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Public Sector Pricing Policies

A Review of Bank Policy and Practice

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Six sectors — health, education, housing, fertilizer, ports, and railways — have made little attempt to incorporate efficiency pricing into public sector pricing. And most sectors pay far too little attention to fiscal objectives in public pricing.

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Nearly a decade has passed since the Bank codified its position on cost recovery policies for public sector projects, in Operational Manual Statement (OMS) 2.25. OMS 2.25 recommended that a common analytical framework be used in all sectors to determine appropriate pricing guidelines and cost recovery targets. That framework involved two steps:

- Estimating efficiency prices — prices that would maximize the net economic benefit from the project.
- Adjusting those prices to take into account nonefficiency objectives (distributional, fiscal, or financial) and implementation constraints.

In a review of 13 sectors, the authors have found that those Bank guidelines are followed fairly closely in seven sectors: coal, irrigation, oil/gas, power, roads, telecommunications, and water/sewerage. In these sectors, the approach has proven effective in accommodating eco-

nomie, distributional, and financial objectives — primarily through carefully designed tariff structures.

In the other six sectors the focus is heavily on either distributional (health, education, housing) or financial (fertilizer, ports, railways) concerns — with little attempt to incorporate economic pricing principles.

Efficiency pricing is not irrelevant or impossible in these sectors, and — even if used only as a benchmark — could improve sector management and project selection and design.

The fiscal dimension of public sector pricing has received little attention in most sectors. In view of the serious constraints on growth that several less developed countries face because of scarce fiscal resources, this is a major shortcoming — and deserves priority attention in the formulation of future price recommendations.

This is a background paper for the 1988 World Development Report. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Lupita Mattheisen, room S13-067, extension 33757 (122 pages with tables).

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PUBLIC SECTOR PRICING POLICIES:

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I. INTRODUCTION

1. Nearly a decade has passed since the Bank codified its position on "Cost Recovery Policies for Public Sector Projects" in Operational Manual Statement (OMS) 2.25. That statement provoked controversy by explicitly eschewing rules of thumb about appropriate target levels of cost recovery. Instead it recommended a general analytical approach to be followed in all projects, with the outcome heavily dependent on the relative importance of economic, fiscal and distributional concerns in the country, as well as the particular measurement and implementation problems in the sector.

2. This approach put a major burden on the project analyst. Although guidelines on pricing and cost recovery have been developed in many sectors, and country economists have calculated shadow prices and distributional parameters, the final judgments on pricing policy and cost recovery remain at the project level. Thus a review of Bank practice must begin with Bank projects.

Objectives

3. The purpose of this paper is to review the Bank's experience--on a cross-sectoral basis--with its policy on public sector pricing. In particular, we seek to answer two sets of questions:

- The Policy: How closely has the recommended approach been followed? How well has it stood up to rigorous application?
- The Practice: What have been the results? Based on our experience, can we now generalize about appropriate levels of cost recovery by sectors or within sectors? Have any patterns emerged about the importance of competing objectives? How have common problems, such as externalities or metering, been dealt with in different sectors? Has the Bank been more successful in some sectors than in others at providing practical pricing guidelines or at implementing its pricing recommendations? Are there lessons that can be transferred from one sector to another?

Limitations

4. Public sector pricing is a large topic in itself, but it also has close links to other major subjects such as the economic evaluation of projects and the degree of financial cost recovery. To the extent possible we have tried to restrict our focus to recommendations produced at the appraisal stage for pricing public sector goods and services. Thus we have not examined how prices are used for project evaluation. Except as they are relevant in setting prices, we have not considered financial covenants

in detail nor have we compared overall levels of cost recovery across sectors.

5. The definition of a public sector price is not always clear. Where a charge is made for incremental use--as in water, power or railway projects--it is fairly straightforward to compare that charge with the economic cost of production. However, in sectors such as roads or irrigation, constraints on measuring usage have meant that benefit taxes or user charges are more common than prices which vary strictly with consumption. We have included such non-price instruments in this review where relevant.

Approach

6. Our approach is primarily empirical. Appraisal reports from 13 sectors representing 149 projects sent to the Board in FY84 and FY85 have been reviewed, focusing particularly on their treatment of pricing and cost recovery issues. In addition, we have reviewed the sector specific guidelines, staff working papers and other outputs (mainly from OPS) designed to assist project staff on pricing issues.

7. Following this Introduction, Part II provides a brief summary of the Bank's general policy on public sector pricing. In Part III we review the practice across the 13 sectors in (a) calculating efficiency prices, (b) adjusting for implementation constraints, (c) adjusting for distributional objectives, (d) adjusting for fiscal objectives and (e) adjusting for financial objectives in public sector enterprises. Finally, Part IV presents our conclusions in terms of the questions set out above, along with suggestions for future work in the various sectors. Thirteen Annexes are attached which summarize the pricing guidelines and data collected from appraisal reports by sector.

II. THE BANK'S POLICY ON PUBLIC SECTOR PRICING

8. As set out in OMS 2.25, the Bank's policy on public sector pricing is that a common analytical framework should be used in all sectors to determine appropriate pricing guidelines and cost recovery targets. That framework has two steps. In the first step, efficiency prices are estimated. These are the prices that would maximize the net economic benefit from the project. In most cases, this means that the price should be set equal to the current economic cost of producing the last unit sold, plus a mark-up if needed to clear the market. Complications that may be involved in calculating these efficiency prices include indivisibilities of investment costs, externalities and projecting the effect on demand of future price expectations. In addition, complications may arise in implementing efficiency prices because of difficulties in measuring the consumption of project outputs (i.e., metering costs), price instability and constraints imposed by non-economic pricing of competing and complementary goods and services (i.e., "second best" problems).

9. After calculating efficiency prices, the second step is to adjust those prices to take into account non-efficiency objectives. The most

common of these are (i) income distributional objectives, (ii) fiscal objectives, and (iii) financial objectives, in the case of public sector enterprises. With respect to the first, OMS 2.25 notes that not all subsidies are for distributional reasons. Some are justified on efficiency grounds; for example, using promotional prices to stimulate initial demand in a new market. Where subsidies are meant to be targeted on low income consumers, the objective should be to find the least cost method of providing the subsidy.

10. Fiscal objectives are accorded high priority in the OMS. There were thought to be many cases where public revenues will be scarce enough to make it desirable to price public goods and services above their efficiency prices. Questions then arise as to the least distortionary method of raising public revenue. Discriminatory taxes on project beneficiaries may sometimes be preferable to raising prices, particularly if the product is an intermediate good.

11. With respect to financial objectives, the OMS makes a clear distinction between the needs of public enterprises, providing goods such as water or electricity, and those of government departments, providing health care or transportation. It argues that the former have legitimate financial objectives that contribute to their efficient operation. These might include financial independence; the ability to meet operating costs, service debt and earn a reasonable return on invested capital; or the ability to self-finance a portion of future investments. Since public enterprises do not usually have recourse to benefit taxes, they must raise the revenue to achieve such objectives through the prices charged for the goods and services they provide, even if that means pricing higher than efficiency prices. It is sometimes possible to mitigate any resulting uneconomic effects on demand by careful design of the structure of prices or tariffs.

12. The OMS rejects the notion of financial objectives for whole sectors or sub-sectors; for example, recovering the cost of low cost housing schemes from profits made on selling other real estate to wealthier clients, or financing village water supply out of profits from urban water systems. The rationale for subsidizing or taxing certain beneficiaries should not depend on whether cross-subsidization within the sector is possible.

13. While the OMS calls for a rigorous application of this two-step framework across all sectors, it suggests that efficiency pricing will be most relevant in electricity, telecommunications, ports, railroads and industry. There efficiency pricing should be the starting point with the financial objectives of the enterprise an "equally important consideration." Pricing and cost recovery were not expected to play a significant role in education or health sectors, and there was thought to be little scope for efficiency pricing in urban, village water or rural development projects.

III. APPLICATION OF THE POLICY

A. Use of the Two-Step Approach

14. Of the 13 sectors reviewed, the two-step approach was consistently used in the project Staff Appraisal Reports (SARs) of seven sectors: coal, highways, irrigation, oil/gas, power, telecommunications and water. While not yet widely reflected in appraisal reports, sector-specific guidelines or research papers that follow the two-step approach are also available in health and education. In the power sector, a theoretical treatment of efficiency pricing issues is available, but without an empirical trial. For railroads, there is an excellent paper on cost estimation, but little on efficiency pricing. For housing and fertilizer, the pricing focus tends to be on cost recovery.

15. In comparing the experience with efficiency pricing across sectors, it is useful to distinguish among three categories of publicly provided goods and services: those with external economies in consumption; those with external economies in production; and those in the public sector for some other reason. While these categories are not mutually exclusive (e.g., telecommunications exhibits external economies of both consumption and production), they serve to highlight the different approaches that have been developed to deal with essentially similar problems.

Sectors with External Economies in Consumption

16. The first category includes three of our 13 sectors: education, health and water/sewerage. In each case, the utility of one individual is positively affected by the consumption of the good or service by others. Thus, in order to maximize utility, the economic price for each consumer should be lower than the marginal cost of production. In addition to efficiency arguments, income distributional objectives have justified low prices in these sectors. All three are sometimes classified as merit goods which society may wish to provide to all its citizens, regardless of their ability to pay.

17. In a number of countries, these arguments have been carried to their extreme and the services are provided free. The consequences have been remarkably similar.1/ Excess demand has overwhelmed available supplies, the quality of service has deteriorated (e.g., higher student/teacher ratios, longer waits at the health clinics, daily or seasonal water shortages), funds have been insufficient to provide for maintenance and operating costs, morale of the professional staff in the sector has declined and centralized budgeting has led to inefficient investment allocations and little managerial incentive for cost control. Distributional objectives have been frustrated by the lack of funds for service expansion. In some cases, income disparities have been exacerbated by a zero-fee policy since rural services are the hardest to justify on a per capita cost basis, given fiscal constraints.

18. As a result of such experiences, the pricing question is being reexamined in the education and health sectors. In the water sector,

perhaps because of its traditional links with power and telecommunications as a "public utility" operation, considerable research and development of practical pricing methodologies has already taken place (Annex 13). Paradoxically, the calculation and implementation problems with efficiency pricing are probably more severe in water than in health or education. Thus, while much of the work on water relates to its own problems (e.g., capital indivisibilities, metering costs), the general approach developed there should be useful to education and health.

19. An important initial step in designing tariffs or user charges is to disaggregate costs according to services provided and to relate those costs to the relevant market segments. In the water sector, this has meant assigning pumping costs to areas of higher elevation and capacity expansion costs to peak season consumers. In the education sector, it means disaggregating costs according to level of education: primary, secondary, tertiary; while in health a finer distinction may be appropriate: primary health care (immunizations, maternal/child, general practitioner curative) and referral service (district clinics, national hospitals).

20. The next step is to examine the rationale for diverging from efficiency pricing at each level of cost and for each market segment within the sector. For water, external economies of consumption accrue predominantly with the initial 25-50 liters per capita per day of safe water for drinking and basic hygiene. A tariff structure with a low charge for the first consumption block and charges equal to long-run marginal cost (LRMC) for incremental consumption would satisfy both economic and distributional objectives. (Because LRMCs are typically above average costs in water, financial objectives would normally be met as well). In the education sector, external economies of consumption are most significant at the primary school level. This is also where costs per pupil are the lowest, although total costs may be large because of the larger number of pupils. Substantial subsidies at the primary school level are probably justified. However, at higher education levels most of the benefit will accrue to the consumer, and he is better able than the primary school student to recognize its value and compare it with the cost. Unlike in the water sector, distributional concerns are still important at higher consumption levels in education. Advanced education should be rationed not only by willingness-to-pay but also by ability to benefit. Thus a scholarship and/or government-guaranteed loan program is a necessary complement to a system of cost-reflecting tuition charges for secondary and tertiary education (Annex 2).

