rico and St. Lucia. (Ref. No. 671-74)

Determinants of Fertility in Egypt

The Egyptian Fertility Survey will shortly collect economic and fertility data from 10,000 women. The present project is phased to follow this survey, and will interview the heads of 2,000 of these households. The resulting data set will contain a unique combination of male-female economic and fertility data, and is expected to contribute towards the design of policies to encourage smaller family size. (Ref. No. 671-81)

Experiments in Family Planning

Experiments in Family Planning evaluated the approaches tested and the methodologies employed in 96 family planning experiments. The study resulted in a book; an article and a paper presented at an international conference were also based on this exercise. (Ref. No. ECDPH40)

Population and Savings

This research models the micro-economic relationship between household size and composition and savings, in a life-cycle context. It suggests ways of testing behavioral hypotheses, one of which relates to the viewing of children as a vehicle for savings. (Ref. No. ECDPH42)

Fertility Behavior in Rural Botswana

The objectives of this study are to identify and measure the socio-economic correlates of fertility behavior in rural Botswana. The research extends a preliminary analysis prepared for the Government of Botswana, and prepares for a comprehensive research program on the economic implications of household demographic characteristics in Botswana. This program is to be based on the Bank-financed Botswana Rural Income Distribution Survey. (Ref. No. ECDPH44)

Education and Fertility

This study reviews the empirical evidence on the relationship between education and fertility on an aggregate and an individual level, and has constructed a model of fertility determination. This exercise is now completed and the results published as World Bank Occasional Paper No. 26, "Fertility and Education: What do We Really Know". (Ref. No. ECDPH45)

Intercountry Analysis of Family Planning

This is a study of fertility decline at the country level with a bearing on the controversy regarding the effectiveness of family planning programs. Comparative country analysis is used to demonstrate that a country's birth rate is strongly associated with household standard of living. The availability of family planning inputs is a significant but weaker influence than the level of development. The results of the study are now available as World Bank Staff Working Paper No. 318, Sources of Fertility Decline: Factor Analysis of Intercountry Data.

Women in the Urban Labor Market

This study uses data from the 1971 National Urban Migration and Employment Survey to analyze the performance of women in the urban labor market of Tanzania and to compare it with that of men. No evidence was found of occupational or wage discrimination against women, although sex differences in employment and earnings exist, apparently because of sex differences in access to educational opportunities. (Ref. No. ECDPH52)

Note: All non-RPO projects: Development Economics Department

IX. Public and Private Finance

Commercial Bank Behavior

Because of its size, its role in mobilizing deposit resources and its relatively wide geographic dispersion, the commercial banking system is the dominant financial institution in most developing countries and exerts a substantial influence on the allocation of resources. Yet, despite the policy importance of commercial banks, little is known about the determinants of their behavior and the effects of government policy on their actions. This study, now completed, investigates the banking system of selected countries; a study of Brazil, evaluates the use of selective credit policies to determine how successful they have been in influencing the flows of commercial bank credit to the agricultural sector and to export-oriented industries. A study of Sri Lanka concentrates on the mobilization of resources by the banking system and on differences in the operations of expatriate and domestic banks. Finally, there are three studies of Indian banking which discuss some of the institutional innovations that have been introduced to improve the accessibility of credit, especially to smaller borrowers, and accelerate the pace of deposit mobilization. (Ref. No. 671-25)

Small Enterprise Financing: The Role of Informal Credit Markets

Despite the importance of so-called informal credit markets in the financing of small enterprises in Asia and Africa they have been little studied. Greater knowledge of their operations would be useful in designing policies relating to the credit market and in obtaining estimates of transaction costs. This project will study the indigenous bankers of India, the Shroffs, and their clients. The project is also intended to indicate those aspects of the informal credit market most in need of study in other countries. (Ref. No. 671-65)

Capital Market Imperfections and Economic Development

This study is closely related to other Bank projects on small enterprises and capital markets (Ref. Nos. 671-25, 671-59 and 671-65) and examines the interaction between capital market structures and economic development. Using a country-specific and substantially micro-economic approach, the study analyzes the impact of capital market imperfections on the traditional sectors, and the impact of policy interventions on the capital markets. A later phase will expand the country coverage and the scope of the study to analyze wider aspects of the relationship between financial and economic development. (Ref. No. 671-69)

Innovations in Banking: The Gujarat Experiments

This study describes and surveys the banking innovations introduced by several Gujarat state institutions to provide financial, entrepreneurial training and infrastructural facilities to small scale industries. Units receiving assistance through the experiments, as well as through conventional channels, are surveyed. The experiment provides some important lessons for similar operations elsewhere. (Ref. No. ECDPF82)

Contractual Saving

This study analyzes the effects of social security institutions on resource mobilization and allocation in India, Malaysia, Philippines, Singapore, and Sri Lanka, In Asia these institutions appear to have a positive impact on saving, and they have become one of the principal sources of medium- and long-term finance. The experience in Chile is different because of the inflationary environment and the way in which social security schemes are implemented. (Ref. No. ECDPF85)

The Flow of Funds as a Tool of Analysis in the Less Developed Countries

Development planning often ignores the fact that the financing of investment has to be consistent with the structure of saving and the flow of funds. Hence the investment structure ex post can be radically different from the structure that was planned. This research examines the uses of flow of funds data, and their potential use as a tool of analysis and as a basis for investment planning. In most countries at present, these data are insufficiently disaggregated by sector and by income class. A case study using Indian data developed a model to project the flow of funds over time, and traced the implications for savings and investment policy. (Ref. No. ECDPF90)

Credit Extension to the Small-Scale Sector in the Philippines: An Estimation of Transaction Costs

This study estimates the transaction costs of lending to small farms and enterprises through rural banks, private development banks, the Development Bank of the Philippines and the Private Development Corporation of the Philippines. Transaction costs were estimated using data obtained from the institutions, or were imputed on the basis of cost-accounting techniques. (Ref. No. ECDPF92)

Note: All non-RPO projects: Development Economics Department.

X. Tourism

Social Impact Study

This study examined the non-economic effects of tourism development, which have frequently been used as counter-arguments to projects justified on economic grounds, to determine means to take account of such factors in the design of projects. The proceedings of a seminar on the Social-Cultural impact of tourism will be published in 1979. (Ref. No. R707)

Integration of Women in Development

The objective of this study was to examine the effects of tourism development on the roles and positions of women in Zihuatanejo, Mexico, where the Bank has financed a tourism project. The effects of urbanization and community development on the employment status of women and on family living patterns are described.

Tourist Flows

This report contains statistics and commentaries on tourist promotion and arrivals, and receipts and developments in the travel industry. The report aims at keeping the Tourism Projects Department up to date as to the most recent data and developments in countries to which the Bank is considering making, or to which it has made, tourism loans.

Note: All non-RPO projects: Tourism Projects Department.

APPENDIX B

Evaluation of Completed Projects

Four completed projects have been evaluated since the last report to the Board. The first of these (670-89) was a study of traditional smallholder agriculture within the overall agricultural development strategy of Yugoslavia. The study was to be undertaken by consultants in collaboration with a research institution in Yugoslavia. The outcome of the study has been disappointing for several reasons. The original proposal was insufficiently precise as to methodology and staffing; the evaluation panel felt that the proposal would not have been approved under current Research Committee review procedures. These weaknesses were compounded by difficulties encountered with the various consultants on the project as well as with the data. The senior consultant was forced to leave the project shortly after it began and the execution of the project was shifted onto Bank staff at short notice. The local collaborating institution insisted, for reasons of security, that it control all access to the principal data set, and that it undertake all data processing. This arrangement proved both costly and inefficient, and made analysis extremely difficult. It was ultimately decided to terminate the project before its objectives were fulfilled. In drawing lessons for the future, the evaluation panel concluded that an intermediate review of the project would have been desirable and would probably have led to earlier termination. It noted that suitable arrangements for data availability and data processing could have been formalized prior to initiation of the project. The lack of arrangements within the Bank for guaranteeing the security of data sets owned by other agencies was cited by the panel, which suggested that appropriate procedures be devised to permit the use of such data by the Bank.

The second project (671-03) was a comparatively small-scale study financed jointly by the Bank and USAID. It was undertaken in response to requests from researchers and operating staff in both agencies for assistance in the design of household surveys, particularly in connection with monitoring and evaluation work. The project was almost wholly undertaken by consultants, whose performance was satisfactory. The project was well integrated with related work in the Bank and included a review of experience with 33 Bank-related

household surveys conducted since 1970. The principal end-product from the research is a multi-purpose household questionnaire of standard economic and demographic questions. This questionnaire has been published by the Bank and widely distributed; though limited in scope, it is expected to be useful in Bank operational work, and to the academic and official community concerned with household surveys. Overall, the study was seen as cost-effective and satisfactorily executed.

A project on port pricing and investment policies (671-13) is the latest in a series of studies undertaken over more than a decade, in which principles of marginal cost pricing have been applied to tariff and investment decisions in a variety of sectors. The study grew out of questions arising from Bank operations and constitutes a significant methodological advance in its field. The principal output from the research is a book to be published shortly by the Bank, which presents a coherent economic framework for developing a port pricing system, and gives suggestions for implementing these ideas. The framework may be used to analyze decisions on port pricing policies, financing arrangements, provision of services, and investments, under alternative market conditions, and to assess the distribution of costs and benefits among the agents concerned. As a result of vigorous effort at dissemination by the sponsoring department, there appears to be some reassessment of port pricing policies and approaches within the Bank. A staff working party has been constituted to examine the feasibility of translating this body of ideas into practice. A consultant is currently engaged in defining the accounting, statistical and costing systems that would be needed to identify unit costs. This is expected to lead to one or more case studies. Over the longer haul the use of the book produced by this project as a training text for port administrators could result in a greater spread and application of these ideas. The evaluation panel concluded that this particular research project was a prime example of the proper exploitation of the Bank's comparative advantage in research.

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The fourth project (671-37) was to develop a framework for analyzing the effects of different urban housing policies in developing countries. The methodological work undertaken had the ambitious objective of adapting a model of the United States housing market, designed by the Urban Institute, to conditions in developing countries. Though the theory behind this model was broadly applicable, the very considerable differences between U.S. and developing country housing markets demanded adaptations which were beyond the resources of the project team. The research has nonetheless indicated the way in which future modelling work on housing markets in developing countries fruitfully move. After an intermediate review, the project's focus shifted toward empirical analysis of the demand for housing, taking cities in the Republic of Korea as a case study. Valuable results on the demand for housing in Korea have been generated from this exercise. These results have had some influence on the discussion of housing policy in Korea.

APPENDIX

WORLD BANK RESEARCH PROGRAM

Table 1: RESEARCH COMMITTEE MEMBERS

H. B. Chenery, (Chairman), Vice President, Development Policy

B. Balassa, Acting Research Adviser

J. Benard, Special Adviser, Economic Analysis and Projections Department

L. de Azcarate, Chief Economist, Western Africa Regional Office

J. Holsen, Chief Economist, Latin America and the Caribbean Regional Office

B. B. King, Director, Development Economics Department

R. Picciotto, Director, South Asia Projects Department

D. Turnham, Adviser, Agriculture and Rural Development Department

H. G. van der Tak, Director, Projects Advisory Staff

E. B. Waide, Chief Economist, South Asia Regional Office

A. A. Walters, Urban Adviser, Urban Projects Department

D. J. Wood, Assistant Director, Programming and Budgeting Department

APPENDIX

WORLD BANK RESEARCH PROGRAM

Table 2: FINANCIAL STATUS OF CURRENT AND RECENTLY COMPLETED RESEARCH PROJECTS
(US$ '000)