21. The design of user charges in the health sector should also be based on a disaggregated analysis of costs and the incidence of benefits. A rough distinction has been drawn between preventive and curative services, where the former is further divided into patient-related (maternal/child health, home visits, community health programs) and non-patient related (pest control, mass immunization campaigns) costs.^{2/} User charges are clearly impractical for the non-patient related services, which also have significant positive externalities. However, for patient-related preventive care and for non-referral curative care, the major efficiency objections to user fees do not apply. On distributional and financial grounds, the Chinese system of service fees to cover marginal costs plus general coverage, or subscriber, fees paid by all has much to recommend it.

22. The general consensus in the education and health sectors is that, for fiscal and X-efficiency reasons, economic pricing is now thought to be more relevant than was expected at the time that OMS 2.25 was prepared. The basic research and thinking has been done; however, our review of SARs indicates that this new perception is not yet mirrored in Bank project work or in many of the developing countries. The same is true of rural water supply, where Bank thinking has shifted strongly in favor of cost recovery. Case studies or cross-country comparisons should be developed and disseminated as examples of how disaggregated user charges can be designed and applied. The priority in these sectors is to apply the ideas that have been developed and to monitor and disseminate their results.

23. Urban water supply is at a different point and holds lessons of its own. Economic costing has become routine in SARs and is widely used for project design. Tariff studies based on LRMC are often financed through Bank projects. However, it is clear that properly designed tariffs are not a sufficient condition for an efficient utility. Much attention has been devoted to LRMC estimation, while the metering/billing/collection systems in many countries have continued to deteriorate. The result is often higher tariffs yielding little additional revenue. A better balance is needed, combining rougher estimates of LRMC with more focus on the other links in the chain of user charge implementation.^{3/}

Sectors with External Economies in Production

24. We include seven sectors in this category: highways, irrigation, natural gas, ports, power, railways and telecommunications. These are the sectors where decreasing marginal production costs lead inherently to monopoly. The ownership of natural monopolies can be left in the private sector, as is the case in some industrial countries, but even then they are subject to price regulation by the public sector.

25. The interpretation of efficiency prices presents difficulties in these sectors since investment lumpiness, problems in projecting demand and the importance of using a "system" rather than a project framework in estimating marginal costs are common to sectors with external economies in production. In the natural gas, power and telecommunications sectors, these problems have received considerable attention and practical guidelines have been developed for implementing the recommended approaches. In general, LRMC is felt to be more appropriate as a representation of economic cost in these sectors, and the "average incremental cost" formula has been developed to approximate LRMC under certain conditions.^{4/} For highways and ports, shortrun marginal cost (SRMC) is advocated; this has been widely applied in the former sector, but discussed only at a general level in the latter. The choice between LRMC and SRMC in railways depends on the circumstances of the country's rail system; however, this has not been elaborated in any detail. In the irrigation sector, little attention has been given to the best measure of economic costs because metering has generally been considered impractical.

26. The distinction between LRMC and SRMC is less relevant where a rationing or congestion price should be applied during those times of day or in those parts of the system where demand at existing prices cannot be

satisfied with existing capacity. Congestion pricing is advocated in theory for all of these sectors, with the exception of irrigation. In practice, only telecommunications projects have attempted it. On both economic and fiscal grounds, the use of rationing prices deserves further trial.

27. Once economic prices have been defined and estimated, their implementation presents major problems only for the highways and irrigation sectors. In both cases the obvious metering systems--road tolls and volumetric charges--have been rejected as being too costly, cumbersome or inaccurate to be generally recommended. Fuel taxes and licensing fees are used for roads, but these are too gross to reflect congestion costs and influence drivers' behavior during certain times of the day or on certain roads. In irrigation, it is our impression that in many cases metering has been assumed to be uneconomic without a quantitative analysis. There are numerous examples where, with hindsight, metering could have improved the allocation of water among users and postponed or prevented the need for drainage systems caused by overwatering. We suggest that in both these sectors a range of pricing instruments, such as inner-city parking fees, zonal access charges and transferable water rights, should be tried.

28. Highways and irrigation also differ from the other five sectors in this set in that they are not separately constituted public enterprises. In most countries, natural gas, ports, power, railways and telecommunications are institutionally separate from the government ministries, with the designated authority to levy charges on users and to retain those revenues to cover operating costs and finance future expansion. If congestion charges are to be more widely used, appropriate systems of taxation would be needed to ensure that excess rents accrue to the general fund rather than weakening incentives for cost control in the enterprise.

29. Without the financial legitimacy of a public enterprise, highways and irrigation have both had difficulties ensuring funding for maintenance activities, even where the total revenues from user charges exceeded such costs. The arguments for and against earmarked funds in these sectors are summarized later in this paper; on balance, we feel that an earmarked fund whose revenues are clearly from sector beneficiaries and whose expenditures are subject to the same scrutiny given to public enterprises can be justified on both fiscal and X-efficiency grounds.

30. The value of marginal costs as benchmarks in refining project design and improving operational performance has been recognized for many years in the power sector, even where second-best or other considerations prevent marginal cost pricing. This lesson is beginning to be applied in the natural gas and telecommunications sectors, although empirical work is needed in both to develop examples that can guide consultant studies and developing country practitioners. Of the three transport sectors, marginal costing techniques have only been widely applied in highways. SARs from the railways and ports sectors, as well as irrigation, rarely contain disaggregated cost information although studies to develop such data are sometimes financed.

31. In summary, these seven sectors are at different stages in addressing similar pricing issues. Methodological research to develop techniques for marginal cost estimation is probably needed in the ports and railways sectors. Such research has already taken place for natural gas and telecommunications, but the methods need to be applied in trial cases to generate practical guidelines for developing countries. For irrigation and power, such guidelines exist although, in the former case, pricing still receives inadequate attention in SARs perhaps because of pessimism about the application of volumetric charges. In irrigation and highways, a wider range of pricing instruments should be tried with the emphasis on improving allocational efficiency. Earmarking should also be reexamined for these sectors. Congestion pricing is relevant for most of them but has received little trial despite its clear fiscal benefits. Finally, only in the power sector is there evidence that pricing systems based on marginal costs are being widely adopted in the developing countries. The gap between policy and practice is still a wide one.

Public Sectors without External Economies

32. The preceding two sections dealt with sectors whose rationale for an externally imposed pricing policy was the presence of external economies that would lead to inefficient private market solutions. There are four additional sectors covered in this review where the rationale for public provision is not primarily externalities in consumption or production, but a variety of other factors. These are coal, fertilizers, housing and oil.

33. It could be argued that the coal, fertilizer and oil sectors exhibit economies of scale and therefore should be treated together with power, railways and the other sectors in the previous section. However, the tendency toward natural monopoly with prices higher than marginal costs does not arise for these sectors in an open economy. All three are subject to international competition and face a clear border price. Yet even in many industrial countries coal and oil are produced in the public sector and sold domestically at prices above import parity.

34. In the developing countries, coal and oil are nearly always produced by the public sector (Colombian coal provides an interesting exception). For oil products, there is no question that border prices represent economic values despite considerable market imperfections at the international level with cartels, extreme volatility during certain periods, etc. SARs for oil projects consistently compare domestic prices with border prices and discuss the aggregate contribution of the sector to tax revenues. A closer examination of alternative means of taxing the sector to avoid incentives for uneconomic substitution and better systems of transfer pricing crude oil to refineries is still needed (Annex 8).

35. For coal, international and internal transport costs are high, often leaving a wide gap between import and export parities. In addition, many grades of domestic production are not suitable for export. This means that the economic value of coal in many cases is the LPMC plus an allowance for depletion (Annex 1). As in oil, SARs for coal projects were found to contain a thorough treatment of pricing issues and explicit references to efficiency price calculations. There are still major problems at the

producer price level in the largest producing countries where cost-plus systems are used. However, improvements have been achieved in the allocational and X-efficiency incentives of these systems through Bank participation. Additional attention is warranted on the potential for price rationing of coal grades in short supply and of the scope for increasing the fiscal contribution of the sector.

36. The fertilizer sector presents an interesting paradox. On the one hand, border prices are easily observed and would be straightforward to administer. As an intermediate input, there would seem to be compelling arguments against price distortions on efficiency grounds, and fewer distributional or fiscal complications than one has in the pricing of, say, gasoline, kerosene or coal. Yet in every country of our sample, fertilizer prices were set without reference to border prices and there were major X-efficiency, allocational and fiscal problems.

37. The Bank's then Industry Department (IND) recently sponsored an international seminar on fertilizer prices.^{5/} Its proceedings provide a good survey of the theoretical issues involved and of the existing pricing systems in a number of developing countries. The case for diverging from border prices for fertilizer at the producer price level rests on two factors. First, international prices are said to be highly volatile because of lengthy periods of over- and under-capacity in the industry, as well as international collusion. To reflect this volatility in domestic prices would imply alternating periods of excess profits and major losses or perhaps plant closures. Second, strategic arguments have been presented to justify a domestic production capability. Because fertilizer is a key agricultural input, and because its application is time-sensitive, countries have claimed that they must have a domestic production capability to insure against international price or supply disruptions.

38. These arguments should be subjected to cost-benefit analysis, given the high administrative costs of existing pricing systems, their negative effects on X-efficiency and the large fiscal burdens they impose during periods of low international prices. The costs of mothballing and restart operations and of building and maintaining domestic buffer stockpiles of fertilizer should be explored as alternatives to the present cost-plus pricing systems.

39. At the consumer level as well as reexamination of the justification for fertilizer price subsidies is needed. As with irrigation, there has been a tendency by sector specialists to neglect consumer pricing on the grounds that fertilizer is part of a complex system of agricultural input and output prices that should be reviewed as a whole. Meanwhile, on the agricultural side, there is growing concern over the widespread practice of subsidizing fertilizers to farmers. First, it is impossible to truly delink producer and consumer prices because the difference between the two has direct fiscal implications. In addition, fertilizer subsidies are rarely efficient from the overall perspective of agricultural policy. In many countries, fertilizer use is unbalanced and inefficient due, in part, to its long history of low prices. If there are more cost-effective ways to achieve the same ends (including distributional and fiscal, as well as efficiency ones), then these should be identified so that project staff in the fertilizer sector can propose appropriate

alternatives. New approaches are needed for fertilizer pricing at both producer and consumer levels (Annex 3).

40. The housing sector is, in many ways, in a class by itself. It contains few externalities of consumption or production. Its output is non-tradable and not subject to border price comparisons. The case for public sector intervention--and World Bank support--rests more on social than on economic considerations. Those considerations clearly apply to only a part of the housing sector; i.e., the market for low-income housing. Thus the scope for cost recovery is inherently lower than in sectors which cater to all income levels such as water supply or transport, where it is possible for most consumers to pay the full cost of the service.

41. Efficiency pricing has not been a major point of reference in the housing sector. While there are sometimes problems determining the value of publicly owned land; in general, the calculation of the economic price of a plot and its improvements should not present major difficulties. It would be useful to carry out this calculation for prototype projects in order to develop practical techniques for estimating efficiency prices. At the same time the meaning of project "replicability" needs to be clarified with respect to its relation to efficiency objectives and financial targets. Disaggregated economic costs for housing projects would also help with project design; e.g., for examining the trade-offs in cost-minimization between lower standard infrastructure and lower valued land. In sum, the analytical balance in the housing sector needs to be shifted from financial to economic considerations (Annex 6).

42. This cross-sectoral review of pricing issues reveals significant differences in how they are treated both in the Bank and in the developing countries. Some sectors are clearly farther along than others in applying the two-step approach outlined in OMS 2.25. It is striking how much scope for improvement there is in the developing countries across almost all sectors. To effectively target that improvement, however, it is necessary for sector specialists to develop practical approaches for estimating and applying efficiency prices as benchmarks. The following sections of this Chapter compare the approaches used in different sectors to overcome common problems of calculating and implementing efficiency prices and of adjusting those prices to meet other objectives.

B. The Calculation of Efficiency Prices

43. The calculation of efficiency prices for public sector goods is likely to present problems for the same reasons that the goods are provided by the public sector. Some type of market failure prevents a smooth build-up of demand and supply. Barriers to entry may exist. There may be divergences between private and social costs or benefits. Related economic infrastructure, such as insurance and credit markets, may be lacking. Consumers may be ill-informed. These types of market failure will block the development of a diverse market--with numerous buyers and sellers--where efficiency prices can be easily observed. The most common sources of difficulty in estimating efficiency prices are discussed below.

Capital Indivisibilities

44. As noted above, many of the public sector producers have characteristics of natural monopolies; for example, electricity, water, irrigation, telecommunications, ports, roads, natural gas transmission and railways. These sectors all face lumpy investment costs due to economies of scale over at least a portion of their output. All produce non-tradable outputs, so no border price reference exists to which efficiency prices can be pegged. Over time their short-run marginal costs will tend to rise very sharply prior to each new investment and fall precipitously thereafter. Such price instability would be difficult for most consumers to accept or interpret as they prepare to make long-term consumption decisions; such as locating a plant near a railhead or port, buying an electric or gas boiler, etc.

45. In the electricity, water, telecommunications and natural gas sectors, the Bank recommends the use of LRMC rather than SRMC as the efficiency price (except when supplies need to be rationed as discussed below). In the roads and ports sectors, SRMC pricing is recommended with congestion charges applied to those facilities that are congested.^{6/} However, this is stated to be a theoretical recommendation; experience with its implementation is not yet widely enough available to provide the basis for a firm policy. For railways both SRMC and LRMC have been recommended depending on the circumstances of the system.^{7/} In irrigation, efficiency pricing is thought to be infeasible due to metering problems, so little attention has been given to its appropriate definition.

46. Where LRMC is considered the relevant pricing guideline, a method must be determined to approximate it. In the water supply sector in 1976, the Bank compared several approximation formulae and recommended the use of the Average Incremental Cost (AIC).^{8/} This has subsequently been applied in the power, telecommunications, gas and coal sectors. The AIC is essentially a smoothing formula over time of the future investment stream. The structure of marginal costs is reflected by separating capacity costs from operating costs and by assigning each to those parts of the system or times of the day when they are incurred at the margin. Recently, in the power sector, more disaggregated estimation methods have been recommended where the data permit.^{9/} In the railway sector, guidelines exist for calculating long-run marginal costs but not for translating those costs into practicable pricing structures.

Project versus System Costs

47. An estimation problem related to capital indivisibilities and LRMCs is the need in some sectors to base prices on future system costs rather than on the cost of the project. This is particularly relevant in the case of power, railroads and telecommunications where technological improvements and long lived equipment mean that a new purchase will change the utilization patterns of existing stock. For example, obtaining more energy efficient new locomotives allows a railroad to reduce fuel costs by shifting some old locomotives to peak use only. The parallel is obvious in the power sector.

48. The long-run marginal system cost is a concept that has only been extensively applied in the power sector. The theory has been developed for telecommunications and railways, but there are few available applications. In power, primarily for planning purposes rather than pricing, computerized least-cost system expansion plans over 10-20 year periods are fairly common. Where such models exist it is possible to move from general AIC estimates for efficiency prices toward a more precise and disaggregated set of cost-reflecting prices at different times of the day, geographic nodes in the system, and even demand patterns of major consumers. The benefits from calculating such LRMC-based prices extend not only downstream--toward providing the consumer with correct signals--but also upstream--as a tool to improve the efficiency of system operation. Disaggregated marginal costs can be a handy yardstick to resolve operational planning problems at the margin of the least-cost expansion program.10/

49. Further examples of this link between marginal cost estimation, pricing and internal operational efficiency are found in the health and education sectors. In health, inefficient operations are cited as a major problem, of which a large part of the blame is placed on the lack of pricing incentives to minimize costs. Doctors are rarely provided with information on the costs of the tests and treatments prescribed for their patients, hospital administrators are given a budget based on the previous year's expenses thereby encouraging them to inflate rather than reduce costs, and fees are set at the national level without regard to local differences in costs.11/ In education, the inefficient use of resources in schools is traced to the separation of education revenues--generally from central governments--from the costs paid by beneficiaries--through general taxes and/or fees. This leads to little flexibility at the local level, no competition for students, a lack of accountability to parents and therefore little incentive for the schools to be cost effective.12/

50. In both health and education it has also been suggested that private sector provision should play a larger role. Scale economies are not a major barrier to entry and there is often excess demand for public services indicating an untapped willingness to pay. The introduction or expansion of the private sector would increase the total supply as well as providing a competitive check on charges and service levels.

51. There is still a long way to go to apply the type of system costing that is now routinely done in the power sector to other sectors. An analytical framework along those lines has been developed (but not yet applied) in natural gas, where supply alternatives are often less complex than in power; but chunky demand options loom large, and trade-offs over time must be addressed because of depletability.13/ In telecommunications and railroads there is an open question about the appropriate level of disaggregation for system LRMC estimates. In addition, there is often a case for rationing access by charging "what the traffic will bear." This makes cost levels less relevant to pricing, although the structure of LRMC should still be reflected in the structure of prices by differentiating between those parts of the system with capacity constraints and those without.

Joint Cost Allocation

52. Joint cost allocation is a universal problem: it arises to a greater or lesser extent in all 13 sectors of our review. How easily it can be handled varies from sector to sector. In most of the sectors the main joint costs are for different products or services within the sector itself. For example, oil and gas are often produced from the same field, and oil exploration sometimes results in the discovery of gas reserves. The same health clinics and doctors provide both curative and preventive health care. Railroads are used both for passenger and freight transport. The basic infrastructure in housing projects serves plots of different sizes and quality characteristics. For such intrasectoral joint costs, common sense and a knowledge of the cost characteristics of the sector are generally sufficient to allocate the costs in a sensible manner.

53. In four of the sectors--power, water, irrigation and transport--there are occasional instances of intersectoral joint costs. These arise with dams that supply electricity, water and irrigation benefits. They are prevalent in the various transport sectors. Rail lines are built to connect inland production with ports (e.g., Carajas in Brazil). Gas pipelines are built to supply fertilizer plants located near their market (e.g., the KBJ pipeline in India). Such cases present few problems if the transport facility is wholly dedicated to the one product; where it also serves smaller, unrelated consumers, however, the incremental costs they impose on the system are not often straightforward to determine.

54. From the demand side as well, it is difficult in practice to estimate derived demand curves for the joint products and, therefore, to set prices for the various beneficiaries. Although joint cost problems must be tackled on a case-by-case basis, there are right and wrong ways to approach them. A common mistake is to confuse the economic distinction between joint and separable costs with the accounting distinction between fixed and recurrent costs. There is some evidence of this confusion in the SARs from irrigation and housing projects, where undue emphasis seems to be placed on recovering certain percentages of financial costs as a pricing target.

Information Problems

55. Three types of information problems plague marginal cost estimation: (i) lack of information about future investment and operating costs; (ii) existing cost information based on sub-optimal past investments or operating practices; and (iii) difficulties in forecasting demand for the product or service due to uncertainties regarding income and price elasticities. Problems (i) and (ii) are most acute in those sectors where system, rather than project, costs are the relevant LRMC measure. Problem (iii) arises especially in new markets, such as natural gas, and where there are close substitutes, such as for railroads.

56. A common response to lack of information about future investment and operating costs is to commission a consultant study, often financed as part of a Bank loan or credit. As shown in Table 1, during our sample period this technique was used fairly often in telecommunications, ports

and roads; less often in oil/gas, health, power, housing and railroads; and relatively seldom in irrigation, water, education, coal and fertilizers.

57. Such cross-sectoral comparisons reveal little, however, about the type or usefulness of such studies. In the power, roads and water sectors the terms of reference seemed to be clearly defined and similar across countries. These are cases where the Bank has been concerned with pricing issues for many years, and the methodology to be used in marginal cost calculations is well known by project staff and consultants. In the telecommunications and health sectors, the Bank's focus on efficiency pricing is relatively new and study approaches appear more diverse. A recent review of pricing initiatives undertaken as part of telecommunications projects (including LRM studies, tariff changes and setting up economic cells within the enterprises) concluded that of the 22 examples only four have been completed satisfactorily, 10 have never been carried out, six have been failures and the remaining two studies are under review.^{14/} A major work program has been proposed to strengthen the supervision of tariff studies now underway and to develop guidelines for tariff analysis. A similar approach was used in the oil/gas sector where the initial set of gas utilization studies was provided extra supervision and, based on that experience, a guideline was prepared to set out the methodology for future such studies.

Table 1. Projects with pricing studies

	<u>Number of SARs Reviewed</u>	<u>% with Pricing or Costing Studies</u>
Telecommunications	6	100
Ports	8	62
Roads	2	50
Oil/Gas	10	40
Health	11	36
Power	20	30
Housing	7	29
Railroads	7	29
Irrigation	14	14
Water	14	14
Education	20	10
Coal	5	0
Fertilizer	5	0

58. In the ports, education and housing sectors, approaches varied widely and, for the most part, seemed geared more to financial than to economic definitions of costs. Prototype terms of reference in those sectors would be useful. In irrigation, pricing studies have often been carried out by local teams who were part of the system being reviewed. This has generally produced poor results. In addition, Bank supervision of the studies has been lax and little attention given to their eventual review and implementation. Finally, it is striking that no cost or pricing studies were financed under the coal or fertilizer projects reviewed. Our sample period may have produced a fluke statistic; however, these sectors

should consider making use of pricing studies in those cases where information problems prevent concrete recommendations at the project appraisal stage.

59. Difficulties in forecasting demand have arisen primarily in the utility and transport sectors. The problems in power, water and natural gas stem mainly from the difficulty of estimating the consumption of new customers; average per capita consumption tends to fall as service is extended into poorer areas of the city. In addition, in the power sector demand was badly overestimated in many countries during the 1970s due to the failure to recognize the major price and income effects of higher oil prices. Demand estimation has also been poor in the transport sectors. In railroads, the 1981 sectoral review showed that freight volume growth had been consistently overestimated, with 30-40% shortfalls by the second or third year after appraisal in some cases. Meanwhile, passenger traffic exceeded forecasts in three quarters of the cases. (Because of the widespread subsidization of passenger traffic, this often increased losses). Port traffic projections must consider competition from neighboring countries, the effect of shipping cartels, and the buoyancy of export markets, as well as domestic intermodal choice. Thus, while some of the problems of transport demand estimation could be alleviated by taking a full sectoral approach (i.e., considering roads, rails and ports together), the difficulties will remain substantial.

60. In the housing sector there has been considerable recent research into the determinants of housing demand by income class.^{15/} The traditional method of demand estimation was to use a rule of thumb that households would be willing to pay 20-25% of their income for shelter. More sophisticated analyses show a range of 5%-40%, depending on income level and stage of development. In addition, empirical research has shown the importance of including "unearned" income, such as transfers, in such calculations. Efficiency prices for housing must reflect the full value of land and mortgage capital; these typically exceed the willingness to pay of low-income target beneficiaries. Thus the pricing implications of this research are that either lower cost design standards or higher subsidies will be necessary to reach the target population.