Category/Title	Project Code	Dept. Resp.	FY77 (Actual)	FY78 (Actual)	Total to Date a/	FY79 Auth. b/	Remainder of Total Authorization c/
I. Development Policy and Planning							
A. General/Planning	-	-	-	-	-	-	-
B. Income Distribution							
Short-run and Long-run Influences upon Income Distribution	670-06	DRC	10.7	-	171.6	-	-
Evaluation of Latin American Data on Income Distribution	670-83	DRC	9.9	-	154.6	-	-
Growth, Employment, and Size Distribution of Income	670-84	DRC	-	-	209.5	-	-
Urban Income Distribution in Latin America	670-85	DRC	-	-	193.0	-	-
Distributive Impact of Public Expenditures	670-96	DRC/DED	14.9	-	174.3	-	-
Evaluation of Asian Data on Income Distribution	671-08	DRC	40.0	64.7	170.8	48.5	-
Income Distribution in Thailand	671-36	DRC	25.6	5.8	43.6	-	-
Indirect Estimation of the Size Distribution of Income	671-41	DRC	17.6	-	20.0	-	-
Household Incomes and Expenditures in Mexico	671-76	LC1	-	-	-	30.0	66.1
Sub-Total			118.7	70.5	1137.4	78.5	66.1
C. Growth/Country Economic Analysis/Development Strategy							
Development Strategies in Semi-Industrial Countries	670-01	DRC	0.7	5.4	140.4	-	-
International Comparison Project	670-68	EPD	203.0	-	604.2	150.0	-
Prototype Models for Country Analysis	670-86	DRC	96.8	108.2	352.1	53.6	-
Commercial Bank Behavior	671-25	DED	4.9	10.0	50.1	-	-
Social Accounts and Development Models	671-27	DRC	62.4	46.0	149.8	37.7	10.0
A General Algebraic Modeling System	671-58	DRC	-	23.2	23.2	41.8	20.0
Small Enterprise Financing: Role of Informal Credit Markets	671-65	DED	-	7.2	7.2	60.9	-
Research Support for the World Development Report	671-66	EPD	-	18.2	18.2	212.3	365.5
Capital Market Imperfections and Economic Development	671-69	DED	-	20.0	20.0	18.3	-
Growth, Poverty and Basic Needs	671-72	DRC	-	-	4.5	75.5	-
Penetration of Japanese, Canadian and Australian Markets by LDC Manufactures	671-82	EPD	-	-	-	34.0	36.0
Sub-Total			367.8	238.2	1369.7	684.1	431.5
Total Section I			486.5	308.7	2507.1	762.6	497.6
II. International Trade and Finance							
Natural Resources and Planning: Issues in Trade and Investment	671-09	DRC	54.9	10.4	151.3	13.8	-
Promotion of Non-Traditional Exports	671-10	LC2	35.0	-	42.0	-	-
Agricultural Commodity Projections	671-23	EPD	-	-	50.0	1.9	-
Linkage of Commodity and Country Models	671-28	EPD	30.0	39.0	69.0	4.0	-
Export Incentives in Developing Countries	671-35	DRC	52.1	31.8	83.9	23.3	25.0
Marketing Manufactured Exports	671-56	DED	-	7.2	7.2	25.3	-
Effects of Increased Imports of Manufactured Goods from Developing Countries	671-67	EPD	-	-	-	91.2	9.6
Key Institutions and Expansion of Manufactured Exports	671-68	DED	-	25.7	25.7	57.9	9.4
International Trade Policy for the Development of Bangladesh	671-75	ASA	-	-	-	78.6	41.3
Total Section II			172.0	114.1	429.1	296.0	85.3
III. Agriculture and Rural Development							
Rural Development in Northeast Brazil	670-73	DRC	44.0	17.6	386.8	1.1	-
Land Reform in Latin America	670-80	DED	-	-	55.8	-	-
Development Strategies for Smallholder Agriculture in Yugoslavia	670-89	AGR	0.8	-	33.1	-	-
Evaluation of Lilongwe Land Development Program	670-93	EAP	2.5	-	24.8	-	-
The Analytics of Change in Rural Communities	671-17	DRC	48.6	38.2	219.3	19.7	-
Simulation of Buffer Stocks	671-24	DED	10.9	13.1	40.6	8.1	-
Agricultural Pricing and Storage Policies in East Africa	671-29	DRC	49.3	15.6	108.3	-	-
Management and Organization of Irrigation Projects	671-34	AGR	25.0	92.9	153.3	5.2	-
Price Intervention in Agriculture	671-39	DRC	2.8	-	5.2	-	-
Country Case Studies of Agricultural Prices and Subsidies	671-42	AGR	189.1	28.3	217.4	-	-
Consequences of Risk for Agricultural Policy	671-43	DRC	25.4	14.5	39.9	8.1	-
Agricultural Innovation and Rural Development	671-44	AGR	54.1	3.8	57.9	11.8	-
Programming and Designing Investment: Indus Basin	671-45	DRC	53.4	83.3	136.7	133.3	-
Distribution of Income through the Extended Family System	671-57	WA2	-	140.4	140.4	34.9	-
India: Impact of Agricultural Development on Employment and Poverty: Phase I	671-62	DRC	-	5.2	5.2	20.3	-
Food Deficits of Target Groups	671-64	AGR	-	23.1	23.1	21.7	-
Evaluation of Food Distribution Schemes	671-80	AGR	-	-	-	82.0	25.0
Total Section III			503.9	476.0	1647.8	346.2	25.0
IV. Industry							
Scope for Capital-Labor Substitution in the Mechanical Engineering Industry	670-23	DED	8.0	6.3	128.1	-	-
Programming in the Manufacturing Sector	670-24	DED	28.5	9.2	209.3	27.3	-
Industrial Capacity Utilization in Selected Latin American Countries	670-25	IDF	-	12.5	37.5	-	-
Industrial Policies and Economic Integration in West Africa	670-87	DRC	3.0	2.4	90.0	3.6	-
Patterns of Industrial Development	671-05	DED	17.2	1.3	57.2	1.3	-
A Comparative Study of the Sources of Industrial Growth and Structural Change	671-32	DED	42.6	44.1	143.2	12.4	3.1
Appropriate Industrial Technology	671-51	DED	-	17.3	17.3	9.5	2.8
Small Scale Enterprise Development	671-59	DED	-	77.4	77.4	115.0	57.2
Public Manufacturing Enterprises	671-71	DED	-	7.2	7.2	86.6	4.0
Appropriate Industrial Technology, Phase II	671-77	DED	-	-	-	75.0	25.0
Sources of Growth and Productivity Change: A Comparative Analysis of Three Countries	671-79	DED	-	-	-	66.2	-
Total Section IV			99.3	177.7	767.2	396.9	92.1
V. Transportation							
Substitution of Labor and Equipment in Civil Construction	670-26	TRP	101.4	-	955.4	-	-
Highway Design Study, Phase II	670-27	TRP	115.4	78.6	530.2	74.4	-
Port Pricing and Investment Policies for Developing Countries	671-13	TRP	6.2	-	34.5	-	-
Madagascar Feeder Road	671-14	TRP	14.2	-	102.2	2.3	-
Economic Role of Railways	671-50	TRP	10.8	4.9	15.7	15.8	-
Total Section V			248.0	83.5	1638.0	92.5	-

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APPENDIX

Category/Title	Project Code	Dept. Resp.	FY77 (Actual)	FY78 (Actual)	Total to Date a/	FY79 Auth. b/	Remainder of Total Authorization c/
VI. Public Utilities							
Standards of Reliability of Urban Electricity Supply	670-67	EWT	64.6	6.5	121.0	-	-
Pricing and Investment in Telecommunications	670-76	EWT	-	-	33.4	-	-
Appropriate Technology for Water Supply and Waste Disposal	671-46	EWT	168.1	359.9	528.0	51.8	-
Total Section VI			232.7	366.4	682.4	51.8	-
VII. Urbanization and Regional Development							
Urban Public Finance and Administration	670-70	DED	3.4	8.7	79.0	1.6	-
Pricing and Financing of Urban Public Service: Water Supply and Sewage Disposal	671-18	DED	1.8	0.1	59.6	0.5	-
Urban Traffic Restraint (Singapore)	671-20	URB	7.3	4.8	267.5	-	-
Analyzing the Effects of Urban Housing Policies in Developing Countries	671-37	DED	22.2	-	32.2	-	-
Strategic Planning to Accommodate Rapid Growth in Cities of Developing Countries ("City Study")	671-47	DED	30.4	177.6	208.0	351.0	30.0
Total Section VII			65.1	191.2	646.3	353.1	30.0
VIII. Population and Human Resources							
A. Education							
Project Evaluation Methodology: Education Attainments	670-78	EDC	12.7	-	97.0	-	-
Economic Development and Educational Reform	671-19	DED	2.4	1.7	41.7	1.2	-
Ability Characteristics as Factors of Production	671-33	DRC	-	-	7.3	-	-
Education and Rural Development in Nepal and Thailand	671-49	DED	30.4	60.5	90.9	38.8	12.0
Occupational Structures of Industries	671-52	EDC	-	32.4	32.4	41.2	-
Economics of Educational Radio	671-54	EDC	4.0	57.1	61.1	5.5	-
Retention of Literacy/Numeracy Skills Among School Leavers	671-55	EMP/EDC	1.9	41.6	43.5	144.0	76.0
Textbook Availability and Educational Quality	671-60	EDC/DED	-	20.9	20.9	56.4	64.0
Educational and Other Determinants of Farm Household Response to External Stimuli	671-78	DED	-	-	-	30.9	-
Sub-Total			51.4	214.2	394.8	318.0	152.0
B. Labor and Employment							
Labor Force Participation, Income and Unemployment	670-45	DED	18.2	6.8	118.9	3.2	-
Employment Models and Projections	671-06	DED	24.1	3.4	145.5	-	-
Council for Asian Manpower Studies (CAMS)	671-07	DED	-	-	50.0	-	-
Migration Patterns in West Africa	671-26	DED	13.1	14.6	56.1	4.9	-
Structure of Rural Employment, Income, and Labor Markets	671-30	DED	8.6	47.9	69.2	40.6	-
A Comparative Analysis of Rural-Urban Labor Market Interactions	671-31	DED	0.4	1.4	24.0	2.6	-
Urban Labor Markets in Latin America	671-48	DED	5.5	49.3	54.8	3.3	-
Labor Migration and Manpower in the Middle East and North Africa	671-63	DED/EMP	-	17.7	17.7	111.8	-
Export of Manpower from Pakistan and Bangladesh to the Middle East	671-83	ASA	-	-	-	120.0	30.0
Wage and Employment Trends and Structures	671-84	DED	-	-	-	30.5	30.5
Sub-Total			69.9	141.1	536.2	316.9	60.5
C. Population and Health							
Population Growth and Rural Poverty	671-02	DED	13.7	-	60.4	2.0	-
Narangwal Population and Nutrition	671-38	DED	61.1	57.5	172.1	42.5	-
International Review Group on Research in Population and Development	671-40	DED	-	-	20.0	-	-
El Salvador Health Study	671-53	DED	-	0.9	0.9	1.1	-
Socio-Economic Aspects of Fertility Behavior in Rural Botswana	671-61	DED	-	20.0	20.0	63.3	-
Case Studies of Determinants of Recent Fertility Decline	671-70	DED	-	3.5	3.5	76.5	-
Kenya - Health, Nutrition and Worker Productivity Studies	671-73	TRP	-	24.5	24.5	30.8	42.0
The Economics of Schistosomiasis Control Activities	671-74	PAS	-	10.7	10.7	55.4	30.7
Determinants of Fertility in Egypt	671-81	DED	-	-	-	54.0	125.5
Sub-Total			74.8	117.1	312.1	325.6	198.2
Total Section VIII			196.1	472.4	1243.1	960.5	410.7
IX. Other d/			19.4	39.0	111.1	16.8	-
Grand Total			2023.0	2229.0	9672.1	3276.4	1140.7

a/ Sum of expenditures, FY1972-FY1978. Research projects completed during or prior to FY77 have been omitted from this table for simplicity of presentation. For financial information on such projects, please consult World Bank Research Program, January 23, 1978, Appendix Table 2.

b/ Research Committee authorizations as of January 1979. Authorizations include overprogramming to allow for normal intervals between authorizations and disbursements. The budget authorization for FY79 is $2,524,000.

c/ FY80 and beyond.

d/ Includes studies in the country concentration exercise completed in 1976, and provision for travel and conferences.

NOTE: The above figures include expenditures for consultant fees, consultant and staff travel, and contractual services, but not salaries of Bank staff.

DEPARTMENT CODES

Development Policy Staff

DED - Development Economics Department
DRC - Development Research Center
EPD - Economic Analysis and Projections Department

Central Projects Staff

AGR - Agriculture and Rural Development Department
EDC - Education Department
EWT - Energy, Water, and Telecommunications Department
IDF - Industrial Development and Finance Department
TRP - Transportation Department
URB - Urban Projects Department

Regional Offices

ASA - South Asia, Country Programs Department
EAP - Eastern Africa, Projects Department
EMP - Europe, Middle East and North Africa, Projects Department
LC1 - Latin America and Caribbean, Country Programs Department I
LC2 - Latin America and Caribbean, Country Programs Department II
PAS - Projects Advisory Staff
WA2 - Western Africa, Country Programs Department II

WORLD BANK RESEARCH PROGRAM

APPENDIX

Table 3: COUNTRY REFERENCE OF EXTERNAL RESEARCH PROJECTS AND PARTICIPATING INDIVIDUALS AND INSTITUTIONS

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Argentina	670-01	Development Strategies in Semi-Industrial Countries	D. Schydlowsky (Center for Latin American Studies, Boston University, USA); J. Berlinski (Di Tella Institute, Buenos Aires)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
Bangladesh	671-75	International Trade Policy for the Development of Bangladesh	D. Schydlowsky (Center for Latin American Studies, Boston University, USA).
Bolivia	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima
Botswana	671-46	Appropriate Technology for Water Supply and Waste Disposal	M. D. Blackmore
	671-61	Socio-Economic Aspects of Fertility Behavior in Rural Botswana	Botswana Central Statistics Office; R. Lucas (Boston University, USA); E. Mueller (University of Michigan, USA)
Brazil	670-27	Highway Design Study, Phase II	Transport Planning Agency (GEIPOT), Brasilia; University of Texas (USA)
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Fundação Getúlio Vargas, Rio de Janeiro
	670-73	Rural Development in Northeast Brazil	Superintendencia do Desenvolvimento do Nordeste (SUDENE), Recife
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. Garcia, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-25	Commercial Bank Behavior	Fundação Getulio Vargas, Rio de Janeiro
	671-35	Export Incentives in Developing Countries	Mauricio Barata de Paula Pinto (Fundação Instituto de Pesquisas Economicas, Sao Paulo)
	671-54	Economics of Educational Radio	J. and M. Oliveira
	671-68	Key Institutions and Expansion of Manufactured Exports	L. H. Wortzel, H. V. Wortzel (Boston University, USA)
Chile	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	671-19	Economic Development and Educational Reform	C. Calvo, M. Carnoy (Stanford University, USA)
China, Republic of	670-01	Development Strategies in Semi-Industrial Countries	T.H. Lee (Joint Commission on Rural Reconstruction, Taipei); K. Liang (Central Bank of China, Taipei)
	671-07	Council for Asian Manpower Studies (CAMS)	K. Liang (National Taiwan University); C. Liang (National Changchi University)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-19	Economic Development and Educational Reform	G. Tannenbaum
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	W. Kuo (National Taiwan University, Taipei)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. S. Ng
Colombia	670-01	Development Strategies in Semi-Industrial Countries	D. Schydlowsky (Center for Latin American Studies, Boston University, USA)
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Departamento Administrativo Nacional de Estadística (DANE), Bogotá
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	670-96	Distributive Impact of Public Expenditures	Compania Colombiana de Datos, Bogota
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. Garcia, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-18	Pricing and Financing of Urban Public Services: Water Supply and Sewage Disposal	R. Bird (University of Toronto, Canada); L. K. Hubbell (University of Missouri, Kansas City, USA); C. E. Mc Lure (Rice University, USA)
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	J. de Melo (Georgetown University, USA)
	671-47	Strategic Planning to Accommodate Rapid Growth in Cities of Developing Countries ("City Study")	Corporación Centro Regional de Poblacion (CCRP), Bogotá; Departmento Administrativo Nacional de Estadística (DANE), Bogota
	671-48	Urban Labor Markets in Latin America	A. Berry (University of Toronto, Canada)
	671-56	Marketing Manufactured Exports	D. Morawetz (Boston University, USA)
	671-59	Small Scale Enterprise Development	José F. Escandon; Gabriel Poveda; Corporacion Financiera Popular, Bogotá