61. Regardless of the quality and quantity of studies on the determinants of demand and the degree of price responsiveness, uncertainties will remain. These should be dealt with through the strategy of implementing the recommended price. Once the studies and estimations have produced a price target, if it is a major step from current prices, the government has two choices. If the final target is fairly clear (such as an import equivalent price for a petroleum product), it is often best to move in a single large leap, thereby fulfilling expectations, reducing uncertainty and reaping the political costs only once. If the target itself is uncertain, it may be better to approach it gradually, monitoring the demand response along the way, and making mid-course corrections if the original assumptions about price elasticities are not borne out by experience.

Externalities

62. In the health, education, water and telecommunications sectors the gain that accrues to society from incremental consumption is likely to be larger than that accruing to the individual consumer. Vaccination

campaigns and access to sanitation reduce the risk of disease for neighbors as well as for those served. Widespread literacy enhances the productivity of all. Every new telephone connection increases the value of access to those already connected. The existence of such positive externalities means that the efficiency price of the good or service will be less than its private marginal cost. Negative externalities are also significant in some sectors. Coal production can affect agricultural land and its consumption in congested areas can cause respiratory problems. Forestry and irrigation projects have a well-known potential for environmental degradation. Less well understood are the widespread and long-run environmental effects of policies such as kerosene taxation on fuelwood demand or agricultural pricing on land clearance. Methodologies are only now being developed to assess these.^{16/} The problem is that where positive or negative externalities are significant, it will rarely be possible to measure efficiency prices directly since the aggregate social demand curve cannot be observed. This does not negate the importance of estimating marginal cost; but it does mean that indirect routes must often be taken to arrive at pricing recommendations.

63. In the telecommunications sector externalities present little practical problem for pricing. The widespread existence of excess demand means that prices should generally exceed marginal costs in order to efficiently ration supplies. In health, education and village water supply, prices have traditionally been set close to zero, both in order to avoid overshooting the efficiency price and on income distributional grounds. Recently this policy has come under question in all three sectors. Most of the discussion focuses on the interaction between fiscal and distributional constraints, which is reviewed later in this paper. However, in both the health and education sectors, part of the argument centers around the need to identify which particular services within the sector have significant externalities and which do not. Such distinctions permit the design of a structure of prices that reflects efficiency concerns more directly while also reducing sectoral deficits.

64. In the health sector, a number of different distinctions have been suggested: preventive versus curative; communicable versus non-communicable diseases; patient related versus non-patient related; primary versus referral care; etc. These categories are overlapping and none exactly coincides with the presence or absence of externalities. However, given a list of particular services provided by a health clinic or hospital, sector specialists could generally agree which entail significant externalities and which do not. For example, most of the benefits from curative treatment for non-communicable diseases accrue directly to the patient, while immunization against communicable diseases benefits the entire community. User charges are more justified for the former than the latter. Because curative care often accounts for 70-80% of all health costs, in many cases efficiency pricing would bring major fiscal benefits. As noted below, supply elasticities are also important in the health sector, and may justify user fees even where externalities are significant.

65. Similarly in the education sector, it is instructive to disaggregate services according to the size of externalities. These are generally thought to decrease as the level of education rises. Coincidentally, the cost per pupil also rises with the level of schooling. Thus depending on the proportion of the education budget spent on higher

education, a policy of efficiency pricing (i.e., where the proportion of subsidy was highest for primary school and lowest for university) could also yield a major reduction in the sectoral deficit. (This ignores distributional concerns, which are discussed below).

Shadow Pricing

66. In an economy with major price distortions, the efficiency price of a public sector good must be calculated on the basis of the real resource cost, or shadow price, of its inputs or replacement. This calculation is needed both for least-cost evaluations and as a benchmark for domestic pricing policy. Of course, where economy-wide price distortions are large, second-best considerations may require that the domestic price diverge from its efficiency level. Nonetheless, the efficiency price of natural gas in a case where it substitutes for imported fuel oil at the margin, is the border price of the fuel oil, not its domestic market price. The efficiency price of electricity produced in that economy with fuel oil would also be based on the border price of fuel oil even though the power company actually pays the domestic market price. If the electricity generators are imported, their cost should be calculated at the true border price of foreign exchange for the economy, which may be different from the official exchange rate.

67. These principles are well known, and about 45% of the SARs reviewed used at least one shadow price in their internal rate of return calculation. Labor was shadow priced in 28% of the projects, including 100% of the irrigation projects. A foreign exchange conversion factor was used in 11% of the projects, and some form of direct border price was used in a further 29% of projects. However, it is curious that none of the 31 health and education projects reviewed mentioned shadow pricing. This may be because rates of return are not generally calculated in these sectors, and little disaggregated cost data were available in the SARs. Table 2 summarizes the results of shadow pricing by sector.

Table 2. Percent of projects using shadow prices

	<u>in IRR</u> <u>calculation</u>	<u>for</u> <u>labor</u>	<u>for foreign exchange</u> <u>border</u> <u>price</u>	<u>conversion</u> <u>factor</u>
Irrigation	100	100	100	0
Railways	86	43	43	28
Coal	80	80	80	0
Oil/gas	70	0	60	10
Power	65	40	55	5
Ports	62	25	12	38
Fertilizer	60	60	60	0
Roads	36	4	4	27
Telecommunications	33	17	0	17
Water/sewerage	29	29	0	7
Housing	14	14	0	14
Education	0	0	0	0
Health	0	0	0	0

68. The opportunity cost of capital (OCC) is a shadow price that enters efficiency price calculations in many sectors; including power, water, telecommunications, railroads, housing, oil/gas and coal. The OCC is generally provided to the project analyst by the country economist. Some developing countries have mandated an OCC to be used in all project analyses. In the short-term, some countries use a high OCC as an effective cut-off for allocating scarce capital, irrespective both of the long-term prospects for reinvesting that return at the same rate and of other constraints on the actual productivity of that capital. Problems arise when such an OCC is used for long-run decisions--such as those involving depletable resources where exploitation today affect imports 15 years hence. Even for near-term choices, a shortage of managerial talent and skilled labor often means that labor-intensive technologies (selected by a high OCC) have actual returns far lower than the assumed OCC. This is not directly because the OCC is too high, but because the labor element has not been properly shadow priced as well. Although there is already a large economic literature on the theory of the OCC, a summary for practicing economic planners in developing countries that outlines the key assumptions and the practical consequences of error in either direction would be useful.

Rationing Prices

69. In cases of excess demand at the cost-reflecting price, the efficiency price is a rationing price which, given the elasticity of demand for the congested facility, equates demand to supply. Depletable resources present a special case where intertemporal price rationing is necessary, and the equilibrium price must rise over time to induce producers to hold stocks for future consumption.^{17/} The only sectors that have tried to apply this principle in our sample are natural gas and telecommunications. Yet instances of excess demand were cited in power, education, ports and housing. In the roads and ports sectors, Bank guidelines support congestion charges but no references to them were found in the projects' discussions of pricing, even where problems of excess demand were mentioned in the same SAR.

70. A major difficulty with rationing prices is deciding how high they should be. In sectors with close substitutes, there will be clues about the appropriate rationing price. For example, in the power sector the price of centrally supplied electricity should consider the cost of small private generation. In coal import prices can be readily observed. In ports a practical limit is provided by the cost of using neighboring ports. In railroads, both passengers and freight customers have alternative transport options. The cost of substitutes does not provide an absolute limit since it may not be high enough to ration existing supply. However, it does provide a benchmark that should be crossed only cautiously in case demand is more price elastic than expected.

71. In other sectors private providers are not available and outputs have few substitutes; for example health, education and sometimes housing. While it may be even more difficult to determine a market clearing price (and, where externalities are large, one may be reluctant to overshoot), it is usually easy to assess the presence or otherwise of excess demand. An interesting paper in the education sector shows that in cases of excess

demand, when there is a fiscal constraint to increasing supply, an increase in the price will result in an increase in net economic benefits, as long as the increased revenues are used to expand the supply. This is true even where the efficiency price cannot be directly measured.^{18/} It would be worthwhile to examine the applicability of this argument to other sectors. Should it prove valid, it provides an elegant link between the efficiency objectives and fiscal constraints to public sector prices.

Issues of Price Structure

72. A theme running through several sections above is the importance of carefully designing the structure of public sector prices to reflect efficiency and other concerns. We discuss below how adjustments in price structures have been used in some sectors to reconcile conflicting objectives at minimal cost. From the efficiency standpoint alone, however, there are strong arguments for a disaggregated pricing analysis.

73. In the utility and railroad sectors, peak and off-peak tariffs, capacity and energy charges, access and usage tariffs are essential to properly reflect LRMCs. While this is widely recognized, only in the power sector is it routinely applied in the developing countries. The tendency in most sectors seems to be to focus first on getting average tariff or cost recovery levels up to an acceptable standard, and only then to worry about issues of price structure. There are two fallacies in this view. First, it implies a trade-off between financial and economic objectives that is often absent. There are many ways to increase average revenues, of which some will reflect marginal costs much better than others. Where major tariff revisions are needed, it would seem sensible to focus first on those elements of the tariff which are providing the most misleading signals to consumers. By correcting these, consumption patterns as well as revenues would start to move in the right direction. Second, an unfortunate degree of mystery surrounds the idea of marginal cost, making it appear a sophisticated objective that can only be approached through elaborate tariff studies. This is not the case. The information requirements for marginal cost calculations are generally the same as those required for project design and least-cost evaluations. Marginal costs can be calculated on the back of an envelope if need be, and are generally easier to estimate than financial requirements because they do not consider inflation rates, debt repayment terms, historical asset values, and so forth.

74. In many sectors there seems to be an increased focus on aggregate measures of--and covenants on--project or sectoral cost recovery. These are routinely used in irrigation, roads and housing projects. Power and water projects typically include only financial covenants although the SARs generally provide analyses of the adequacy of tariff structures. Where there are clear problems in the structure of prices within a sector, or where there is a clear price candidate to shoulder the major part of a needed overall increase, more closely targeted price covenants should be encouraged.

C. Constraints to Implementing Efficiency Prices

75. The previous Section examined eight of the most common problems of efficiency price determination. The degree of effort it is appropriate to spend on overcoming such problems in the estimation of efficiency prices depends in part on the ease with which such prices can be implemented in a particular sector. If some sectors have devoted less attention than others to the calculation of efficiency prices (as we found in the previous Section), the reason may be that characteristics peculiar to the sector prevent their practical application. This Section discusses the major constraints to efficiency pricing and how they have been handled in the various sectors.

Metering Problems

76. An obvious implementation constraint in sectors such as irrigation and roads is the difficulty of measuring consumption. Volumetric metering has occasionally been advocated in Bank irrigation projects (it was used in two of the 14 cases reviewed), but has generally been considered infeasible or uneconomic. Cost recovery through benefit taxes has sometimes been designed to approximate the volumetric charge that would have been incurred, but much of the efficiency effect is lost since the consumer is not able to directly affect his costs by varying usage. In the case of highways, tolls have been rejected except under unusual circumstances because of their administrative cost and the inconvenience to consumers. Congestion charges have been advocated in theory, but none of the projects reviewed used them.

77. Less obvious cases of metering problems exist in the power, natural gas and water sectors. For small consumers with few appliances or without indoor plumbing, the scope for wastage may be so small that installing and reading meters is not cost-effective. In these sectors metering studies have been carried out to determine practical cut-off levels and consumption surrogates to be used for billing. No references to similar studies were found in the irrigation or roads SARs, although there has been research on the cost of highway tolls. In the roads sector, other methods for cost recovery exist which correlate reasonably well with usage; for example, fuel taxes (although these do not distinguish between congested and underutilized roads). Parking meters and zonal access charges have been introduced successfully in a few developing countries. In the irrigation sector, experience with and without volumetric metering should be reviewed to assess its cost-effectiveness in developing countries. In addition, other instruments such as transferable water rights should be explored. The widespread experience with wastage of irrigation water and the expense of drainage systems necessitated by overwatering justifies a renewed search for means of signaling marginal resource costs to consumers.

78. A different type of metering problem arises in the health sector. Certain types of services are non-exclusive, with no direct link between provider and beneficiary. Examples include disease control through draining swamps, pest eradication programs, and health education through radio or billboard advertising. Mass literacy campaigns, in the education sector, may also be non-exclusive. Benefit taxes may be the only practical alternative for cost recovery in such cases.

Lack of an Efficient Capital Market

79. Almost by definition, most developing countries lack efficient and mature capital markets. In the absence of risk-sharing mechanisms (or loan guarantees) many potentially profitable investments cannot raise the initial capital they require. In addition, interest rates are often fixed at levels that do not reflect market-clearing conditions. Particularly in the education, housing and irrigation sectors, the lack of an efficient capital market is a constraint to efficiency pricing. Even where the personal financial benefits of such projects are high, low income beneficiaries would have difficulty borrowing the resources needed to pay cost-reflecting entry prices. This problem is not easily handled at the project level; it is perhaps not surprising that the projects reviewed had difficulties in implementing their proposed solutions.

80. In the urban sector, the typical approach has been to set up a credit system dedicated to the project. Five of the seven projects reviewed included components for providing home improvement loans, and all specified repayment terms for plot and plot-plus-house purchase. For house and/or plot purchase, interest rates ranged from 8-13%, with repayment over 6-25 years. Although the SARs did not generally provide a comparison of the terms of project-assisted finance with "market" rates, it is suggested elsewhere that these terms incorporate significant subsidies both of interest rates and of land values.^{19/} A review of cost recovery experience showed that even these payments have been difficult to collect regularly from many beneficiaries, although not necessarily because of affordability. Delayed tenure, weak administration and the lack of effective sanctions for non-payment were cited as contributing factors.^{20/}

81. In the education sector, the development of a government-supported credit market has been advocated, but was not tried in any of the projects reviewed. In irrigation, the Bank's focus has been on recovering operating and maintenance costs rather than on providing loans and charging an "enrollment" fee. The latter may be impractical in many cases because of the technical constraints on inclusion/exclusion of individual plots in gravity fed systems.

Lack of an Insurance Market

82. An implementation constraint peculiar to the health sector is the lack of an insurance market to spread the small but expensive risks of major illness. Of the projects reviewed, only Brazil and China had contributory insurance schemes. Brazil has over 100 insurance institutions that operate primarily through employer-related payroll financing. In China health insurance is organized at the brigade level with both individual and pooled financing. The design of risk-sharing mechanisms need not entail formal insurance systems and, indeed, may not be a priority for the health sectors of most African countries. However, in many other countries (including developed ones) it is a growing problem. Seminars on this issue have been held in the Bank and a research effort is underway to explore alternative means to share the risks, and thus the costs, of medical care in an equitable way.

Uninformed Consumers

83. The argument has been made that in sectors such as health, education and, to a lesser extent, water/sanitation, charging efficiency prices may result in underutilization of the service because consumers are not sufficiently well informed to properly value its benefits. For example, if the connection between disease and immunization or sanitation is poorly understood, then prices may need to be low or zero to encourage participation. It is claimed that an Asian country which introduced school fees found that its enrollment of girls dropped to 5%.

84. Despite such examples, it is difficult to believe that this constraint to efficiency pricing is as important as its frequent mention in the literature would imply. Even where consumers are poorly informed, the supply costs to them of no public service are often enormous; e.g., many hours of water carrying, long distances to seek medical treatment. In addition, aggregate levels of demand and supply for a service should be considered in justifying large subsidies for the sake of a few uninformed users. For example, it may be true that some parents fail to recognize the benefits from sending their children to school, but if school facilities are choked with students at the existing fee structure, then lowering those fees to attract more students will not improve sectoral allocation or efficiency. If parents' perceptions of the differing value of education to boys and girls do not coincide with those of the authorities, then compulsory attendance or strict selection by universal examination is likely to be more effective in combating the parents' preferences than is lower fees.

Second Best Considerations

85. A final implementation constraint to efficiency pricing is the presence of distorted prices in competing or complementary sectors. For example, passenger rail tariffs may need to compete with subsidized bus transport. Such "second best" adjustments in prices are most prevalent in the energy and transport sectors where there are many intrasectoral substitutes. The Bank has had particular difficulty implementing efficiency prices for natural gas in a number of countries, because domestic fuel oil prices are subsidized. Second best pricing issues received greatest attention in the SARs for natural gas and railway projects.

D. Adjustments for Distributional Objectives

86. OMS 2.25 foresaw that the desire of governments to provide for the needs of their poorest citizens could introduce a significant, but justifiable, constraint on prices of public sector goods and services. A certain set of goods--which cuts across several sectors--is considered by many governments to be basic human needs, which society should ensure are provided to all. This category often includes basic health care, primary education, safe drinking water, adequate shelter and, in some countries, basic foodstuffs. In the absence of a direct income transfer mechanism, these goods and services are often supplied at greatly subsidized prices or even free. For the pricing analyst, the focus should be on designing the least-cost method of subsidy; i.e., that with the smallest efficiency losses.

87. In the SARs and sectoral guidelines reviewed, distributional objectives were given prominent focus. These were naturally defined differently in the different sectors; and various approaches were developed to incorporate them into the pricing analysis. The main ones are discussed below.

Explicit Distributional Weights

88. In the Bank's basic text on shadow pricing and the economic evaluation of projects, a technique is developed for the differential weighting of project benefits according to the income level of the beneficiaries. In the pricing context, this would imply inflating the willingness to pay of poorer consumers by that weighting factor to determine the intersection of demand and supply (and thus the allocation of the good), then setting differential prices to different consumer groups in order to achieve that allocation.

89. So far as we are aware, explicit distributional weights have not been used in any sector to incorporate distributional objectives into pricing analyses. Nor did we observe their use in the economic evaluation section of the SARs reviewed. The difficulty of "guesstimating" distributional weights, and the somewhat spurious accuracy of the resulting prices or net present values have worked against their practical incorporation into project and pricing analysis.

Percent of Project Beneficiaries Below Income Target

90. The closest approach to the use of distributional weights is probably in the irrigation sector, although the link with pricing is not a direct one. Cost recovery objectives take into account the proportion of project beneficiaries below certain poverty thresholds. The "Critical Consumption Level," below which the social value of a unit of extra consumption is greater than the social value of a unit of extra public revenue, is the most frequently used cut-off. The level of absolute poverty, defined in terms of a "basic needs" consumption basket of food, clothing and shelter, is also sometimes used. Nearly 80% of the SARs reviewed specified an index of ability to pay along with the proportion of project beneficiaries falling below the threshold. That proportion ranged from 10-100% of beneficiaries, so it is not surprising that cost recovery targets varied widely. As discussed below, irrigation is also a sector with one of the lowest levels of overall cost recovery. Its economic rates of return are quite high (relative to other sectors), so it is clearly the perception of distributional constraints that is holding down user charges. Because other sectors use different approaches to adjust for distributional concerns, it is not possible to directly compare the stringency of those constraints across sectors.

Rules of Thumb on Prices as Percent of Income

91. The most commonly used approach across sectors was to compare efficiency prices with income levels, using a rule of thumb for the proportion of income that a poor family could devote to that item. The two main variations on this approach are illustrated by the water and housing sectors. In water supply, the figure of 5% of income is frequently cited

as the maximum that a family should pay for its minimum water requirements (about 25 liters per capita per day). Over 90% of the SARs reviewed specified an affordability measure. The basic needs water requirement averaged 2.7% of income for the poorest households in the project areas. Because water projects tend to benefit entire communities, and because the consumption of poorer households is a small percentage of total consumption, distributional concerns can often be accommodated within the framework of efficiency pricing.

92. The housing sector faces a different set of circumstances. Its projects are often designed specifically to address a distributional problem and thus are exclusively targeted to low income populations. This is especially true of slum upgrading projects, although it is also true of many sites and service projects. Families that have the ability to pay for adequate shelter can generally find it in the private housing market. Thus the scope for intrasectoral cross-subsidy is more limited than it is in water.

93. For housing projects, the design phase typically includes collecting information on income levels of the target population. Project costs are estimated, sales prices and loan terms are worked out, and the latter are compared with incomes, using a rule of thumb that poor families cannot spend more than 20-25% of their income on shelter. If the comparison excludes too large a portion of the target population, then plots are downsized or standards are reduced. The overriding concern is that the project be "replicable," in the sense that cost recovery should be high enough that financial costs are covered over the long term. This pattern was followed, and quantification was provided, in all of the SARs reviewed in this sector.

94. While this approach has the advantage of being easily applied and easily explained to government policy makers, it suffers from several drawbacks. The overriding attention to distributional objectives has meant that efficiency prices are not explicitly estimated. Costs are calculated in financial terms, often with both land and interest rates below economic levels. The objective of replicability focuses attention on aggregate levels of cost recovery rather than on the structure of marginal costs for the different project components; e.g., land, location, water, electricity, communal service facilities, house construction, etc. Follow-up studies on existing projects have shown that there is often a relatively broad mix of income levels represented among beneficiaries, so the scope for efficiency pricing may be larger than supposed.

Differential Prices

95. If low income consumers are to be assisted through price subsidies, then it would be cost-effective to limit those subsidies to the poor through a differential price system. In many sectors this is infeasible because the poor cannot be readily identified. However, in the power, water and education sectors, techniques have been devised to achieve this.

96. Electricity and water consumption tend to correlate with income. Richer consumers have more electrical appliances and larger gardens to water. Since power and water utilities routinely collect information on consumption, it is easy for them to target subsidies to their smaller consumers. Many do this through tariff structures with a "lifeline rate" which charges a lower unit price for the initial consumption block. A more focused subsidy would be to charge each consumer's full consumption at a unit rate that escalates with the total quantity consumed, at least up to the limit of LRMC. While none of our sample utilities used this system, 25% of power projects and 64% of water projects incorporated some type of increasing block tariff structure.

97. Systems of price discrimination based on consumption quantities do not always achieve their intended objectives. Poor families may not be able to afford an individual connection; they may share a jointly financed one which meters the consumption of several households and therefore charges them at a higher rate. In England it is claimed that lifeline electricity rates benefit predominantly the wealthy owners of vacation homes, whose seasonal consumption is averaged over the entire year and billed at the lowest rate. This type of slippage in targeting subsidies is avoided in the education sector where means-tested scholarships, coupled with stringent entrance exams, are provided for successful university entrants. Because the population of successful entrants is already limited, it is feasible to individually assess eligibility on the grounds of family income.

Access versus Affordability

98. The previous sub-sections discussed different approaches to determining affordability and designing subsidies in order to create an effective demand for the good or service. Recently, however, increased attention has been given to the question of access to service--the supply side. The majority of the target population may be bypassed by the best subsidy scheme because the service itself is unavailable where they live. In the absence of fiscal constraints, lack of access would represent an implementation problem. It becomes a pricing issue when fiscal resources available to the sector are limited.

99. When budgetary transfers to the sector cannot be expanded, both fiscal and distributional objectives point to the need to generate greater revenues within the sector. As mentioned in para. 71, recent work in the education sector shows that under conditions of a fixed fiscal transfer and excess demand, user fees should be raised even though the efficiency price cannot be directly measured. Higher sector revenues can be used to expand coverage and/or to fund a loan or scholarship program directed at low income consumers. The housing sector's emphasis on replicability stems from the same concern. When supply elasticities are considered along with demand conditions, there is often a congruence between efficiency, fiscal, distributional and financial objectives.