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Country	Project Code	Title	Participating Individual(s) and Institution(s)
Costa Rica	670-76	Pricing and Investment In Telecommunications	Instituto Costarricense de Electricidad, San José; M. Tristán (University of Costa Rica, San José)
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Cuba	671-19	Economic Development and Educational Reform	M. Carnoy, J. Wetheim (Stanford University, USA)
Ecuador	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Egypt	670-24	Programming in the Manufacturing Sector	Organization for Chemical Industries, Cairo
	671-81	Determinants of Fertility in Egypt	Central Agency for Public Mobilization and Statistics (CAPMAS), Cairo; World Fertility Survey, London, UK
El Salvador	671-53	El Salvador Health Study	Fundación Salvadoreña de Desarrollo y Vivienda Mínima (FSDVM), San Salvador
Ethiopia	670-71	Ethiopia Feeder Road Study	Institute of Development Research, National University, Addis Ababa
	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postelthwaite (University of Hamburg, F. R. Germany)
Gambia	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France); K. Swindell (University of Birmingham, UK)
Ghana	670-87	Industrial Policies and Economic Integration in West Africa	D. Stryker (Tufts University, USA); S. Pearson and G. Nelson (Food Research Institute, Stanford University, USA)
	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France); E. A. Colecraft; B. Gyepi-Garbrah; N. K. Nair
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. Iwugo (University of Birmingham, UK); A. Wright (University of Science and Technology)
Greece	671-35	Export Incentives in Developing Countries	E. Voloudakis (Center for Planning and Economic Research, Athens)
Guatemala	671-46	Appropriate Technology for Water Supply and Waste Disposal	M. Elmendorf; P. Buckles; R. Caceres (Centro Mesoamericano de Estudios, Guatemala City)
Honduras	670-26	Substitution of Labor and Equipment in Civil Construction	Ministry of Communications, Public Works and Transport, Tegucigalpa; GITEC, Dusseldorf, F. R. Germany
	670-83	Evaluation of Latin America Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Hong Kong	671-07	Council for Asian Manpower Studies (CAMS)	R. Hsia (University of Hong Kong)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-68	Key Institutions and Expansion of Manufactured Exports	L. H. Wortzel, H. V. Wortzel (Boston University, USA)
India	670-24	Programming in the Manufacturing Sector	Ministry of Chemicals and Fertilizers, Fertilizer Association of India, Fertilizer Corporation of India, New Delhi
	670-26	Substitution of Labor and Equipment in Civil Construction	Scott, Wilson, Kirkpatrick and Partners, London, UK; Director General, Border Roads, New Delhi; Ministry of Transport, New Delhi; Central Water and Power Commission, New Delhi; State Public Works Department
	670-27	Highway Design Study, Phase II	Central Road Research Institute, New Delhi; Ministry of Transport, New Delhi
	670-45	Labor Force Participation, Income and Unemployment	Bombay University, Bombay
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Central Statistical Organization, New Delhi
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA

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Country	Project Code	Title	Participating Individual(s) and Institution(s)
India	671-06	Employment Models and Projections	R. Krishna (Planning Commission, New Delhi); M. McPherson (Harvard University, USA)
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-19	Economic Development and Educational Reform	P. Panchamukhi (University of Bombay)
	671-25	Commercial Bank Behavior	Indian Institute of Management, Ahmedabad
	671-30	Structure of Rural Employment, Income and Labor Markets	K. Bardhan; E. Karni
	671-38	Narangwal Population and Nutrition	Johns Hopkins University, USA - C. Taylor, R.S.S. Sarma, R. Parker, A. Kielmann, N. Kielmann
	671-59	Small-Scale Enterprise Development	Sri Ram Center for Industrial Research, New Delhi
	671-62	India--Impact of Agricultural Development on Employment and Poverty: Phase I	P. K. Bardhan (University of California, Berkeley, USA)
	671-65	Small Enterprise Financing: Role of Informal Credit Market	T. Timberg
	671-70	Case Studies of Determinants of Recent Fertility Decline	K. Namboodiri (University of North Carolina, USA); A. Thavarajah and S.L.N. Rao (United Nations Fund for Population Activities, UNFPA); Bureau of Economics and Statistics, Kerala Government, Trivandrum; Institute for Social and Economic Change, Bangalore
	671-71	Public Manufacturing Enterprises	P. N. Khandwalla (Indian Institute of Management, Ahmedabad)
Indonesia	670-24	Programming in the Manufacturing Sector	Food and Agriculture Organization (FAO), Rome; PUSRI, Jakarta
	670-26	Substitution of Labor and Equipment in Civil Construction	Directorate of Water Resources Development, Jakarta; Highways Department, Jakarta; Scott, Wilson, Kirkpatrick and Partners, London, UK
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	S. Soesanto (National Institute of Health Research and Development, Jakarta)
	671-65	Small Enterprise Financing: Role of Informal Credit Market	T. Timberg
Iran	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Bank Markazi Iran, Tehran
Israel	670-01	Development Strategies in Semi-Industrial Countries	Z. Sussman (Bank of Israel, Jerusalem)
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-32	A Comparative Study of the Sources of Industrial and Structural Change	M. Fraenkel (Bank of Israel, Jerusalem)
Ivory Coast	670-87	Industrial Policies and Economic Integration in West Africa	D. Stryker (Tufts University, USA); T. Monson (Centre Ivoirien de Recherche Economique et Sociale, Abidjan)
	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Jamaica	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
Japan	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	T. Watanabe (University of Osaka, Japan)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	Nihon Suido Consultants, Tokyo
	671-68	Key Institutions and Expansion of Manufactured Exports	L. H. Wortzel and L. T. Wells Jr.
Kenya	670-26	Substitution of Labor and Equipment in Civil Construction	International Labour Office, Geneva, Switzerland; Scott, Wilson, Kirkpatrick and Partners, London, UK: Ministry of Works, Nairobi
	670-27	Highway Design Study, Phase II	Ministry of Works, Nairobi; Transport and Road Research Laboratory, UK
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Central Bureau of Statistics, Nairobi
	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA
	671-18	Pricing and Financing of Urban Public Services: Water Supply and Sewage Disposal	R. Bird (University of Toronto, Canada); L. K. Hubbell (University of Missouri, Kansas City, USA); C. E. Mc Lure (Rice University, USA)

Table 3, Page 4

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Kenya	671-54	Economics of Educational Radio	J. Nkinyanji
	671-65	Small Enterprise Financing: Role of Informal Credit Market	T. Timberg
	671-73	Kenya - Health, Nutrition and Worker Productivity Studies	M. C. Latham and L. S. Latham (Cornell University, USA); Rural Access Road Programs, Ministry of Works, Nairobi; Overseas Development Ministry, UK
Korea, Republic of	670-01	Development Strategies in Semi-Industrial Countries	K. S. Kim (Korea Development Institute, Seoul)
	670-23	Scope for Capital-Labor Substitution in the Mechanical Engineering Industry	Korean Institute of Science and Technology, Seoul
	670-24	Programming in the Manufacturing Sector	Korean Institute of Science and Technology, Seoul
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); S. Otto (United Nations Statistical Office, UNSO); Bank of Korea; Economic Planning Board; Ministry of Construction, Seoul
	670-70	Urban Public Finance and Administration	R. Bahl (Syracuse University, USA)
	670-86	Prototype Models for Country Analysis	Korea Development Institute, Seoul
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, H. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-30	Structure of Rural Employment, Income and Labor Markets	C. Y. Ahn (Choong Ang University, Seoul); Korea Rural Economics Institute, Seoul
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	K. S. Kim (Korea Development Institute, Seoul)
	671-35	Export Incentives in Developing Countries	S. T. Sieh (Korea Development Institute, Seoul)
	671-46	Appropriate Technology for Water and Waste Disposal	D. M. Kim (City College of Seoul, Seoul)
	671-54	Economics of Educational Radio	Y. T. Kim
	671-68	Key Institutions and Expansion of Manufactured Exports	L. H. Wortzel and L. T. Wells Jr. (Boston University, USA)
Lesotho	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
Liberia	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Madagascar	671-14	Madagascar Feeder Road Study	Swiss Federal Institute of Technology, Zurich; Bureau Central d'Études Pour les Equipements d'Outre-Mer, Paris, France; Fonds d'Aide at de Coopération, Paris, France
Malawi	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); National Statistical Office, Zomba
	670-93	Evaluation of Lilongwe Land Development Program	B. Kinsey (School of Development Studies, University of East Anglia, UK)
Malaysia	670-24	Programming in the Manufacturing Sector	World Pulp and Paper Program, Food and Agricultural Organization (FAO), Rome
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Department of Statistics, Kuala Lumpur
	670-96	Distributive Impact of Public Expenditures	Lai ah Hoon (University of Malaysia, Kuala Lumpur); P. Heller (University of Michigan, USA); Eastern Market Assessment Survey Company, Kuala Lumpur; Department of Statistics and various ministries, Kuala Lumpur
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-27	Social Accounts and Development Models	J. Round (University of Warwick, UK); Department of Statistics, Kuala Lumpur; Economic Planning Unit, Kuala Lumpur
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. S. Ng
	671-65	Small Enterprise Financing: Role of Informal Credit Market	T. Timberg
Mali	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France); Michéle Fiéloux
	671-57	Distribution of Income through the Extended Family System	J. Mogey (Boston University, USA)

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Country	Project Code	Title	Participating Individual(s) and Institution(s)
Mexico	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Direccion General de Estadistica, Mexico City; Banco de Mexico, Mexico City
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, R. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	M. Syrquin (Bar Ilan University, Israel)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	F. Miller (University of Minnesota, USA)
	671-76	Household Incomes and Expenditures in Mexico	L. Solis (Bank of Mexico) G. Martinez (Ministry of Labor)
Nepal	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-49	Education and Rural Development in Nepal and Thailand	New ERA, Kathmandu; L. Lau (Stanford University, USA); M. Lockheed (Educational Testing Service, USA)
Nicaragua	671-46	Appropriate Technology for Water Supply and Waste Disposal	M. Elmendorf; C. Pineo
	671-54	Economics of Educational Radio	P. Suppes (Stanford University, USA)
	671-60	Textbook Availability and Educational Quality	P. Suppes (Stanford University, USA)
Nigeria	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA
	671-30	Structure of Rural Employment, Income, and Labor Markets	Northern Projects Monitoring and Evaluation Unit, Kaduna
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. Iwugo; P. Oluwande (University of Ibadan)
Pakistan	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Statistics Division, Ministry of Finance, Planning and Economic Affairs, Islamabad
	671-35	Export Incentives in Developing Countries	M. Khan (Pakistan Development Institute, Karachi)
	671-45	Programming and Designing Investment: Indus Basin	Water and Power Development Administration, Karachi
Panama	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Peru	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima; Inter-American Development Bank, Washington, D.C., USA
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
	671-48	Urban Labor Markets in Latin America	Universidad Católica Peruana, Lima; P. and C. Brennan
Philippines	670-24	Programming in the Manufacturing Sector	World Pulp and Paper Program, Food and Agriculture Organization (FAO), Rome
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); National Census and Statistics Office, Manila
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-59	Small-Scale Enterprise Development	Department of Industry, Manila; H. Fajardo (University of the Philippines, Manila)
	671-60	Textbook Availability and Educational Quality	Educational Development Implementing Task Force, Manila
	671-68	Key Institutions and Expansion of Manufactured Exports	L. H. Wortzel, H. V. Wortzel (Boston University, USA)

Table 3, Page 6

Country	Project Code	Title	Participating Individual(s) and Institution(s)
Romania	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Central Statistical Board, Bucharest
Senegal	670-87	Industrial Policies and Economic Integration in West Africa	D. Stryker (Tufts University, USA); B. Horton (Tufts University, USA)
	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France); N. K. Nair
	671-57	Distribution of Income through the Extended Family System	J. Mogey (Boston University, USA): Société Nationale des Etudes de Developpement (SONED), Dakar; Société d'Amenagement et d'Exploitation des Terres du Delta, Dakar
Sierra Leone	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France); G. Okoyo; E. K. Campbell
Singapore	670-01	Development Strategies in Semi-Industrial Countries	A. Tan (University of Singapore);O. Hock
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-20	Urban Traffic Restraint (Singapore)	Singapore Road Transport Action Committee, Government of Singapore, Singapore; United Nations Environment Programme (UNEP); United States Department of Transportation
Somalia	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
Spain	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Instituto Nacional de Estadística, Madrid
Sri Lanka	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); National Census and Statistics Office, Colombo
	671-02	Population Growth and Rural Poverty	S. Epstein (Institute of Development Studies, University of Sussex, UK); Ministry of Overseas Development, UK; Population Council, USA; Sri Lanka Centre for Development Studies (Marga Institute), Colombo
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-70	Case Studies of Determinants of Recent Fertility Decline	K. Namboodiri (University of North Carolina, USA); S.L.N. Rao (United Nations Fund for Population Activities, UNFPA); Department of Statistics, Ministry of Plan Implementation; Demographic Training and Research Unit, University of Sri Lanka, Colombo.
Sudan	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	B. M. Elhassan (University of Khartoum, Khartoum)
Swaziland	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany)
Syria	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Central Bureau of Statistics, Damascus
Tanzania	670-78	Project Evaluation Methodology: Education Attainments	International Institute of Educational Planning (IIEP), Paris, France; N. Postlethwaite (University of Hamburg, F. R. Germany); M. Kinunda (Commissioner of National Education, Dar es Salaam); Institute of Education, University of Dar es Salaam
	671-19	Economic Development and Educational Reform	T. Maliyamkono (University of Dar es Salaam)
Thailand	670-24	Programming in the Manufacturing Sector	World Pulp and Paper Program, Food and Agriculture Organization (FAO), Rome
	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO): National Economic and Social Development Board; Ministry of Commerce, Bangkok
	671-08	Evaluation of Asian Data on Income Distribution	UN Economic and Social Commission for Asia and the Pacific (ESCAP)
	671-36	Income Distribution in Thailand	C. Chiswick (Stanford University, USA)

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Country	Project Code	Title	Participating Individual(s) and Institution(s)
Thailand	671-49	Education and Rural Development in Nepal and Thailand	L. Lau (Stanford University, USA); M. Seetisarn (Chiang Mai University)
	671-68	Key Institutions and Expansion of Manufactured Exports	A. H. Wortzel, H. V. Wortzel (Boston University, USA)
	671-78	Educational and Other Determinants of Farm Household Response to External Stimuli	L. Lau (Stanford University, USA)
Togo	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France); N. K. Nair
Tunisia	670-70	Urban Public Finance and Administration	R. Prud'homme
Turkey	671-32	A Comparative Study of the Sources of Industrial Growth and Structural Change	M. Celasun (Middle East Technical University, Ankara)
Upper Volta	671-26	Migration Patterns in West Africa	J. Condé (OECD Development Center, Paris, France)
Uruguay	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Banco Central del Uruguay, Montevideo
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Venezuela	670-24	Programming in the Manufacturing Sector	Junta del Acuerdo de Cartagena, Lima
	670-83	Evaluation of Latin American Data on Income Distribution	UN Economic Commission for Latin America (ECLA) - O. Altimir
Yugoslavia	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Federal Institute for Statistics, Belgrade
	671-10	Promotion of Non-Traditional Exports	UN Economic Commission for Latin America (ECLA) - A. Monti, H. García, R. ffrench-Davis, J. Piñera; United Nations Development Programme (UNDP)
	671-71	Public Manufacturing Enterprises	International Center for Public Enterprises in Developing Countries, Ljublana
Zambia	670-68	International Comparison Project	I. Kravis (University of Pennsylvania, USA); C. Otto (United Nations Statistical Office, UNSO); Central Statistical Office, Lusaka
	671-06	Employment Models and Projections	M. McPherson (Harvard University, USA)
	671-46	Appropriate Technology for Water Supply and Waste Disposal	K. Iwugo (University of Birmingham, UK)

NOTE: Affiliation given for individual consultants applies to time period of execution of project.