E. Adjustments for Fiscal Objectives

100. OMS 2.25 gave at least as much attention to fiscal objectives as to distributional ones. It recognized that fiscal resources are scarce in many countries, and the mechanisms for increasing tax revenues are often underdeveloped. Pricing public sector goods higher than their efficiency prices will often be warranted, as will be discriminatory taxes on project beneficiaries. The job of the pricing analyst is to minimize the efficiency losses from such taxes.

101. Our review of SARs indicates that fiscal objectives are rarely given explicit attention. The exceptions are telecommunications and a minority of irrigation projects, and indirect mention in most education and health projects. Fiscal objectives are implicitly apparent where projects incorporate covenants that require the government to make annual contributions to the operating budget of the public enterprise or department. However, such covenants were rarely accompanied by an evaluation of the general fiscal position of the country or of the relative importance of alternative sectoral claims on government resources. It could be argued that such covenants are the antithesis of the approach recommended in OMS 2.25: instead of adjusting public sector prices to accommodate fiscal resources, the latter are arbitrarily earmarked for sectoral priorities. (Earmarking is discussed more generally later in this Section).

102. Because there is so little discussion in the SARs of the net fiscal contribution of the sector, the following analysis is based on the fiscal impact of the Bank projects. Comparative figures should therefore be used with caution.

Taxes on Public Enterprises

103. Taxes on the income or output of public enterprises were mentioned in eight sectors: coal, fertilizers, oil/gas, ports, power, railways, telecommunications and water/sewerage. In addition, in the roads sector indirect user charges such as fuel taxes often contribute to general government revenues. Except in oil/gas and sometimes roads, it was unusual for the Bank to make any recommendations or negotiate covenants about these taxes, despite considerable intrasectoral variation in size and incidence.

104. In the coal sector, two of the four sample countries levy a tax on output. In India a tax of about 14% of minehead prices is paid by consumers, of which about one-sixth is returned to the producers to pay for workers' housing and medical facilities. The remainder is presumably retained by government. In Colombia, where most mines are small and privately owned, a 5% tax is levied on the minehead price. The National Coal Fund receives 60% of the tax revenues for financing coal exploration and assisting small and medium scale mining operations; the remainder apparently rests with central government. Neither SAR gave an analysis of the amount of revenue generated or whether the taxes were set at an appropriate level.

105. In the fertilizer sector, two of the five cases reviewed were subject to corporate income tax on their earnings of 55-58%. The incidence

of these taxes is unclear, however, since producer prices were set on a cost-plus basis and consumer prices were heavily subsidized in both cases. In three of the five cases the inputs into the fertilizer plants were exempt from duties and taxes, in one case they were subject to duty and in one case such information was not reported.

106. In the oil/gas sector, both income and sales taxes are common although the bulk of profit remitted to government is collected through the latter. Income taxes in the sample projects ranged from 25-55%, while taxes on the petroleum products sold were often in excess of 100% of their ex-refinery prices. These taxes accounted for 8-15% of total government receipts in the countries reporting. There were numerous distortions in both ex-refinery and consumer prices, some of which were tackled in project covenants. Only one project, however, included a recommendation on restructuring government taxation of the oil company. In view of the importance of oil product taxation to government revenues, and the variety of taxation devices applied to the sector, a cross-country review of the relative productivity of different types of energy taxes and their effects on incentives would be useful.

107. In the ports sector, income taxes ranging from 50-100% were paid in six of the eight projects reviewed; taxes were not reported in the other two. Inputs were subject to duty in seven cases and exempt in one. The Bank made no recommendations about the level or structure of these taxes.

108. In the power sector, tax treatment also varies widely. Of the 16 sample countries, eight are subject to income taxes (ranging from 32-53%). The other eight are exempt from income taxes. Five of the countries levy sales tax on electricity, sometimes at several levels of government. Two-thirds of the power utilities are exempt from paying import duties, while one-third benefits from subsidized fuel prices. The only tax recommendation made by the Bank was for earmarking the proceeds of one of the sales taxes for reinvestment in the power sector.

109. In the railway sector, six of the seven projects concerned loss-making enterprises, and income tax treatment was not reported. In China, income tax is at least 55% of net profits and there is also a 15% sales tax on gross operating revenue. The Bank made no recommendations about taxes.

110. In telecommunications, three projects reported corporate income taxes were paid, at rates ranging from 45-58%. In two projects income tax was not levied, and one project did not report on income taxes. Customs duties, ranging from 1-70%, were paid in four of the projects; the other two were exempt. Despite this enormous variation of tax treatment across countries, the Bank made no recommendations in these projects about taxes.

111. In the water/sewerage sector, of the 11 countries represented in the sample, two utilities paid income tax (at 11 and 37.5% of profits) and two paid a tax on gross revenues (3 and 4%). Five utilities were subject to taxes and duties on their inputs, while six were exempt or did not report. No comments or recommendations were made about these taxes.

112. Indirect user charges in the roads sector are typically collected in the form of fuel taxes, import duties on vehicles and tires, and licensing and registration fees. The total revenues from these sources amounted to more than 100% of total road expenditures (but excluding congestion costs) in eight of the 22 sample countries. As noted above, many governments regard fuel taxes primarily as a direct revenue source rather than as a type of road user charge. Because such taxes are paid mainly by road users, it is not incorrect for the Bank to assess their adequacy partly in terms of the SRMC of road transport. However, they also need to be analyzed from a general revenue perspective. It is possible that the transport sector is being overtaxed in some countries while other sectors are undertaxed. Two of the 22 projects reviewed included fuel pricing covenants; in both cases the arguments were made in terms of sectoral rather than fiscal objectives.

Recurrent Cost Financing by Governments

113. In four of the sectors there is significant government financing of recurrent costs: education, health, irrigation and railways. In the education sector, of the 50% of the SARs that reported on cost recovery, the government financed 80-100% of recurrent costs. These amounted to an average of 14% of total government recurrent expenditures (ranging from 7-23%). The education sector was the only one that routinely reported the relative significance of sectoral expenditures in-terms of the overall government budget.

114. In health, recurrent expenditures accounted for an average 40% of total sectoral expenditures (ranging from 31-95%). While a breakdown of financing sources for recurrent costs alone was not provided, such figures are available for total health costs. The central government contributed an average 54% of total costs (ranging from 10-100%), while user charges accounted for 28% (ranging from 0-85%) and state, local and other sources made up the rest. Thus if one were to assign all user charges to recurrent costs, they would cover an average of 70%.

115. In the irrigation sector, of the 80% of projects reporting on cost recovery, the government financed an average of about 50% of recurrent costs. This average covered a wide variation, with 36% of projects needing no government support for recurrent costs, 36% needing full government subsidy and 27% requiring levels of government subsidy ranging from 40-60%. Irrigation was the only sector to define a "cost recovery index" (based on both investment and recurrent costs) which was reported by 57% of the SARs reviewed. It ranged from 6-42%, with a mean value of 24%.

116. Six of the seven railway projects reviewed needed government financing of recurrent costs. The levels ranged from 3-51%, with a mean value of 19%. In some cases government subsidies are explicitly tied to the running of unremunerative branch lines or losses on passenger train service due to government tariff policy.

117. It is difficult to analyze the extent to which shortfalls in recurrent cost financing in these four sectors are consistent with efficiency pricing objectives. The importance of externalities in the education and health sectors makes it infeasible to estimate economic

prices, and thus to compare them with average recurrent costs. In the irrigation and railways sectors, economic prices will probably be close to recurrent costs except where price rationing is appropriate. However, in none of these sectors' SARs was there explicit consideration of the relative importance of fiscal objectives and the trade-offs in pricing policy these might imply. Prices which do not enable a sector to finance even its operating costs clearly constitute a claim on revenues generated outside the sector. To what extent this is appropriate depends both on the sector and on the fiscal options available to the country.

Investment Cost Financing

118. Information was rarely available on a sector-wide basis about the role of government equity contributions to investment. Table 3 shows such figures for the 149 sample projects. Not surprisingly, government equity contributions were highest in the health and education sectors. The high figure for roads is misleading since non-earmarked revenues from user charges are not taken into account.

119. It is more surprising that telecommunications is the only sector in which government equity was not used. Its level of internal cash generation (39% on average; ranged from 15 to 69%) was significantly higher than that in any other sector except oil/gas (at 32%), and the proportion of project costs financed by the World Bank was correspondingly lower. While these project financing figures cannot be assumed to mirror the percentages for overall sector finance, the low levels of internal cash generation from our sample across so many sectors indicate a significant scope for relaxing fiscal constraints through better public sector pricing policies.

Table 3. Sources of Project Funds in SARs (percent)

	<u>No. of Projects</u>	<u>Internal Cash Gen.</u>	<u>IBRD/ IDA</u>	<u>Other Donors</u>	<u>Govt. Loans</u>	<u>Govt. Equity</u>	<u>Other</u>
Health	11	0	57	7	0	35 (5-74)	0
Education	20	0	60	6	0	35 (7-88)	0
Roads	22	0	55	10	0	35 (6-72)	0
Irrigation	14	1 (0-10)	53	18	0	28 (3-50)	1
Housing	7	10 (4-40)	57	5	9	19 (0-29)	0
Fertilizer	5	10 (0-35)	54	10	1	22 (0-70)	3
Water	14	10 (0-49)	53	9	2	23 (0-54)	3
Railways	7	16 (0-72)	32	16	24	12 (0-74)	0
Ports	8	14 (0-35)	48	13	13	9 (0-25)	3

Power	20	14 (5-40)	38	26	7	6 (2-47)	10
Coal	5	24 (0-52)	39	6	4	26 (0-62)	0
Oil/Gas	10	32 (0-69)	30	23	4	7 (0-34)	4
Telecoms	6	39 (15-69)	28	30	4	0	0

120. Only in the irrigation and telecommunications sectors was an attempt made to calculate the net impact of the project on the government budget. Four of the 14 irrigation projects reviewed made such calculations, two of which relied on the additional income and sales taxes to be paid out of the incremental income of beneficiaries. The latter approach is questionable unless the funds for the project were not fungible. Net fiscal impacts were calculated in five of the six telecoms projects reviewed. Calculations of the net project impact on fiscal aggregates would also be useful in other sectors--such as ports and oil/gas--where investments may be partly government financed but means exist to transfer a portion of profits and rents back to government. Inter-project comparisons (within a sector) could help to develop norms of tax contributions as well as highlight tax inconsistencies or unintended consequences within a project.

Earmarking

121. The earmarking of project revenues for reinvestment in the sector is a controversial subject, and one on which Bank practice varies across sectors. Earmarking has been defined as "the practice of designating or dedicating specific revenues to the financing of specific public services....Normally, earmarking (means) the dedication of a single tax source to a single public service within a multitax, multiservice fiscal unit, but the identical effects are produced by the creation of special-purpose fiscal units, such as school districts, fire districts, and sanitation districts, each of which is granted independent, but restricted, taxing powers."^{21/} Public finance experts have called earmarking "probably the worst danger to good budget practice."^{22/} Yet in many industrialized countries it is a widespread practice with strong-taxpayer support.

122. Using the broad definition quoted above, the revenues of public enterprises--power, water, telecommunications, railways, fertilizer, coal and sometimes ports--are examples of a type of earmarking. All the tests of financial viability for such enterprises hinge on an explicit link between revenues from beneficiaries and the costs incurred in providing the service. In the housing sector, earmarking is routinely required in order to institutionalize replicability. In the case of roads, covenants to earmark funds for road maintenance were included in 45% of the projects reviewed. Many of the other projects included assurances that the government would allocate specific sums to maintenance in future years.

123. The disadvantages of earmarking are well-known. It places constraints on the budget authority to transfer resources in response to changing priorities. It distorts the picture of a government's finances and makes it harder to exert macroeconomic controls. The administrative

costs of maintaining numerous smaller funds are probably higher than those associated with one general fund. Sometimes an earmarked revenue expands far beyond original expectations and provides extravagant support for the function it finances thus weakening incentives for cost control. On the other hand, having once earmarked revenues for a function, officials may feel that they have made full provision for it and be reluctant to approve additional funds even when justified.

124. In favor of earmarking are one theoretical and two essentially practical arguments. The theoretical case, as made by Buchanan in 1963,²³ asserts that the standard arguments against earmarking hinge on adopting the reference system of the budgetary authority, which is, by presumption, divorced from the citizenry in the political community. His alternative hypothesis of the political order is an individualistic one in which the reference system becomes that of the individual citizen. In this model, the state or the collectivity exists only as a means through which individuals combine to accomplish collective or jointly desired objectives. Thus the restrictions that such practices as earmarking may impose on the independence of a budgetary authority need not produce "inefficiency" in the fiscal process. Segregation of revenues may provide one means of ensuring more rational individual choice, and thus be a desirable feature of a fiscal structure.

125. A practical advantage of earmarking is that, in the absence of rational means of budget allocations and/or expeditious transfers of funds within the government bureaucracy, earmarking can provide a way of ensuring that certain high priority tasks are adequately funded. A second advantage is that earmarking provides a certainty and continuity of funding that is conducive to better internal sector management. Particularly for activities that require long-range planning or a build-up of trained staff, efficient organization and management may require a longer planning horizon than the budgetary process provides.

126. Another aspect of the sector management argument has been advanced in both the health and education sectors. The incentive for improving cost recovery in those portions of the sector where it is warranted (e.g., curative health care, university education) will be greatly enhanced if at least a portion of the revenues generated can be reallocated within the sector. At an even more disaggregated level, a health clinic or school district is likely to make better use of its budgetary resources if there is a direct link between the fees it collects and the funds it has available to spend. To the extent that these arguments are valid, the practice of earmarking could actually increase available fiscal resources. This will only be the case, however, when the earmarked revenues are generated within the sector.

127. In view of the widespread weaknesses both in methods of budgetary allocation and in sector management, a fresh look at earmarking seems warranted. To minimize the number of extraneous variables, this should probably be done within--rather than across--sectors. Transport would be a good initial candidate because of its project experience with and without earmarking covenants. In view of the arguments above, two caveats to earmarking should be observed: first, funds earmarked should be only those which come from sector beneficiaries as user charges or benefit taxes; and

second, whenever the earmarked revenues account for a large proportion of sector expenditures, an authority outside the sector should be appointed to review the generation and use of such funds.

Link to Public Expenditure Reviews

128. The slight consideration given to fiscal constraints in SARs is surprising in view of the increased attention devoted in country economic work to public expenditure reviews. Many country economists consider the scarcity of public sector funds the dominant medium-term constraint to growth. When economies are only partially monetized, the scope for expanding tax revenues in an efficient way is limited. At the same time, the demand for public sector services is growing rapidly, while the productivity of public investment is often low.

129. The analytical linkages between public sector investment strategies and public sector pricing policies have long been recognized. Under uncomplicated conditions, setting prices at economically efficient levels and aiming for full (marginal) cost recovery will ensure that the right level of investment is demanded and that the beneficiaries--rather than government revenues--foot the bulk of the bill. Thus proper pricing of public sector services can go a long way toward relaxing fiscal constraints to development, as well as improving macroeconomic and budgetary balances.

130. In practice, however, the link between sectoral pricing policies and macroeconomic investment objectives seems rarely to be the focus of Bank policy advice at either the country or the project level. This may be because better pricing in a single sector--or project--does not have a large enough fiscal impact to be important. It may also be that country economists generally have neither the time nor the mandate to delve into "micro" issues such as pricing. The widespread economic distinction--mirrored in the Bank's organization--between macroeconomic and project issues seems to have obscured the fiscal/public sector pricing link.

131. To see how public sector pricing policies are treated from the macroeconomic side, we reviewed a set of eight Public Investment Review (PIR) reports produced recently by Bank economists.^{24/} A shortage of domestic savings was identified as a major constraint to growth in five of the eight cases, and the implementation capabilities of the public sector were singled out in four. Five of the PIRs made some mention of the need to change tariff policies in at least one public sector. Agricultural prices were mentioned in two cases, public enterprise prices generally in two and port tariffs in one. The PIR for Ghana contained the most far-reaching set of tariff recommendations, including changes in health, education, roads, communications and water prices.

132. None of the PIRs attempted a quantitative analysis of the impact that efficiency pricing (or the recommended, but generally unspecified, price increases) would have on the fiscal or monetary aggregates or on growth prospects. This is an important next step. In order to make a convincing case for a change in the philosophy of public sector pricing--or even for changes that extend beyond project boundaries in a few key sectors--it is necessary to quantify the expected fiscal and macroeconomic

impacts. Without such estimates of the benefit side, policy makers will continue to be heavily influenced by those consumers who are negatively affected by price increases.

F. Adjustments for Financial Objectives in Public Sector Enterprises

133. From the standpoint of public sector pricing, the financial objectives of most relevance are the revenue covenants: rates of return on assets, internal cash generation, operating ratios and break-even covenants. (Additional financial covenants deal with the capital structure of the enterprise and its liquidity requirements, but these are not reviewed here). Basically, revenue covenants require public sector entities to take the necessary actions, including price increases, to ensure that their total revenues are sufficient to cover a specified set of costs and, in most cases, contribute to future investments.^{25/} A key difference between the financial and economic objectives for public sector pricing is that the former are unconcerned with the structure of tariffs so long as the average level is high enough, while the latter are focused on individual tariff elements rather than their averages. There is often no conflict in the two sets of objectives, but at the same time the achievement of one does not guarantee the satisfaction of the other.

134. Financial objectives are given considerable attention in the SARs of most loans to public sector enterprises; i.e., power, water, oil/gas, telecommunications, fertilizer, coal, ports and railways. Of the 75 projects reviewed in these sectors, only eight lacked revenue covenants. Both rates of return on revalued assets and internal cash generation covenants were widely used in all sectors except fertilizer and coal where general price covenants were prevalent. In general, the range of target rates of return or percentage cash generation was larger within sectors than across sectors (see Table 4; ranges are shown in parentheses).

Table 4. Use of Revenue Covenants

	<u>Rate of Return</u> <u>on Reval. Assets</u>		<u>Internal Cash</u> <u>Generation</u>		<u>Others</u>		<u>No Revenue</u> <u>Covenants</u>
	<u>% Proj.</u>	<u>Ave. Return</u>	<u>% Proj.</u>	<u>Ave. %</u>	<u>% Proj.</u>	<u>Type</u>	<u>% Proj.</u>
Telecoms	100	11.4 (4-13)	50	41 (23-50)	0		0
Oil/gas	20	10.5 (6-15)	40	56 (26-80)	0		40
Water	36	4.2 (1.5-7)	57	12 (5-54)	36	Break-even	0
Power	40	7.1 (4-10)	40	23 (8-40)	20	Return on Historic	0
Ports	38	6.5 (6-7.5)	50	30 (10-40)	38	Break-even	0
Railways	28	3.5 (3-5)	28	34 (20-48)	28	Break-even	28
Fertilizer	0	--	0	--	20	Break-even	20
Coal	0	--	0	--	60	Price policy	
					80	Price policy	20

135. There was little indication in the projects reviewed that financial objectives for pricing conflicted with economic ones. In general, sectors with declining LRMCs would be expected to show financial losses if prices were set on economic grounds. While there are occasional instances of this in the power sector, telecommunications is the only sector where it is widespread. In telecoms, however, the economic price is often that which rations available supply, which is generally higher than both the LRMC and the average financial cost.

136. In most of the SARs reviewed, prices were thought to be too low on both financial and economic grounds. The text supporting financial covenants nearly always stated that they represented minimal objectives. It is striking that target rates of return are as low as they are in these sectors--generally below the opportunity cost of capital, even in sectors such as ports and power where the scope for revenue generation should be relatively high.

137. Our review of revenue covenants addresses only a small part of the treatment of financial objectives in SARs. We have not dealt with perhaps the most important issue of all: the extent to which the financial objectives of the entity are adequately reflected in the financial covenants of the project. A thorough review of financial objectives across sectors is beyond the scope of this paper. However, the wide sectoral diversity shown in our surface data indicates that such a review could produce useful insights into the reasons for cross-sectoral differences and the degree to which various sectors have been successful in promoting financial viability through different means.

IV. CONCLUSIONS AND RECOMMENDATIONS

138. Inappropriate prices for goods and services provided by the public sector are a problem in many developing countries. Loss-making public enterprises constitute a major drain on fiscal resources. Incentives are lacking for cost-conscious sector management. Meanwhile, the quality of supply deteriorates for those with access, while fiscal constraints prevent expansion of coverage to those without. Proper pricing policies alone would not remedy all these problems, but they are a key ingredient and one on which the Bank is often asked to advise.

139. The basic philosophy of the Bank on public sector pricing was set out a decade ago in OMS 2.25. It emphasized the importance of using the efficiency price of the good or service as a benchmark, but recognized the equal claims of distributional, fiscal and financial considerations in arriving at a price recommendation. Our review of 149 appraisal reports across 13 sectors indicates that this two-step approach to pricing is followed fairly closely in seven of the sectors (coal, irrigation, oil/gas, power, roads, telecommunications and water/sewerage), but in the other six the focus is heavily on either distributional (health, education, housing) or financial (fertilizer, ports, railways) objectives, with little attempt to estimate efficiency prices or to explicitly incorporate economic pricing principles. Our review suggests that efficiency pricing is not irrelevant or impossible in these sectors and, even if used only as a benchmark, could bring improvements in sector management and project selection and design. In some of these sectors research is already well advanced to incorporate

explicit consideration of efficiency prices into Bank projects and sector advice. In others, basic definitions and costing methodologies have still to be developed. In the Annexes we have made specific recommendations for further work, sector by sector, to address the major gaps in pricing analysis.

140. Where it has been used, the two-step approach has proven effective in incorporating economic and distributional analyses, primarily through careful design of the structure of fees or tariffs within sectors. The financial dimension has also received much attention, but generally as an isolated topic with few references, even in the revenue discussions, to economic or other pricing objectives. In some cases, the financial analysis has tended to undermine other objectives by its focus on defining minimum percentage increases in average revenues over the short and medium term, rather than casting those in the light of ultimate targets for financial viability and fiscal contributions from the sector. In general, financial targets seemed to be low and often entailed average output prices that were below those implied by efficiency pricing objectives. However, a more detailed look at financial covenants and intersectoral differences would be necessary to reach specific conclusions and provide recommendations.

141. The fiscal objectives for public sector prices have received little attention in most sectors. This is a major gap, in view of the serious constraint to growth that many countries face because of the shortage of public sector revenues. Public Investment Reviews sometimes mention the need for price adjustments, but only at a general level; their focus is mostly on the expenditure side of the accounts. Yet it is difficult for project analysts to address issues such as the tax structure facing a particular public enterprise or the target fiscal contribution (or maximum loss) that a sector should make, since those issues are broader than any one sector. The next step should be one or more case studies--involving both macroeconomic and sectoral expertise--to assess the expected fiscal and sectoral impacts of economic pricing across the major public sectors.

142. The role of efficiency prices as tools to improve internal operations, or X-efficiency, deserves more attention. This role has been well demonstrated in the power sector, and is increasingly referred to in the health, education, ports, oil/gas and fertilizer sectors. The impetus that economic pricing gives to managerial efficiency may provide justification for reexamining the OMS's rejection of sectoral budgeting and the Bank's long-standing opposition to earmarking.