WORLD BANK RESEARCH PROGRAM — APPENDIX

Table 4: REPORTS FROM RESEARCH PROJECTS COMPLETED IN 1978

Project Title	Project Code	
Short Run and Long Run Influences upon Income Distribution	670-06	I. Adelman, "Development Economics - A Reassessment of Goals." American Economic Review 65 (June 1975).
		_____, "Strategies for Equitable Growth." Challenge 17 (June 1974).
		I. Adelman and S. Robinson, "A Poverty Focused Planning Model." In Economic Growth in Developing Countries - Material and Human Resources. Edited by Y. Ramati. New York: Praeger, 1975.
		_____, "Income Distribution, Import Substitution and Growth Strategies in a Developing Country." In Modelling Economic Change: The Recursive Programming Approach. Edited by R. H. Day and A. Cigno. Amsterdam and London: North-Holland, 1978.
		_____, Income Distribution Policy in Developing Countries: A Case Study of Korea, Stanford: Stanford University Press, 1978.
		_____, "Migration, Demographic Change and Income Distribution in a Model of a Developing Country." In Research in Population Economics. I Edited by J. Simon. Greenwich, Conn: JAI Press, 1978.
		I. Adelman, C. T. Morris and S. Robinson, "Policies for Equitable Growth." World Development 4 (1976). Also reprinted in Income Distribution, Poverty and Economic Development. Edited by J. Powelson. Boulder: Westview Press, 1977.
		I. Adelman, M.J.D. Hopkins, S. Robinson, G. Rodgers and R. Wery, "A Comparison of Two Models for Income Distribution Planning." Journal of Policy Modeling 1 (1979).
		_____, The Political Economy of Egalitarian Growth. Monograph. Geneva: International Labor Organization, 1976.
		S. Robinson, "Income Distribution within Groups, among Groups and Overall: A Technique of Analysis." Research Program in Development Studies, Discussion Paper No. 65, Princeton University, August 1976.
		_____, "Toward an Adequate Long Run Model of Income Distribution and Economic Development." American Economic Review 66 (May 1976).
Standards of Reliability of Urban Electricity Supply	670-67	M. Munasinghe, "The Leisure Cost of Electric Power Failures." World Bank Staff Working Paper No. 285, June 1978.
		M. Munasinghe and others. "The Economic Costs of Electric Power Outages and the Optimum Level of Reliability. Report I - The Economic Methodology Report II - Outage Costs of Residential Consumers Report III - The Demand Forecast and Engineering Methodology Final Report." P.U. Reports Nos. 16 - 19, Energy, Water and Telecommunications Department, World Bank, October 1978.
		M. Munasinghe and M. Gellerson, "Optimum Economic Power System Reliability." World Bank Staff Working Paper No. 311, January 1979.
		M. Munasinghe, The Economics of Power System Reliability and Planning. Baltimore: Johns Hopkins University Press (forthcoming).
Economic Development of East and Southeast Asia	670-79	International Development Center of Japan, "The Interrelated Economic Development of East and Southeast Asia in the Coming Decade." (mimeo, August 1974).
Land Reform in Latin America	670-80	S. Eckstein, G. Donald, D. Horton and T. Carroll, "Land Reform in Latin America: Bolivia, Chile, Mexico, Peru and Venezuela." World Bank Staff Working Paper No. 275, April 1978.
Growth, Employment and the Size Distribution of Income	670-84	J.C.H. Fei, G. Ranis and S.W.Y. Kuo, "Equity with Growth: The Taiwan Case." New York: Oxford University Press (forthcoming).
		_____, "Growth and the Family Distribution of Income by Factor Components." Quarterly Journal of Economics 92 (February 1978)
		G. Pyatt, C. Chen and J. Fei, "The Distribution of Income by Factor Components." (mimeo, December 1978).
Urban Income Distribution in Latin America	670-85	R. Ferber and P. Musgrove, "Finding the Poor." (mimeo, 1976).
		_____, "Identifying the Urban Poor." Latin American Research Review (Summer 1979).
		_____, "Finding the Poor." Review of Income and Wealth (forthcoming).
Development Strategies for Smallholder Agriculture in Yugoslavia	670-89	P. Hazell, "Statistical Analysis of the Cooperative Arrangements between Social and Private Farms in Yugoslavia." (mimeo, January 1975).
Employment and Income Distribution in Malaysia	670-94	S. Anand, Inequality and Poverty in Malaysia: Measurement and Decomposition. New York: Oxford University Press (forthcoming).
		_____, "Aspects of Poverty in Malaysia." Review of Income and Wealth (March 1977).
		"Malaysia: Second Plan Performance and Third Plan Issues. Annex V." IBRD Report 1177-MA, July 1976.
Urban Land Use Policies: Taxation and Control	670-98	W. Doebele,"A Commentary on Urban Land Policy in Sweden." (mimeo , 1974).
		_____, "Land Policy in Seoul and Gwangju, Korea, with Special Reference to Land Readjustment." World Bank Urban and Regional Economics Division, Report No. 77-9, Volumes I and II, 1976.

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Project Title	Project Code	
Urban Land Use Policies: Taxation and Control (Cont'd.)	670-98	W. Doebele with O. Grimes, "Valorization Charges as a Method of Financing Urban Public Works: The Example of Bogotá, Colombia." World Bank Staff Working Paper No. 254, March 1977.
		W. Doebele, O. Grimes and J. F. Linn, "Participation of Beneficiaries in Financing Urban Services: Valorization Charges in Bogotá, Colombia." Land Economics 55 (February 1979).
		O. Grimes, "Reappraising Urban Land Tax Effectiveness Against Policy Goals." Urban Systems Research. Edited by John W. Dickey and Roy W. R. Muncey. Washington D.C.: National Technical Information Service, April 1975.
		_____, "Urban Land and Public Policy: Social Appropriation of Betterment." World Bank Staff Working Paper No. 179, May 1974. Chapter 16 in Local Service Pricing Policies and Their Effects on Urban Spatial Structure. Vancouver B.C.: University of British Columbia Press, 1977.
		O. Grimes and G. C. Lim, "Employment, Land Values and the Residential Choice of Low-Income Households: The Case of Bogotá, Colombia." Land Economics 52 (August 1976).
Port Pricing and Investment Policies for Developing Countries	671-13	E. Bennathan and A. Walters, Port Pricing and Investment Policies for Developing Countries. New York: Oxford University Press, 1979.
West African Migration Study	671-26	J. Condé, "Migration in Upper Volta." (mimeo, 1978).(French and English)
		M. Fieloux, "Mali: Internal and International Migration." (mimeo, 1978). (French and English)
		C. S. Okoya(with an annex by E.K. Campbell),"Migration in Sierra Leone." (mimeo, 1978).
		M. L. Srivastava, "Migration to Liberia." (mimeo, 1978).
		K. C. Zachariah, "Migration to Ivory Coast." (mimeo, 1978).(French & English)
		K. C. Zachariah and J. Condé, "Demographic Aspects of Migration in West Africa." (mimeo 1978).
		_____, "Demographic Aspects of Migration in West Africa: A Bibliography." (mimeo, 1978).
		_____, "International Migration in West Africa - Demographic and Economic Aspects." In International Union for Scientific Study of Population, Proceedings of the Conference on Economic and Demographic Change: Issues for the 1980s. Helsinki: 1978.
		K. C. Zachariah(with an annex by Kenneth Swindell),"Migration in the Gambia." (mimeo, 1978).
		K. C. Zachariah and N.K. Nair,"Demographic Aspects of Recent International and Internal Migration in Ghana." (mimeo, 1978).
		_____,"Togo: External and Internal Migration." (mimeo, 1978).(French and English)
		_____,"Senegal: Patterns of Internal and International Migration in Recent Years." (French and English)
Analyzing the Effects of Urban Housing	671-37	J. Gueron and R. J. Struyk, "Documentation for the LDC Urban Housing Model." Urban Institute Working Paper 5062-2. August 1976.
		R. Struyk, "A Simulation Model of Urban Housing Markets in Developing Countries." Urban Institute Working Paper 5062-1. Urban Institute, Washington D.C. August 1976.
Optimality of Tax Subsidies Intervention	671-39	T. Bertrand, "Market Interferences and Income Distribution: A Methodology for Studying the Agricultural Sector in Less Developed Economies." (mimeo, August 1976).
Personal Distribution of Income	671-41	R. S. Eckaus, "Report on an Indirect Approach to Measuring Size Distribution of Income." (mimeo, March 1977).
Country Case Studies of Agricultural Prices and Subsidies	671-42	T. Bertrand, "Thailand: Country Case Study of Agricultural Prices and Subsidies." AGREP Working Paper No. 5. Agriculture and Rural Development Department. July 1977.
		G. Brown and G. Donaldson, "Agricultural Prices, Subsidies and Taxes: A Review of Experience." (mimeo, 1978).
		G. Brown and C. Gotsch, "Prices and Subsidies in Pakistan Agriculture: 1960-1976." AGREP Division Working Paper No. 4. May 1978.
		A. Cox and A. Rayner, "Yugoslavia: Agricultural Prices and Subsidies Case Study." AGREP Division Working Paper No. 6. March 1977.
		W. Cuddihy, "Egypt: Farm Prices, Taxes and Subsidies." AGREP Division Working Paper No. 2. September 1977.
		H. Kim, "Agricultural Prices and Subsidies - Portugal Case Study." AGREP Division Working Paper No. 8. May 1978.
		E. Lutz and P. Scandizzo, "Price Distortions in Developing Countries: A Bias Against Agriculture." AGREP Division Working Paper No. 12. November 1978. (American Journal of Agricultural Economics, forthcoming).
		P. McLaughlin, "Kenya: Case Study of Agricultural Prices and Subsidies." AGREP Division Working Paper No. 3. June 1977.
		Y. Plessner and H. Yumiseva, "Mexico: Country Case Study of Agricultural Prices and Subsidies." AGREP Division Working Paper No. 7, 1978.
		L. Reca, "Argentina: Country Case Study of Agricultural Prices and Subsidies." AGREP Division Working Paper No. 1. February 1977.
		P. Scandizzo, "The Structure and Efficiency Effects of Agricultural Price Intervention." (mimeo, 1978).
		"Agricultural Prices, Subsidies and Taxes: A Policy Note." World Bank, November 1978.

APPENDIX

WORLD BANK RESEARCH PROGRAM

Table 5: RESEARCH INSTITUTIONS DOCUMENTS EXCHANGE PROGRAM

List of Participating Institutions

EASTERN AFRICA

1. Institute of Development Research, National University, Addis Ababa, Ethiopia
2. Institute for Development Studies, University of Nairobi, Kenya
3. National University of Somalia, Mogadisho, Somalia
4. Economic and Social Research Council, National Council for Research, Khartoum, Sudan
5. Economic Research Bureau, University of Dar es Salaam, Tanzania
6. Institute for African Studies, University of Zambia, Lusaka, Zambia

WESTERN AFRICA

1. Association of African Universities, Accra, Ghana
2. Institute of Statistical, Social and Economic Research, University of Ghana, Legon, Ghana
3. Centre Ivoirien de Recherches Economiques et Sociales, Université d'Abidjan, Ivory Coast
4. Economic Development Institute, University of Nigeria, Enugu, Nigeria
5. Institute for Agricultural Research, Zaria, Nigeria
6. Nigerian Institute of Social and Economic Research, University of Ibadan, Nigeria
7. Société Africaine d'Etudes et de Développement, Ouagadougou, Upper Volta

EAST ASIA AND PACIFIC

1. Bureau of Agricultural Economics, Canberra, Australia
2. Research School of Pacific Studies, Australian National University, Canberra, Australia
3. Bogor Agricultural University, Bogor, Indonesia
4. Institute for Regional Economic Research, Andalas University, Indonesia
5. Institute of Economic Research, Hitotsubashi University, Tokyo, Japan
6. Overseas Economic Cooperation Fund, Tokyo, Japan
7. Korea Development Institute, Seoul, Korea
8. University of Malaya, Kuala Lumpur, Malaysia
9. Development Academy of the Philippines, Makati, Philippines
10. University of the Philippines, Quezon City, Philippines
11. Chulalongkorn University, Bangkok, Thailand

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SOUTH ASIA

1. Bangladesh Academy for Rural Development, Comilla, Bangladesh
2. Bangladesh Institute of Development Studies, Dacca, Bangladesh
3. Bureau of Economic Research, Dacca, Bangladesh
4. Center for Studies in Social Sciences, Calcutta, India
5. Council for Social Development, New Delhi, India
6. Department of Economics, Bombay University, India
7. Gokhale Institute of Politics and Economics, Poona, India
8. Indian Institute of Foreign Trade, New Delhi, India
9. Indian Institute of Management, Ahmedabad, India
10. Institute for Social and Economic Change, Bangalore, India
11. Institute of Economic Growth, University of Delhi, India
12. National Council of Applied Economic Research, New Delhi, India
13. Reserve Bank of India, Economics Department, Bombay, India
14. Agricultural Projects Services Centre, Kathmandu, Nepal
15. Centre for Economic Development and Administration, Kathmandu, Nepal
16. Industrial Services Center, Kathmandu, Nepal
17. Planning Commission, Government of Pakistan, Islamabad, Pakistan
18. Sri Lanka Academy of Administrative Studies, Colombo, Sri Lanka
19. Sri Lanka Centre for Development Studies (Marga Institute), Colombo, Sri Lanka

EMENA

1. United Nations Industrial Development Organization, Vienna, Austria
2. Vienna Institute for Development, Austria
3. Center for Development Studies, University of Antwerp, Belgium
4. Ministry of Finance, Nicosia, Cyprus
5. Planning Commission, Planning Bureau, Nicosia, Cyprus
6. Center for Development Research, Copenhagen, Denmark
7. Institute of National Planning, Cairo, Egypt
8. Institut de Recherches en Economie de la Production, Paris, France
9. OECD Development Centre, Paris, France
10. Bibliothek des Instituts fur Weltwirtschaft, Kiel, Germany
11. Friedrich-Ebert-Stiftung Forschungsinstitut, Bonn, Germany
12. German Development Institute, Berlin, Germany
13. IFO-Institut für Wirtschaftsforschung, Department for Development Studies, Munich, Germany
14. Institute for Scientific Cooperation, Tübingen, Germany
15. Institut für Allgemeine Überseeforschung, Hamburg, Germany
16. Research Institute for International Techno-economic Cooperation, Aachen, Germany
17. South Asia Institute, University of Heidelberg, Germany
18. Greek Productivity Center, Athens, Greece
19. Institute for World Economics, Hungarian Academy of Sciences, Budapest, Hungary
20. Bank Markazi Iran, Tehran, Iran

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EMENA (continued)

21. Economic Research Institute, University of Tehran, Iran
22. David Horowitz Institute for the Research of Developing Countries, Tel Aviv University, Israel
23. Maurice Falk Institute for Economic Research, Jerusalem, Israel
24. FINAFRICA, Centro per l'assistenza finanziaria ai Paesi Africani, Milan, Italy
25. Istituto di Studi per lo Sviluppo Economico, Naples, Italy
26. Scuola di Sviluppo Economico, Rome, Italy
27. Institut National de Statistique et d'Economie Appliquée, Secretariat d'Etat au plan et au Développement Régional, Rabat, Morocco
28. Centre for Development Planning, Rotterdam, Netherlands
29. Institute of Social Studies, Resource Development Department, The Hague, Netherlands
30. Institute of the Tilburg University, Tilburg, Netherlands
31. Chr. Michelsen Institute, Bergen, Norway
32. Central School of Planning and Statistics, Research Institute for Developing Countries, Warsaw, Poland
33. Centro de Estudos de Economia Agraria, Fundação Calouste Gulbenkian, Oeiras, Portugal
34. Escuela Superior de Técnica Empresarial Agrícola, Department of Social Sciences, Cordoba, Spain
35. Institute for International Economic Studies, University of Stockholm, Sweden
36. Research Policy Program, University of Lund, Lund, Sweden
37. Centre d'Etudes et de Recherches Economiques et Sociales, Tunis, Tunisia
38. Middle East Technical University, Ankara, Turkey
39. Turkish Scientific and Technical Documentation Centre, Ankara, Turkey
40. Ekonomski Institut, Zagreb, Yugoslavia
41. The International Center for Public Enterprises, Titova, Yugoslavia
42. National Bank of Yugoslavia, Research Department, Belgrade, Yugoslavia
43. Institute of Economic Sciences, Belgrade, Yugoslavia

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LATIN AMERICA AND CARIBBEAN

1. Instituto de Desarrollo Económico y Social, Buenos Aires, Argentina
2. Instituto de Estudios Políticos para América Latina, Buenos Aires, Argentina
3. Library of Instituto Torcuato di Tella, Buenos Aires, Argentina
4. Instituto de Investigaciones Socio-económicas, Universidad Católica Boliviana, La Paz, Bolivia
5. Fundação Instituto de Pesquisas Economicas, Cidade Universitaria São Paulo, Brazil
6. Instituto Brasileiro de Economia, Department of Statistics and Econometrics, Rio de Janeiro, Brazil
7. Universidad Católica de Chile, Centro de Estudios de Planificación Nacional (CEPLAN), Santiago, Chile
8. Corporación de Investigaciones Económicas para Latinoamérica, Santiago, Chile
9. Fundación para la Educación Superior y el Desarrollo (FEDESARROLLO) Bogota, Colombia
10. Instituto de Investigaciones, Escuela de Ciencias Economicas y Sociales. University of Costa Rica, San Jose, Costa Rica
11. Programa Centroamericano de Ciencias Sociales, Consejo Superior Universitario, San Jose, Costa Rica
12. University of the West Indies, Kingston, Jamaica
13. Dirección de Estudios Económicos, Secretaría de la Presidencia, Mexico City, Mexico
14. Instituto de Investigaciones Económicas, Universidad Nacional Autónoma de México, Mexico City, Mexico
15. Programa Académico de Ciencias Sociales, Pontificia Universidad Católica del Peru, Lima, Peru

CANADA

1. Institute for International Cooperation, Ottawa
2. International Development Research Centre, Ottawa
3. University of Western Ontario, London, Ontario

UNITED STATES

1. UNCTAD Library, United Nations, New York

SOCIAL ACCOUNTING METHODS IN DEVELOPMENT PLANNING

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A

MACROECONOMIC MODELLING PROJECT

FOR

SAUDI ARABIA

D. Wilkes

Cambridge, UK

April 16 - 21, 1978

PREFACE

In November 1975 the Saudi Arabian Ministry of Planning invited proposals for the development of economic models. The term 'models' was used (both in the generic sense and as a convenient shorthand) to indicate the complex nature of the Ministry's requirements.

Essentially what the Ministry wanted were macroeconomic tools that would not only describe the economy structurally but could also be integrated into the planning process by enabling intersectoral simulation. Particularly important was the ability to anticipate critical supply/demand relationships in both the factor and the product markets. The reference to 'models' was thus quite deliberate as it underlined, on the one hand, the willingness to experiment and, on the other, the refusal - explained by the uniqueness of the Saudi economy - to subordinate the Ministry's overall analytical and planning approach to methodological conformity of any particular kind.

The Ministry, being an established user of statistical data on the Saudi economy, was fully aware then (as it is now) that no macro-economic tool could be of any practical use unless its data base was reliable and up-to-date. Hence, it stipulated that the study was to include (in fact it had to start with) the collection of economic data "needed to construct a comprehensive set of models to be used by the Ministry of Planning in formulating policies ... and to assist in the setting of priorities for resource allocation ..."

As far as the different macro-models were concerned, the Ministry envisaged :

i) a descriptive, structural model to provide a detailed description of all the significant interrelationships in the economy ;

ii) an input/output model, based initially on a sector flow matrix of appropriate size ;

iii) forecasting capabilities that could utilise production functions, the verified patterns of public and private consumption and investment and, finally, would allocate output among sectors/sub-sectors of final demand.

As it should be clear from Mr. D. Wilkes' presentation, it has become possible to incorporate the Ministry's requirements for new data, for a descriptive/analytical macro-economic framework and for a dynamic planning/simulation model in the construction of a SAM-based simulation model, made particularly sensitive to the presently dominant features of the Saudi development process. Although this harmonisation on the methodological plane is still preceding, we shall shortly begin to test the model's data base and structural equations in order to verify certain initial assumptions and alternatives for the period of the third Development Plan (1980-1985).

Perhaps, at this stage, it might be useful to make certain observations from the viewpoint of the model's user, that already point beyond the work done so far :

a) The special importance we attach to a comprehensive model means that its data base and the associated structure of dynamic relationships should both reflect the rapid changes taking place in the economy, in society including socio-economic organisation and institutions. In order to develop a better (i.e. factual as well as conceptual) understanding of change in particularly important sectors, there will be special, so called, 'sub-models' to accomodate descriptive and structural information on those areas. Experience will show how best the analytical insights so gained could serve the planning process whether by being fully integrated into the main simulation model or by some other parallel means.

b) The wage-price endogenous character of the simulation model is, in the Saudi circumstances, a daring attempt to anticipate inflationary pressures by simulation. Our view is that there are obviously certain dimensions of the overall modelling assignment which invite innovations without guaranteeing full reward in terms of practically useful results. At the same time they stress the importance of concentrated analytical work on complex, value-related planning issues.

c) The simulation model's dynamic is based on the overall importance of public sector investment and its activity generating effects throughout the Saudi economy. As you may know, the longer term expectation is to see more private sector initiative in industry, agriculture and especially in the various service activities. One of the most interesting problems of refining the model will be the development of transitional situations giving greater weight to exogenous private investment. These alternatives will very probably have to be linked to industrialisation policy in general and also to regionally oriented marketing strategies.

These selected (and very compressed) points illustrate the need for keeping the model and its statistical and analytical inputs continually updated, and particularly, to maintain a high level of methodological convergence between the policy maker's objectives and the model's structural flexibility.

Finally, I should add that while Mr. D. Wilkes' Presentation could include only a very simplified preliminary summary of the SAM for 1976/77, it is hoped that by the time this Conference's proceedings are published, more detailed information could also be released on the Saudi economy.

His Excellency Dr. F.S. Al-Bashir
Deputy Minister of Planning

INTRODUCTION

This paper describes the current position on the macroeconomic modelling project which is being carried out by Coopers & Lybrand Associates Limited on behalf of the Ministry of Planning in Saudi Arabia.

The treatment of the paper is uneven and reflects the unfinished nature of the work. Most space is devoted to the surveys which provide the information on which SAM and the planning model are based. This is, we hope, understandable since collecting and processing the data has absorbed at least half our effort so far.

The model itself is presented only in outline, since its principal features are relatively well known although the reasons for the choice of such a model are worth discussing. Saudi SAM itself receives scant attention since it is probably too early to present our detailed results and, apart from a number of minor idiosyncracies in presentation, we have little to add which is new on the subject of social accounts.

It is hoped nevertheless that the text will indicate the position which has been reached on the assignment and the way we see the path which lies ahead.

The paper is divided into five sections describing in turn the:

(a) background to the assignment;

(b) proposed planning model;

(c) data needs;

(d) preliminary SAM for Saudi Arabia;

(e) model in operation.

Various preliminary, formats and results and specimen model outputs are attached as annexes.

It will be appreciated that the observations and results presented in the paper are to be regarded as provisional.

I. BACKGROUND

The Kingdom of Saudi Arabia attracts a great deal of attention by virtue of the powerful economic and political role it has come to play in world affairs. The Kingdom's increased influence stems, of course, from the fact that it controls a major share of the world's proven hydrocarbon resources.

The increase in the price of oil which occurred during the early 1970's - and in particular the major jump in 1974 - increased the wealth of the Kingdom in a remarkable way. In 1971, oil revenues stood at little more than US$ 3 billion (at current prices) while in 1974 they climbed to close on US$ 32 billion. During 1977 it seems likely that they rose even further to around US$ 40 billion.

The basic features of the Saudi economy are well known and need no detailed treatment. Given its geographical size the Kingdom has a relatively small population (around 7 million according to the 1974 Census) with a single major export - if one excludes accommodating the million or so performing the annual pilgrimage - hydrocarbon products.

Major attention in planning focuses quite naturally on the non-oil sector and the main development problem is seens as expanding the contribution of non-oil activities to GDP. In the longer term, this expansion is intended to reduce the dependence on exports of oil.

The Ministry of Planning emphasises this goal in its Annual Report for

1396 (1976):

> "the unique feature of the economy's growth is the utilisation of oil revenues to finance Government spending on specific projects or activities, which in turn generates and reinforces activity in the private sector. The non-oil sector's combined ability to mobilise resources and organise supplies in response to effective final demand is thus the key element in the Kingdom's economic growth".

The non-oil sector's growth in recent years has been impressive. The Ministry of Planning estimates annual increases of expenditure (at constant prices) at rates of 17 percent for the First Plan period (1970 - 1975) and 26 and 38 percent for the first two years of the Second Development Plan. Nevertheless the weight of the oil sector is such that the economy remains dominated by its overwhelming importance and oil related activities still account for around 85 percent of GDP (as measured by the published national accounts).

Recent Planning Experience

The First Development Plan for the Kingdom was drawn up in an atmosphere of financial uncertainty; and fears that the resources necessary for its implementation would not be forthcoming were only laid to rest when the Kingdom negotiated a modest increase in crude oil revenues in 1971.

In the event, the first major goal of the Plan - to increase the rate of economic growth as measured by GDP - was achieved in a spectacular way, as we have already seen.

The process of producing the Second Development Plan (SDP) was well advanced when the massive rise in oil revenues occurred. The Planning Organisation had already prepared a document presenting the guidelines for the

Plan, together with a review of the economy and a statement of the main Plan objectives. This was intended as a brief for the major public agencies in the submission of their proposals for the future.

(It may be helpful to restate the Plan objectives since they played a major role in defining the direction of our work. The principal goals are to:

(a) maintain the religious and moral values of Islam;

(b) assure the defense and internal security of the Kingdom;

(c) maintain a high rate of economic growth by developing economic resources, maximising earnings from oil over the long term and conserving depletable resources;

(d) reduce economic dependence on crude oil;

(e) develop human resources, by education, training and raising standards of health;

(f) increase the well being of all groups within the society and foster social stability under circumstances of rapid social change;

(g) develop the physical infrastructure to support the achievement of the above goals.

The emphasis on growth, diversification and the distribution of income is directly reflected in the way in which the modelling and survey work has evolved.)

In general, the process of generating projects for inclusion in the

Plan worked tolerably well, but certain practical problems arose. Given the timescale for producing the Plan, the recent and dramatic revision of the resources available for development and the lack of skilled and experienced planners in certain agencies, it is not surprising that many of the projects put forward were not properly considered in terms of the manpower, financial and other resources required for their implementation. Nor was it possible, given the poor statistical information on the workings of the economy, for the Ministry to investigate how programmes would interact and how developments in certain sectors would effect those in others.

The Plan which emerged then, was a reflection of the aspirations of each agency freed from considerations of budgetary constraint. The Ministry of Planning was aware of this and recognised that the Plan was ambitious. It stated:

> "It is anticipated that actual expenditures, for a variety of reasons, will fall short of appropriations. The development plans of individual Ministries and agencies are not beyond accomplishment but, in combination, they represent a formidable task. Bottlenecks and other problems may be expected from time to time and the achievement of many targets may require extra time."

and again "The Kingdom's financial resources are more than ample to handle whatever programmes are deemed feasible and economically rational. The problem is one of physically obtaining, moving and managing the utilisation of the natural, manufactured and human resources required to maximise this potential".

The negative results of the acceleration in the pace of development are well known; the Kingdom has suffered substantial inflation, severe shortages of labour of all kinds and shortages of material and goods reflecting

massive bottlenecks at the country's ports. But these problems are now diminishing and the development of the economy has been brought under a 'dual system of control: one emanating from the Plan and the other - as foreseen - arising in response to the practical problems of implementation.'

A vigorous policy to combat inflationary pressure has recently been initiated with some success. One major cause of difficulty, port congestion, has disappeared and sensible budgetary policy, coupled with attention to areas of special concern, such as housing and food, has more than halved the inflation rate of 1395/96.

In order to assess progress the Ministry of Planning set up a comprehensive monitoring system which measures the achievements of each agency against the targets of the Plan and reports on the reasons for any shortfall in performance. The Minister of Planning, His Excellency Hisham Nazer, reviewing the latest Follow-Up Report, was able to state that all the targets for real growth had been surpassed and that in the key areas of education, housing, port expansion, agricultural land distribution and transport, programmes were completely up to date.

Despite this, it is clear that the Third Development Plan (TDP) will need to be a more comprehensive and thoroughly argued statement concerning future development than either of its predecessors. In particular specific attention will have to be paid to the consistency of sectoral plans in order to ensure that - taking direct and indirect effects into account - they produce a result broadly in accordance with the accepted strategy for economic development. Above all, the bottlenecks produced by conflicting sectoral pressures, which were a feature of the early years of the SDP are to be avoided or - at least - revealed in time for some remedial action to be taken to relieve them.

Realising this, the Ministry decided that the problem of ensuring macroeconomic consistency could best be handled by a computer system, probably

based on input-output or related techniques, using a disaggregated, inter-sectoral model to simulate the impact of alternative public spending programmes on the economy. In this way the planners hoped to assess the relative merit of each programme in terms of the plan objectives.

It is in this concern to investigate in advance the effects of alternative spending programmes that the current model assignment has its origin.

II. THE MODEL SYSTEM

Our approach was based on the results of our previous experience in building a simulation model of the Saudi Arabian economy.

In 1974 the Saudi Government commissioned a series of studies to establish the feasibility of developing a large scale complex of heavy and petrochemical industry at Jubail on the Arabian Gulf. The resources involved in such a project were large - initial estimates were around US$ 15 billion - and it was clearly of interest to investigate the impact of spending of this magnitude on the national (and regional) economy.

We decided to attempt to construct a SAM model to show the effects of industrial development on such a scale. We started by looking at the model developed by Pyatt (et al) for Iran in 1972. This model was essentially a closed and extended Leontief system: government consumption, exports and gross investment demands were all considered as exogenous, the system being closed by making private consumption final demands depend on factor incomes paid directly to four institutions (mainly household types). The model's major limitation was that it used fixed coefficients to determine all inter-sectoral and institutional flows. Subsequently a similar model was developed for Sri Lanka with the additional features that value added was first distributed to factors and factor incomes then 'mapped into' households. This allowed the modellers to divorce the classification schemes for 'institutions' from that for factors and to analyse the distribution of income in more detail. Similar methods were applied more recently in Swaziland.

Our initial attempts in Saudi Arabia followed the broad path laid down by these earlier exercises.

We started with the Saudi Arabia National Accounts for 1972, the latest year for which reasonably complete information was available. Using a combination of fairly conventional techniques, we produced a SAM reasonably familiar in format, with the exception possibly that the Eastern Province, in which the complex is to be built, was shown separately while the rest of the Kingdom was dealt with in aggregate.

Having constructed our SAM and discussed it in detail with reliable authorities in the Kingdom we were able to proceed in building a simple input-output model of the economy with inputs of intermediate and labour requirements being determined by fixed coefficients, wage rates for each skill being determined exogenously and pseudo-current prices given as a constant mark up on unit costs. Like the Sri Lanka model, the prototype distinguished carefully between the factoral and household distribution of income but 'closed' the model by making private investment as well as consumption endogenous.

The model was then used to simulate the impact of various schemes for industry at Jubail - evaluating for example alternative profiles for the build up of the complex through time, differing combinations of plant size, various configurations of products and so on. Each of these alternatives had important implications for the supporting infrastructure, the port, the associated urban development, desalination and other ancillary services and these were also introduced into the expenditure streams which were traced through the model.

The results of the simulations were presented first of all in the familiar form of the six accounts of the nation showing, on a year by year basis, the position if the decision to build the complex went ahead and the likely picture if it did not. Other supporting tabulations showed the effects at a more disaggregated level, both for the region and the rest of the

Kingdom. For each sector of industry for example it was possible to investigate for a given year gross output, value added (and its distribution between wages, operating surpluses and depreciation) taxes or subsidies, exports and capital formation. The associated labour submodel produces estimates of sectoral labour requirements by four skill types, making allowance for the possibility that it might be considered politically desirable for Saudi citizens to make up a minimum proportion of the labour force in certain key sectors of the economy.

The results of the assignment were useful in that they showed in straightforward terms the implications of proceeding with Jubail and also - since we had, naturally enough, to take account of various other major schemes under consideration - the likely effects of the ambitious development programme which the Saudi Government was contemplating. In particular they revealed the problems which were likely to occur in certain areas, particularly labour and transport.

Faced with the opportunity of carrying out a more comprehensive exercise we chose not to repeat the simple treatment outlined above, although there were persuasive arguments that a model of this kind, supported by survey data of adequate quality would have yielded useful results for planning purposes.

Our reasons for not choosing the straightforward option were as follows. The central feature of the model lay in the fact that total sectoral gross outputs are demand determined. Supply factors - capital, labour, intermediate goods - do not limit growth. The model simply introduces levels of wages (and prices) exogenously.

This approach is simply not adequate in the case of Saudi Arabia since it is plainly unrealistic to assume that the economy will be 'demand-led' over the time horizon under consideration.

As we have seen, the economic development of the Kingdom over the past

few years has been characterised by a large number and variety of constraints to growth (for example, in port capacity and labour supply) and there are reasons to assume that certain of these will continue. It is unrealistic to assume infinitely elastic supply curves for labour and goods in such a situation.

These considerations have implications for the behaviour of wages and prices in the Kingdom. Inflation in the Kingdom in recent years has been rapid and is the cause of major concern. This led us to believe that the model should assist the planner to appreciate the effect of planned change in the Kingdom's economy on wages and prices and that wages and prices should be made endogenous to the model solution.

A final consideration guiding the choice of model was the interest for the Saudi planners of changes in income distribution in assessing the attractiveness of alternative development plans. This, of course, is a central factor of the SAM approach but it was considered especially important that the benefits of development in terms of satisfying the real wants of all sectors of the Kingdom's population should receive special emphasis.

The model we are currently building follows the work of Adelman and Robinson in South Korea * while the treatment of consumption relies heavily on the suggestions of Pyatt and Thorbecke **.

Since these approaches are relatively well known it would be unprofitable to describe them here. We will briefly comment on the solution algorithm for the current model, which is shown in Figure 1.

The overall loop in the calculation sequence is shown between block one and block 19 and depends on prices instead of outputs and gross outputs are

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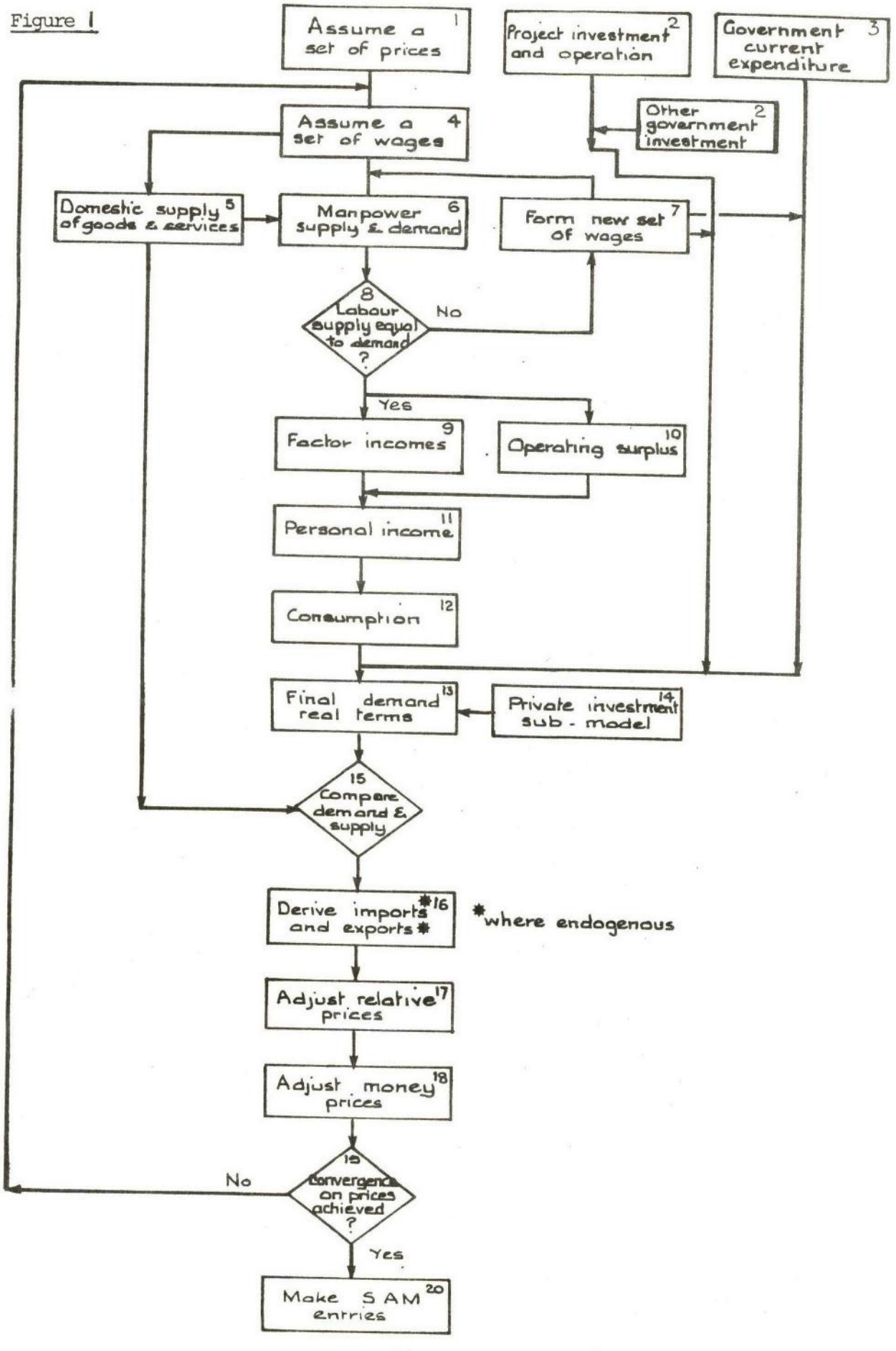
* See Adelman and Robinson, A Wage and Price Endogenous Model of a Developing Country (Stanford University Press) - forthcoming

** Pyatt and Thorbecke, Planning Framework for Development Strategies - forthcoming.

WAGE-PRICE ENDOGENOUS COMPUTATION SEQUENCE

Present SAM Model

Figure 1



not uniquely determined until final convergence on prices has been achieved. Output of goods and services is generated in blocks five and six at which time a solution is derived on an iterative basis for the labour markets. The actual method of solution of the labour loop allows considerable freedom in the choice of sectoral production functions ranging from Leontief to Cobb-Douglas, CES and other relationships.

Outputs in the form of demand result from tracing factor incomes and operating surpluses into personal incomes. These are converted into private consumption using a modified linear expenditure system which Pyatt and Thorbecke have suggested. Thereby priority is placed on obtaining suitable welfare functions and other measures of the living standards of various subgroups in the population. Other components of final demand, namely:

(a) project investment and operation (block two);

(b) other government investment (block two);

(c) government current expenditure (block three)

are estimated in constant or current prices and then aggregated with private consumption.

Both exports and imports are treated endogenously for certain categories of traded goods in order to recognise price competition between foreign and domestic production of these goods (block sixteen). At this stage constraints are imposed by ports and other facilities can be introduced into the analysis.

Subsequently it is necessary to adjust the relative prices of goods and services in order to eliminate any imbalance between supply and demand (block seventeen). Money prices are then calculated (in block eighteen) using

a Walrasian approach in which supplies and demands are aggregated and a test made to establish whether the aggregates are in balance. In order to move towards balanced conditions, an excess aggregate supply of goods requires that the overall price level should fall thereby stimulating demand. Corresponding to an excess supply of outputs is an excess demand for money over the supply of money. The demand for money derived within the modelling system is treated in an incremental manner so that the incremental transactions demand for money of corporations (a function of activity) and of households (a function of income) are calculated explicitly.

We appreciate that the model is based on a number of strong assumptions about production and consumption behaviour and that wage/price endogenous models are still something of a novelty. We feel, nevertheless, that many essential features of the Saudi economy would not be captured by a simpler treatment.

For reasons of timetable, our work on the model system has proceeded in parallel with the data collection programme which is described in the following sections. Broadly speaking, we can say that the model operates reasonably well on artificial data. But it is still to be tested on real information and it may well be that confronted with actual data certain of the system's modules will need to change. Modifications of this kind were foreseen as being quite likely given the need for carrying out modelling and data collection work at the same time.

III. DATA NEEDS

The earlier attempts to construct a SAM for Saudi Arabia using readily available sources - and especially the 1972 National Accounts - revealed a number of areas where data was poor or nonexistent. This is, of course, hardly surprising in a country like Saudi Arabia where the need for statistics for planning purposes has only recently been recognised as the pace of economic development has accelerated.

Attempting to fill all of the major data deficiencies would have been virtually impossible given the timescale for the current project. We were obliged, therefore, to select those areas which we thought critical to any attempt to build a simulation model for the economy. Given the emphasis of the SDP and the type of model we were considering it seemed that the production activities of the non-oil sector and the consumption and saving activities of households were important areas for attention. In the context of Saudi Arabia the activities of the Government, the main engine of change also seemed crucial, so that in the event we decided to carry out three major investigations:

(a) an establishment survey, aimed at providing information on domestic production and service activities;

(b) a household survey, which was to provide information on incomes, employment, savings, expenditures;

(c) a government expenditure survey which was to trace spending through the economy as wages, salaries and other benefits, social security payments, other transfers, subsidies, provision of government services and most important of all government project expenditure and capital formation.

In each of these areas little or no relevant work had been undertaken; partial surveys of certain kinds of establishment had been carried out at various dates but the results had not been completely analysed and a new household expenditure survey was long overdue. Information on past government spending was, of course, available showing aggregate appropriations against budgets but here again much labour was to be involved in bringing together the data in a form in which it could be introduced into the SAM format in a suitably disaggregated way.

In carrying out these surveys we were aware that we were establishing a unique data base for Saudi SAM. Most previous attempts at constructing

SAMs have relied on existing information of varying quality, detail and reliability. As a result, most SAMs relate to a period some years past and suffer in terms of their relevance to future policy.

The Saudi SAM is perhaps unusual in that it is based on the results of surveys specifically designed to obtain the information it (and the underlying model) requires. Our intention was to solve the problems of data deficiency by:

(a) choosing a base year (1976/7) which is as close as possible to the commencement of the planning exercise, making SAM as relevant and up to date as possible;

(b) collecting the data on production relationships for the most recent feasible period (1976);

(c) assembling the behavioural data on final demand (households, firms, government) for a period as close as possible to that used in (a) above;

(d) carrying through the survey processing operations to produce the major entries to SAM within as short a period as possible.

This approach has obvious advantages in terms of the relevance and timeliness of the data which is to be used for planning. But it also imposes severe strain in terms of the volume of data to be processed in a short time and in the assumptions which have to be made in a number of critical (and unsurveyed) areas.

As we have already noted, the approach also involved taking early decisions on the kind of model to be built so that survey work and subsequent data processing operations could proceed in parallel with model development.

While the model has naturally to be adjusted to fit the facts revealed by the surveys the overall structure and type of model, once decided upon, cannot change in its essentials.

It is worth describing these surveys since the information they provide forms the foundation for the planning model system. We shall also briefly comment upon the need to collect data on future programmes.

Having reviewed this information we shall then turn to the format and some peculiarities of Saudi SAM.

Establishment Survey

The survey of establishments was undertaken to provide:

(a) quantitative information on transactions for the construction of base year SAM;

(b) data which would permit the calibration of certain functions in the model system;

(c) evidence on the validity of certain of the behavioural assumptions underlying the model.

In the early stages of survey planning it became clear that close co-operation with the Central Department of Statistics (CDS) was desirable and it was agreed that the CDS listing of establishments would form the basic sample frame. The information available on the structure of Saudi industry at the sample design stage suggested a marked polarisation by size of firm. We decided, therefore, to cover all the large firms, interviewing only a sufficiently large number of small firms to provide a valid basis for grossing up to the total universe of small establishments.

The operating environment in Saudi Arabia precludes any approach to data gathering other than by personal interview, reflecting the lack of delegation which prevails in most Saudi companies. An added problem was the range of data which was to be sought. It was difficult, given the lack of information on the activities of the private sector, to avoid a large and complex questionnaire, although care was taken to ensure that interviews could be kept to a reasonable length. Even so, the questionnaire eventually used became rather formidable with the result that, for the large firms at least, between six to eight visits were usually necessary to complete the questions and occasionally the number of visits was much higher.

The main problems which occurred reflected, not reluctance on the part of establishments to cooperate, but the inadequacy of firms' accounting records for the purposes of answering the questionnaire and a lack of understanding of the terms and concepts employed in the survey.

These problems were also encountered to a much greater degree with small establishments where, in order to maximise response a shorter questionnaire was used. Most firms, however, kept no formal accounts and usually answers had to be based upon estimates.

The effective sample response covered some 140,000 employees or approximately 30 percent of the estimated private sector workforce. We believe that this represents a satisfactory basis for the development of the private establishment elements of the base year SAM.

After a great deal of checking and validation a number of tabulations were produced including the following which are necessary for the construction of SAM:

(a) total current expenditure by major categories for each economic sector and by number of employees;

(b) detailed breakdown of each major category of current expenditure;

(c) employment by job category and nationality for each economic sector;

(d) average wages and wage ranges by nationality, skill and economic sector;

(e) revenues for each economic sector, by sector of origin;

(f) materials used, by source of supply;

(g) fixed assets and value of depreciation by asset by economic sector, together with stock changes;

(h) purchases and sales of assets (including land) by sector.

A distinctive feature of the Saudi Arabian economy is the widespread practice of single companies, often single establishments, engaging in several quite different economic activities. The SAM format adopted requires the representation of 'pure' sectors and it was decided to achieve this by disaggregation at the microdata level. By means of a computer program, each questionnaire relating to a 'mixed' company or establishment was disaggregated to create, in effect, complete 'child' questionnaires for each separate activity. Disaggregation was achieved by reference to coefficients derived from 'pure' questionnaires for different activities, the separate 'child' totals being constrained to sum back to the original aggregated total for each item. The resulting data base was then assembled into pure sectors and analysed to provide the inputs to the construction of the base year SAM.

The model requires an estimate of the current value of capital stock for each sector and firm, in order that the relationship between gross outputs and inputs of labour and capital through a production function could be estimated. We were well aware of the difficulties of measuring capital stock at replacement value and investigated various ways of obtaining sensible responses to questions on the subject. When this approach failed we used:

(a) questionnaire replies on the net book value of assets;

(b) replies on acquisitions and depletions of capital assets during the year in question;

(c) depreciation values (and approved fiscal depreciation rates) for each class of asset

to calculate the average age and purchase price of each type of capital good. This was then converted to current replacement cost by using weighted indices of the prices of selected capital good items exported from the major nations trading with Saudi Arabia.

The resulting figures, while admittedly imperfect, seem broadly plausible and reflect the rapid growth of recent years, since the average age of most kinds of asset is low.

In summary, the Establishment Survey was reasonably successful in providing a detailed picture of activity in the private (and parastatal) sector of the Saudi Arabian economy. It provided virtually all of the information required for the production account in SAM and also to calibrate the production functions of the model. It also provided a great deal of information which was useful elsewhere for checking purposes (in, for example, estimating the compensation of households).

Household Survey

Since no information was available on the expenditure patterns of households a survey was necessary as:

(a) a basis for constructing certain accounts in SAM through estimates of the volume of household consumption and savings;

(b) the source of data on which household consumption functions could be estimated.

In the context of Saudi Arabia, there was also the need to:

(a) provide supplementary data on certain characteristics of the labour force, including the extent of multiple employment;

(b) gain some appreciation of the size and characteristics of the informal sector (i.e. activity carried on from homes rather than from business establishments);

(c) provide an independent check on certain of the establishment survey results (wage and salary levels and the incidence of employee benefits).

Once again special interview procedures had to be devised in part resulting from the fact that only the head, and not the women, of the household could be questioned. A minimum of two visits per household was required, the first to explain the nature of the information required and to collect basic classification data and a second at the end of the week to collect expenditure details. Literate households were asked to keep a diary of their purchases but for non-literate households interviewers made a third

midweek visit.

Daily expenditures were covered by diary entries but major expenditure items were treated on a recall basis.

The survey sample was based upon preliminary Census results and designed to be representative of all private households in the Kingdom, in all regions and in urban and rural areas, covering both settled and migrant households. A sample size of 3,000 was chosen, after a review of the number of household types which were to be modelled and the actual achieved sample was slightly higher. The planned sample design in terms of size of settlement and region was achieved in almost every case.

Overall, the results of the survey are much as expected on a priori grounds. Even when all adjustments are made, there is still a substantial gap between declared income and savings plus expenditure, reflecting an understatement of income from secondary sources (part time employment, rents, dividends - withdrawals, transfers, gifts and so on) coupled with an overstatement of expenditures, especially in those areas where an element of personal prestige is involved.

So far, the household survey has yielded the following information:

(a) household income and expenditure, including monthly income and savings per month by income quartiles and by skill categories for Saudis and non-Saudis;

(b) monthly and annual expenditures on 187 commodities grouped into 31 'wants' including:

(1) seven categories of food items;
(2) clothing, footwear and repairs;

(3) rent and housing;
(4) utilities (gas, electricity, water, telephones);
(5) two categories of furnishings;
(6) domestic services;
(7) cars and running expenses;
(8) travel and holiday;
(9) three categories of household durables;
(10) six other miscellaneous categories of spending.

(c) household characteristics, total household size, number of income earners, occupational categories, by Saudis and non-Saudis.

Analysis of the detailed information has suggested that it should be possible - in the interests of modelling efficiency - to compress the number of wants to around 15 types, in place of the 31 outlined above, while around 10 types of household will be distinguished as follows:

(a) Saudis
Managers, professional and technical
Clerical and skilled manual
Unskilled manual and economically inactive
Agricultural proprietors/workers
Working proprietors

(b) Non-Saudis
Managers, professional and technical
Clerical sales
Skilled and unskilled manual
Working proprietors

We believe that the consumption functions derived from the above data will provide the first survey based methods for estimating the future level and structure of private household consumption in Saudi Arabia.

Government Expenditure Survey

The importance of government activity in Saudi Arabia is such that its influence on the economy needs to be properly understood. At the very least, the way in which the Government spends money in its various activities needs to be captured in SAM and it is crucial to trace through government expenditures in the base year in order to provide some of the control totals on which balancing SAM depends.

We have already explained that we intended to choose a recent year as the base for the compilation of a SAM for Saudi Arabia, since we wished to begin our simulations from as recent a year as possible, given the pace of development in Saudi Arabia.

It was, therefore, decided to take 1396/97 as the base, notwithstanding the difficulties which were involved in estimating and allocating certain of the figures in the Government Closing Accounts. The objective of this data collection programme was to collect sufficient information to enable all government expenditure to be classified according to the following breakdown:

(a) government sector, defined as being health, education, defence and public administration;

(b) sector of origin; the expenditure of each of these four sectors had to be disaggregated into purchases from each of the appropriate sectors recognised in the SAM format;

(c) capital/current; all expenditures had to be disaggregated into a capital and current component. This is not obvious from the way the accounts are presently prepared;

(d) wages and salaries; these had to be mapped together with other incidental benefits, into the skill and nationality

categories referred to above;

(e) subsidies and transfers; here the status of the recipient (sector, nationality etc) needed to be identified.

The approach was to conduct a sample survey of the spending of the Ministries responsible for the greatest volume of spending (10 Ministries account roughly for 80 percent of total expenditure). This proved to be a time consuming process reflecting:

(a) understandable reluctance of certain agencies to part with information which they regarded as being of a confidential nature;

(b) difficulties in understanding the value of the exercise and absence of information on which many of the necessary disaggregations could be based;

(c) the sheer volume of Chapter IV (project) expenditure which had to be translated and broken down into current/capital items and also by region of receipt;

(d) complete lack of data in certain sensitive areas of the economy.

By the time the process of building SAM began we were able to assemble sufficient data on the detail of government spending to allow the work to proceed with confidence. While some data is still missing we shall - later in our programme - demonstrate how it can be incorporated into SAM in a way which takes full advantage of the existing data entries.

Future Expenditure

While not referred to as a survey, a substantial programme of data collection was required in order to gain some understanding of future government spending. The primary aim of the model is, after all, to simulate the effects on the economy of various alternative patterns of public spending. We were not, therefore, aiming to produce a single best estimate of future government expenditure. Instead, we attempted to assemble a data bank concerning possible projects and associated current expenditures so that planners would be in a position to make rapid and realistic changes in the pattern of future government spending and measure their impact by subsequent runs of the model.

The project files includes two types of possible government expenditure, designated as representative and special projects respectively. Representative projects are defined as the class of projects which have already been undertaken in recent years with some regularity and for which standard requirements, in terms of finance, materials and labour, are reasonably well defined. One example might be a kilometer of 2-lane highway in a rural area. Another might be a primary school with a given number of classrooms. The set of representative projects covers virtually the entire field of Government infrastructure expenditure.

The main problems are to calculate for each project the following information:

(1) During construction
  (a) cost of land
  (b) cost of construction broken down by
    - manpower, by skill
    - materials, transport by type
    - plant and machinery by type
    - construction plant by type
    - overheads and profit (operating surplus)
    - design and construction administration

(c) manpower numbers by skill

(2) During operation

(a) value of output

(b) costs of operation broken down by

- manpower by skill
- raw materials by type
- plant and machinery by type
- other cost by type
- operating surplus (where appropriate)

(c) manpower numbers by skill.

This is, of course, a formidable problem in data collection but we are fortunate in that, at least for the construction aspects of projects, we can rely upon the results of the Ministry's own Resource Requirements Programme. This programme pools information from a large range of construction firms with experience of operating in Saudi Arabia in order to provide estimates of the physical resources necessary to build over 80 types of project. The physical requirements are broken down by over 40 types of input including, of course, various types of labour.

We were able to translate these quantity estimates into financial flows by:

(a) obtaining data on the major cost elements of a similar range of represntative projects;

(b) using the physical resource coefficients in conjunction with locally derived unit prices to check on the total cost of selected projects;

(c) deriving typical project profiles over time from engineering consultants.

As a result, we are able to estimate the potential year by year expenditure flows by SAM sectors generated by a fairly comprehensive list of projects typical of those being implemented in Saudi Arabia at the present time.

Aided with this facility, it should be possible, starting with estimtes of the capital and current budgets of each major Agency in the Kingdom, and using the guidelines for the TDP, to produce a plausible series of project 'bundles' which reflect the overall objectives for each of the sectors in question.

Emphasis in the software has been given to a profile system which will allow the selection and modification of project plans to be performed easily. The system is made up of three subsystems:

(a) the input of the base data (a time series profile for each project);

(b) user controlled manipulations of the project data to create a plan;

(c) theconsolidation of project data to provide the required input to the model.

Of these three, the most important is the second since it allows the planner to:

(a) delay;

(b) cancel;

(c) increase the scale of:

(d) change outputs of

projects or group of projects.

The core model requires input at the sector rather than the project level. Once the set of projects has been chosen, phased and scaled to form a plan, the information is consolidated to give the input required by the model at the sectoral level.

Special Projects

All this is perhaps reasonable so long as typical or representative projects are accepted as a sensible basis for planning. But Saudi Arabia is embarking on a series of projects which are virtually without parallel elsewhere and which do not, therefore, lend themselves to the above treatment. Examples of such projects are the:

(a) NGL line across the Peninsula from Arabian Gulf to the Red Sea;

(b) Jubail and Yanbu petrochemical complexes and the associated urban developments;

(c) ARAMCO gas gathering project;

(d) ARAMCO seawater injection project;

(e) SWCC Desalination projects.

All of these are undertakings on a massive scale, involving many billions of dollars in each case. They are decidedly untypical of what has gone before.

Of course, an ideal solution would be to work closely with the engineers on each project, progressively defining the details of each project in order

to incorporate it into the project file in the same way as representative projects. For several reasons this is not possible, since:

(a) many projects are still on the drawing board and their characteristics are subject to constant change;

(b) certain projects involve issues of national security;

(c) the volume of data involved in a detailed 'bottom-up' approach is such that it simply could not be finished in the time available for the preparation of the Third Plan.

To overcome this problem, we have chosen to work in the following way by:

(a) taking the (outline) plans for each of the projects as they are currently known to the Ministry of Planning;

(b) consulting specialist design engineers, with specific experience in each of the relevant areas in Saudi Arabia in order to provide a rough, year by year profile of the projects in aggregate terms;

(c) using this data to refine the magnitudes required with the advice of design engineers and others;

(d) introducing the schemes into the project file in exactly the same way as representative projects.

This approach has the advantage of describing these unique projects as accurately as possible within the Third Development Plan given current knowledge while providing, through the project manipulation facility, the

ability to modify the scale, nature and timing of each project as work on design and execution proceeds.

Work is now nearing completion on the combined project file in anticipation of a series of decisions concerning those projects which:

(a) are committed and will carry on through into the Third Development Plan period (in this task we shall be assisted by the results of the Follow-Up Programme referred to earlier);

(b) will be initiated during the Third Plan period;

(c) can be 'bundled' to reflect the sectoral targets established by the MOP in consultation with the Ministry or Agency in question.

At the same time, the MOP will project future current expenditure for each Ministry together with the changes which are likely in view of any special policy considerations or which may be associated with the capital programme which the Ministry is expected to undertake. The input routines will simply sum the whole as a pattern of government spending to be introduced into the model in the way described earlier.

IV. SAUDI ARABIAN SAM

The form of the initial social accounting matrix produced for Saudi Arabia is presented as Appendix A. While preliminary results are available at the time of writing, they have not yet been examined in detail by the Ministry of Planning and, therefore, cannot be shown. (It is hoped, however, that this examination will be complete by the date of the Conference and that it will then be possible to present the SAM entries in full.)

The first and obvious point to make about the SAM is that it has a rather unconventional format compared with, say, the SAM's for Iran, Sri Lanka, Swaziland, Malaysia. This is so because the matrix is not seen as an end in itself but merely as the framework within which the data base for the model can be organised. This means that information is presented in a relatively unfamiliar way - although its origins will be obvious to all - it bears, of course, more than a passing resemblance to Table 2.1 of UNSNA - and it is likely that we shall need in future to present the same information in a more readily accessible manner.

Some of the peculiarities are described in the following paragraphs.

Null Sectors

One of the major ways in which the SAM format adopted for Saudi Arabia differs from existing arrays is in its treatment of imports.

The whole range of goods and services can be considered as a continuous spectrum. In conventional social accounting methodology, this spectrum is divided into segments designated as 'sectors'. Any demands, either intermediate or final, not figuring in domestic production must be met from imports. The output of any sectors, treated as a homogenous good can be considered as a 'bundle' of goods constituted by the full range of the sectors. Thus any domestic output within a sector must be augmented by an appropriate level of import, representing that part of the segment not domestically produced, to complete the 'bundle'.

Imports can be generated in one of three ways:

(a) complementary imports necessary as inputs to domestic production;

(b) complementary imports necessary to augment domestic production to produce a bundle across the sector;

(c) competitive imports.

The conventional treatment has three disadvantages as far as the model is concerned:

(a) we wish to be able to consider explicitly the effect of import substituting projects which will reduce complementary imports and perhaps generate exports;

(b) we would like to identify imports by type of good rather than the sectors that require them; complementary imports may be completely different, i.e. not within the sector from the goods whose domestic production necessitates their importation (this requirement was prompted by our early preoccupation with a ports constraint);

(c) all elements of demand, both intermediate and final, may not require the same mix between domestically produced goods and complementary imports.

To overcome these problems, we decided that for modelling purposes, those areas covered by complementary imports should be explicitly separated from traditional domestic production and designated by a number of 'null' sectors in the sense that such output, in the base period at least, is not domestically produced. For presentation purposes, each null sector will be aggregated with a designated traditional sector. But all demands, both intermediate and final, are expressed as demands on traditional and null sectors. The ratio of demand on a nullto its designated traditional sector may vary by type of demand. Intermediate demands of a given sector on complementary inputs are divided between the separate nulls rather than being grouped together. Output of projects producing goods previously met by complementary imports are modelled as 'selling' to a null sector thus

reducing imports. In this way, the difficulties of the traditional treatment can be overcome and model's results can be provided in the familiar UNSNA format.

The model recognises 9 such null sectors where domestic production was negligible or non-existent in the base year.

Similar considerations lead to a presentation of imports in a slightly unusual way since they appear as additions to the domestic supplies of each sector, i.e. domestic and import transactions are collapsed in the production accounts.

Wants

In its discussion of the objectives of development the SDP defines as one of its major targets the achievement of an 'adequate dignified minimum standard of living; (while) levels above this minimum will continue to be the reward of individual effort and achievement'.

Correspondingly the model's ability to reflect changes in the distribution of income between households and the resulting levels of want satisfaction is of primary concern. In particular Saudi planners are for obvious reasons interested in the distribution of income between the agricultural and the urban sectors of the population as well as differences between the various nationality groupings.

Pyatt and Thorbecke * argue convincingly the case for the explicit treatment of wants within the SAM framework although there are few examples of their explicit inclusion. They devise a treatment which decomposes demand for each want into three non-zero elements (i) expenditures of the poor; (ii) expenditures of the rich in achieving minimum needs; (iii) further

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* Pyatt and Thorbecke, Planning Framework for Development Strategies (forthcoming)

expenditure by the rich. This corresponds exactly with the components of demand as generated by the piecewise linear expenditure system which is used in our model.

They suggest that an ideal classification of wants would be in terms of calories, clothing, housing and so on. While accepting the need to show wants in such a way, we were obliged to consider the problem otherwise, by taking the results of the household survey and mapping or converting these wants into demands for commodities and production activities. Initially we identified 31 wants, 32 production activities and 15 household types. While a complete mapping is available at this level, we found it convenient to aggregate wants for purposes of modelling efficiency, using the full detail to break down the more aggregate picture when this seemed appropriate. It is not clear, however, that the wants/households/production mappings will remain stable over time, but this of course amounts to no more than saying that there is a need to conduct regular surveys of household expenditure in a rapidly changing society.

Distribution of Factor Incomes

In general SAMs show the income generated by production activities as being distributed to various factors of production, these factors distributing income in turn to a number of institutions. The returns to capital are naturally paid to corporate bodies (which may or may not be classified between residents and foreigners). In turn, the corporate bodies are shown as distributing some of the income to its ultimate recipients and retaining the remainder as corporate saving.

While this treatment has many advantages it loses the ability to show the source, i.e. the production activity from which the ultimate recipient actually derives the income. This information was important for modelling purposes and had to be retained in SAM as the model data base.

The solution is to show an 'ownership profile' of returns to capital and entrepreneurship for each production activity. Thus the returns to, say, capital in manufacturing are shown separately in the factor accounts as owned by government, households and the rest of the world. Actual distribution to the ultimate owners differs from the nominal shares by the amount of corporation tax and retained profit.

Where this treatment might be considered unrealistic is that, since we have defined 'pure industries' (i.e. enterprises are split on production account according to the principal activities in which they are engaged) the treatment involves allocating financial charges to the divided parts of an enterprise, rather than to the enterprise as a whole. In practice this proved no difficulty since we found it possible to allocate charges in such a way as to give 'child' units returns similar to those earned by specialised whole units in the sectors concerned.

SAM and the National Accounts

It is often claimed that one of the advantages of producing a SAM is to provide a cross check on the national accounts since the process of examining and balancing the income and outlay and capital finance accounts for the various institutions often shows up inconsistencies which may then be examined in detail and resolved eventually by the collection of better data. The matrix format also has benefits in that it reveals accounting and economic relationships which are not obvious from an examination of the national accounts themselves.

But it is also true that there is a limit to this; most existing SAMs start with the national accounts providing the essential control totals which are then progressively disaggregated (see Malaysian SAM).

We have already explained that we felt unable to use the existing

national accounts for Saudi Arabia in this way, since previous experience had shown them to lack full detail in certain critical areas, principally the non-oil sector of the economy.

As a result of the information from the surveys described earlier and the process of producing and balancing the accounts for each class of institution, we were naturally able to produce alternative estimates of the national accounts for Saudi Arabia. To the extent that these estimates:

(a) are based on fairly full surveys in the most critical (i.e. non-oil) areas;

(b) use information on government activity which is not incorporated in the present national accounts;

(c) contain the results of an exhaustive analysis of data relating to all unsurveyed sectors, much of which has become available only in the last two years,

we believe the picture which emerges from our analysis is an improvement. Both sets of national accounts suffer, however, from data deficiencies in certain areas and this is particularly true of the agricultural sector where new survey work is badly needed.

The provisional set of accounts for Saudi Arabia for 1396/97 has a number of interesting features. They are presented in Appendix in consolidated form.

V. THE MODEL IN OPERATION

We would wish to stress the distinction between forecasting models and simulation models. The former are designed to predict the future pattern

of development given a single trajectory for each exogenous variable. The purpose of a simulation model, in contrast, is the comparison of effects of alternative trajectories for controllable exogenous variables. A forecasting model has has its primary focus the levels of the relevant indicators while a simulation model focusses on the comparative effects of alternative policies. The model system we are constructing is primarily designed for simulation exercises which will be used and the basis for selecting among alternative patterns of development.

The model will simulate both the direct and indirect (or feedback) effects of policy changes as reflected in alternative patterns of public spending. The simulations will thus consider the general equilibrium effects of policy adjustments as opposed to their partial effects.

In considering the ways in which the model depicts the alternative way in which the development of the Kingdom can be directed by the government, the following distinction should be borne in mind:

(a) policy changes can be simulated in the model by exogenously modifying variables which are, or might be in future, directly or indirectly under government control. These are policy instruments which are input to the model explicitly;

(b) policy changes can also be simulated by exogenously modifying variables which, whilst not under the strict control of the policy maker, can be affected by and therefore act as proxies for the use of policy instruments not in the model.

Examples of the first category are government expenditure patterns, taxes, subsidies and so on. Any exogenous variable over which the planner believes he can exercise control in a manner not explicitly modelled falls into the second category.

The model is, first and foremost, a laboratory intended to simulate the bahaviour of the Saudi economy under alternative assumptions concerning planned government expenditures for the remainder of the Second and for the duration of the Third Plan. This way the model should be able to 'analyse the potential impact of massive public spending on the structure and inter-relationships of the economy by means of appropriate simulation experiments' which is the prime objective of the project.

It may be helpful to conclude with a description of how we see SAM and the model fitting into the planning process.

Briefly put, the following sequence of steps is envisaged:

(a) at the beginning of the planning cycle, the Ministry, after consideration of the various macroeconomic and other indicators of progress over the preceding period and review of the results of the Follow-Up Programme, establishes a series of alternative targets for the development of the economy. For convenience we may assume that these alternatives are expressed in terms of employment numbers, gross outputs and value added by sector, the distribution of income and so on;

(b) it then suggests, using the information of the Follow-Up Programme and the known plans of each of the implementing agencies, a set of ceiling figures for expenditure, both current and capital;

(c) these expenditure figures are broken down either by agency or by major program (transport, housing) and are further divided into:

(i) committed expenditure (from ongoing projects);

(ii) special projects;

(iii) bundles of representative projects, reflecting the special policy considerations for each of the areas in question.

(d) it also selects a desirable set from a series of policy instruments including:

(i) foreign exchange rates;

(ii) tax rates corporate and personal;

(iii) subsidies by sector;

(iv) crude oil output;

(v) tariff rates;

(vi) Saudisation schemes.

(e) these policy instruments and expenditure plans are input to the model which, provided that the total resource requirements of the spending program do not exceed certain constraints, produces a series of outputs;

(f) these output statements are compared with the benchmark figures produced at (a) and if necessary the set of policy instruments and expenditure plans is changed in order to test the effect in achieving a more acceptable set of results;

(g) when an acceptable result is obtained vis-a-vis the benchmarks, the model's other output facilities can be used to investigate, for example the effects of the selected inputs on the distribution of income, the numbers and the skill breakdown of the non-Saudi labour force and so on. Such examinations may lead to further modifications of spending patterns and policy instruments;

(h) the result of the series of runs will, therefore, indicate by the production of selected economic indicators, the implications of a particular set of policy instruments.

Working in this way, the planners will be able to learn and understand how the economy responds to the various ways in which the government may choose to exercise control.

Concluding Remarks

The above discussion makes it clear that we are not attempting to break new technical ground in developing a macroeconomic planning model for Saudi Arabia. There are, indeed, strong arguments against experimentation where the results are to be used for planning one of the world's key economies. Our efforts proceed, therefore, from the familiar concepts of SAM and from the relatively well known wage/price endogenous models which have been developed for Korea. If the project has novelty it resides perhaps in two aspects of the work:

(a) the attempt to collect, process and capture in a SAM format new data on production, consumption and government spending within a short period of time, creating an information base which relates to the fairly immediate past;

(b) the direct incorporation of the simulation model within the planning process, presenting the real prospect that the results of the model will contribute directly to the preparations of the TDP and subsequent monitoring operations.

We stand roughly at the three quarter stage of the assignment. We have constructed a (160 x 160) SAM from fresh survey material, produced a working version of the full model and estimated the production and consumption functions. We have also produced a set of national accounts which, since they differ from official figures, provide the basis for interesting discussion on the ways in which social and economic statistics in Saudi Arabia may be improved. But we are aware that the proof of the pudding is in the eating and that the model has to reveal its value when run on data relating to the real world. This is the next hurdle to be overcome.

The remaining concerns are also familiar. Even though the data collection, modelling and systems concepts we have employed are straightforward, their application involves a considerable amount of fairly skilled effort and the labour of repeating the exercise, revising SAM and the model's structure and its equations each year as fresh information becomes available is formidable. There is probably no way of avoiding this; any information system, including the most simple input-output model, is difficult to maintain in a stage of alert. The last and most difficult problem is therefore to ensure that the Ministry is itself capable of updating, revising and running the model on completion of the current assignment. If this does not happen there is the danger that the model will not be used. In that case, the main contribution of the project will lie in the survey material which would not otherwise have been brought together and analysed and in the revisions to the national accounts which they make possible.

KINGDOM OF SAUDI ARABIA
SOCIAL ACCOUNTING MATRIX
1396/97

(Saudi Riyals : Billions)

				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
				PRODUCTION										CONSUMPTION														ACCUMULATION																REST OF WORLD	TOTAL
														EXPENDITURE			VALUE ADDED							SECTOR OF RECEIPT				STOCKS	FIXED CAPITAL FORMATION								C.F	LMR	CT	CA	INSTITUTIONAL SECTOR				
PRODUCTION		Agriculture	1																																										
		Oil	2																																										
		Manufacturing & Mining n.e.c.	3																																										
		Utilities	4																																										
		Construction	5																																										
		Distribution	6																																										
		Services	7																																										
		Government Services	8																																										
		Imputed Bank Charges	9																																										
		Commodity Taxes	10																																										
CONSUMPTION	EXPENDITURE	Food	11																																										
		Other Wants	12																																										
		Government Purposes	13																																										
	VALUE ADDED	Rent	14																																										
		Net Financial Charges	15																																										
		Profit	16																																										
		Self Employed Income	17																																										
		Wages	18																																										
		Depreciation	19																																										
		Indirect Taxes	20																																										
	SECTOR OF RECEIPT	Government	21																																										
		Corporations	22																																										
		Saudi Households	23																																										
		Non-Saudi Households	24																																										
ACCUMULATION	Increase in Stocks		25																																										
	FIXED CAPITAL FORMATION	Agriculture	26																																										
		Oil	27																																										
		Manufacturing & Mining n.e.c.	28																																										
		Utilities	29																																										
		Construction	30																																										
		Distribution	31																																										
		Services	32																																										
		Government Services	33																																										
	Capital Formation		34																																										
	Land + Mineral Rights		35																																										
	Capital Transfers		36																																										
	Financial Assets		37																																										
	INSTITUTIONAL SECTOR	Government	38																																											
		Corporations	39																																										
		Households	40																																										
REST OF WORLD	Current Account		41																																										
	Capital Account		42																																										
TOTAL			43																																										

GROSS DOMESTIC PRODUCT AND EXPENDITURE			
Gross domestic product	SR billions	Expenditure on GDP	SR billions
Compensation of employees	25.07	Government final consumption	18.55
* Operating surplus	193.68	Private final consumption	52.09
Consumption of fixed capital	4.26	Increase in stocks	3.75
Indirect taxes) 1.11	- 2.16	Gross fixed capital	73.01
Less: subsidies) -3.27		Exports of goods and services	148.70
		Less: Imports of goods and services	- 75.22
DISCREPANCY	.03		
	220.88		220.88

* Including all income from self employment and the letting of property

NATIONAL DISPOSABLE INCOME AND ITS APPROPRIATION			
Appropriation of disposable income	SR billions	Disposable income	SR billions
Government final consumption	18.55	Compensation of employees	25.07
Private final consumption	52.09	Operating surplus	193.68
Saving	144.98	Net property income from abroad	.17
		Indirect taxes)	-2.16
		Less: Subsidies)	
		Net current transfers from abroad	-1.14
		DISCREPANCY (not carried down)	
	215.62		215.62

23/3/78.