143. Finally, ten years of experience with the two-step approach to integrating economic, distributional, financial and fiscal objectives for public sector pricing has generated a body of empirical evidence that there is more congruence than conflict among these concerns. The tone of OMS 2.25 was one of balancing trade-offs. Instead, under conditions of fiscal stringency and when supply elasticities and X-efficiency impacts are considered, setting prices to clear the markets is a strategy that often furthers all objectives. On the distributional side, access to service is the key. A financially viable public enterprise or an adequately funded government department that can expand its coverage to rural and poorer

urban areas is a more effective means to reach the poor than are subsidized prices and constrained supply. During a period of service expansion, economic prices are often higher than marginal costs in order to ration supply; such prices are also necessary from a financial viewpoint to fund new investment and support additional debt. If economic prices prevailed, many public services could greatly reduce their requirements for general tax revenue, leaving those sources for sectors with less ability to generate internal funds.

144. Actual practice in the developing countries is far from this ideal. In most sectors the Bank's recommendations have approached it only marginally, because the fiscal dimension of public sector pricing has been largely ignored. Finding a practical way to resurrect that missing element and incorporate it into pricing advice at all levels is a clear priority.

Summary of Major Recommendations

1. Research based on case studies should be undertaken to quantify the expected fiscal and sectoral benefits from an across-the-board policy of efficiency pricing for public sector goods and services. In addition to quantifying potential benefits, the research should aim to develop a widely applicable methodology for integrating fiscal objectives into project and sectoral pricing analyses. Such a methodology must be robust from the macroeconomic perspective, and must bridge the gap between fiscal considerations (e.g., the choice of tax instruments, budgetary allocation devices) and project/sectoral objectives (e.g., allocational efficiency, X-efficiency, financial viability).
2. A review of financial covenants across sectors should be undertaken to identify which approaches have been most successful in promoting financial viability. In addition, ways should be sought to more closely integrate the economic and financial analyses with respect to pricing issues.
3. Several cross-sectoral issues have been identified where additional research or policy work is needed. These include:
 - (i) application of congestion pricing (paras. 26, 69+)
 - (ii) earmarking and sectoral budgeting (29, 121+)
 - (iii) link between economic costing and X-efficiency (49)
 - (iv) better supervision and use of pricing/costing studies (57+)
 - (v) summary of issues affecting the opportunity cost of capital (68)
 - (vi) survey of systems of public enterprise taxation (103+)
4. In addition, a number of recommendations have been made in the Annexes for sector-specific work. These include, with their text references:
 - (i) coal
 - price rationing for scarce domestic coal grades (para. 35)
 - incorporation of environmental costs
 - scope for increased taxation
 - (ii) education
 - widespread dissemination of existing research
 - empirical trial of economic costing (22)

- (iii) fertilizer
 - case studies of user charge effects (22)
 - cost/benefit of mothballing and restart operations
 - cost/benefit of buffer storage versus new plant (38)
 - develop workable system of border price linkage
 - economic effects of consumer price subsidies (39)
- (iv) health
 - risk sharing mechanisms (82)
 - guideline on economic costing (22)
- (v) highways
 - experience with and without earmarking (127)
 - estimation of deadweight losses from fuel taxes
- (vi) housing
 - clarify meaning of replicability (41)
 - example of disaggregated economic costing (41)
- (vii) irrigation
 - retrospective on volumetric metering (27, 71)
 - potential use of transferable water rights (27)
- (viii) oil/gas
 - transfer pricing for crude oil to domestic refineries
 - alternative oil company tax mechanisms (34)
 - guideline on natural gas pricing
- (ix) ports
 - empirical trial of economic costing
 - prototype terms of reference for costing studies (58)
 - scope for revenue generation
- (x) power
 - improving incentives for cost-minimization
 - improving the metering/billing/collection system
- (xi) railways
 - differential and peak pricing based on economic costs
 - guideline for marginal cost tariff design
- (xii) telecoms
 - increased use of congestion pricing
 - guideline for tariff analysis (57)
- (xiii) water
 - improve metering/billing/collection system (23)
 - reexamine cost recovery targets for rural water supply
 - research on the determinants of water demand

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ANNEX 1. Review of Pricing and Cost Recovery in SARs:

COAL SECTOR

A. THE POLICY

A.1. Interpretation and Calculation of Efficiency Prices

1. In the coal sector, the definition and calculation of efficiency prices are complicated by the heterogeneous nature of coal and the wide range of circumstances under which it is found and used. It may be scarce or abundant relative to domestic demand, exported or not depending on quality and accessibility, subject to depletion over a short or long period, and used to replace other fuels ranging from petroleum to imported coal to natural gas to nuclear or hydroelectric resources.

2. An algorithm has been developed to summarize the parameters involved in determining the efficiency price of coal in a particular case (Energy Paper 23). The first step is to assess the potential tradability of domestic coal by comparing the relative magnitudes of the export equivalent price netted back to the minehead, the import equivalent price similarly netted back and the long run marginal cost (LRMC) of production. If the LRMC is less than the export price, and if exports are not limited by market considerations, then the efficiency price for domestic coal is its export equivalent value. If the LRMC is greater than the import price, then the efficiency price is equal to the import price and only those mines which are competitive with imports will produce. Because of the high transport costs of coal, however, in the majority of cases the LRMC will lie between the export and import equivalent prices.

3. When the LRMC is between export and import prices, then the efficiency price will be equal to the LRMC plus a depletion premium. The size of that premium depends on the time path to economic depletion (i.e., the point at which coal starts to be replaced by an alternative fuel). If that point has already been reached, then the price of coal will equal that of the replacement fuel (probably imported coal). If economic depletion is far into the future, then the depletion premium will fade into insignificance and the efficiency price will be the LRMC. In intermediate cases, an approximation of the depletion premium must be made. Annexes to Energy Paper 23 discuss methods for calculating both the depletion premium and the LRMC.

4. An issue which has not been widely addressed in developing countries is the environmental damage that both coal production (surface mining) and consumption (burning unscrubbed coal near urban areas) can cause. This is, of course, difficult to quantify, but techniques of estimating marginal social opportunity costs in industrial countries and of applying them to price/tax formulation have been developed. Their applicability to certain developing countries where environmental concerns are important would be worth exploring.

A.2 Constraints to Implementing Efficiency Prices

5. There are few technical constraints to implementing efficiency prices in the sector. Production is always measured and charged by the ton. Quality considerations may sometimes present a problem, in that differential prices must be set to reflect demand as well as supply variations. For example, it will be inappropriate to base quality differentials only on calorific value if the demand for the higher grades of coal is much larger than that for lower grades. To clear the market for both grades, differentials may need to be much larger than would be implied by relative calorific values.

6. In some countries the monopolistic position of the railroads presents problems for efficiency coal pricing. Because rail transport of coal is generally so much cheaper than any alternative transport mode, railroads sometimes charge fees to coal producers that far exceed their incremental costs. This may drive up the coal price to consumers and stifle demand even where minemouth prices are appropriate. Where this occurs, it is generally better for the government to intervene directly with the railroads rather than to try to fix consumer coal prices.

A.3 Adjustments to Efficiency Prices

7. Despite the theoretical ease of calculating and implementing efficiency prices in the coal sector, actual prices tend to vary widely. In industrial countries and a few developing ones such as India, the major reason for divergence is concern about the social and employment implications of closing uneconomic pits. This has led to a system of financially determined prices for producers (i.e., cost-plus formula) which often amount to cross-subsidy within the sector from the lower cost to the higher cost mines. Coal prices to domestic consumers are sometimes subsidized, but they generally represent only a small part of total consumption. Few countries have tried to exploit the potential fiscal contribution that an efficient and internationally competitive coal sector could make.

B. THE PRACTICE

B.1. Project Sample

8. Our sample in the coal sector consisted of all five projects (in 4 countries: Morocco, China, India and Colombia) approved by the Bank during FY84 and FY85. One project was for coking coal production, one was for coal exploration, and the others were for steam coal production. Coverage of pricing issues was extensive, except in the exploration project for which only a President's Report was available.

B.2 Calculation and Discussion of Efficiency Prices

9. All of the projects with SARs contained a discussion of efficiency prices and detailed information on the actual price structure in the country. Across the sample, the average domestic price over all coal qualities was \$29 per ton, compared to an average LPMC of \$28 per ton. Import parity averaged \$64 per ton, while (quality adjusted) export parity was about \$20/ton in the one case where it was relevant.

10. In one country efficiency prices were represented by import parity, in one by export parity and in two by LPMC. On this basis, domestic prices ranged from 50% to 104% of their respective efficiency prices.

11. Questions of price structure (mostly reflecting quality differentials) were handled well in most of the reports. In addition, there was often comprehensive coverage of the institutional mechanism by which prices are set and changed. This is important when the Bank argues for a major revision in the basis for setting prices, as it has in several coal projects. Project covenants then need to address the system for price determination, rather than requiring specific changes in price levels or structures.

B.3 Discussion of Adjustments to Efficiency Prices

12. SARs in the coal sector contain full discussions of the financial strength of the companies and the impact of the recommended coal prices on financial viability. Distributional concerns are not a major factor in the sector, and little mention is made of fiscal considerations except insofar as they coincide with financial ones (i.e., to reduce the drain on government resources by raising prices above average costs). The sector in Colombia is an exception to this; there the government has levied a 5% tax on coal production valued at the minehead. Sixty percent of the proceeds of this tax are used to finance coal exploration, with the rest becoming general government revenues.

13. Producer prices receive the bulk of the emphasis in SARs. It is difficult to judge to what extent second best considerations have been reflected in the coal projects reviewed. In view of the wide scope for fuel substitution in the energy sector, it would be useful to see an analysis of the full chain of prices to the consumer and how end-user prices compare with those of substitute fuels.

B.4 Discussion of Cost Recovery Issues

14. Neither rates of return nor cash generation covenants were used in any of the projects reviewed. Debt coverage or debt/equity ratios were specified in four of the projects, and current ratios in three.

15. The financing plans for the Bank projects tell a mixed story. The table below summarizes the average percent accounted for by each source of funds. Internal cash generation averages almost 30% if China is excluded from the sample. However, government equity contributions are also high, averaging 26%. In such a small sample, averages can be misleading. In the

two large countries, India and China, it appears that the coal sector constitutes a net drain on government resources; while in the two smaller countries, Colombia and Morocco, the Bank projects were financed without any government loan or equity contribution.

	<u>Average Percent</u>	<u>Range</u>	<u>Comments</u>
Internal cash generation	24	0 - 52	0 in 1 case (China)
IBRD/IDA	39	35 - 48	
Other external loans	6	0 - 28	0 in 2 cases
Government loans	4	0 - 12	0 in 3 cases
Government equity	26	0 - 62	0 in 2 cases; 31-62 in -other 3 cases

B.5 Use of Pricing Covenants

16. Four of the five projects included specific price covenants. In both Morocco and China, agreement was reached on a new principle for price determination: an import parity link and LRMC, respectively. In India extensive discussions on coal pricing were held (partly in connection with a sector report), and agreement was reached to review prices periodically in order to ensure the financial viability of the producing enterprise and provide "adequate" resource mobilization in the sector.

C. THE MAJOR GAPS

17. Efficiency pricing is clearly relevant to the coal sector and is relatively straightforward to apply and implement. A guideline has been prepared by the Industry Department, and is being followed in the SARs. In the developing countries experience is mixed, but it appears that major changes in the way coal prices are set are being made in several countries. Compared to other sectors, the coal sector is particularly advanced in its handling of the institutional issues of price determination.

18. The areas where more analysis would be useful at the project level include:

- the relationship of consumer coal prices to those of competing energy products;
- the scope for using "rationing prices" (e.g., import parity) for some grades of coal that are in an excess demand situation in countries where coal production or transport capacity cannot be expanded in the short-run;

- the rationalization of producer prices in the two large coal-producing LDCs to promote efficient operations and inter-mine expansion plans;
- the incorporation of environmental costs in efficiency prices, where relevant; and
- the scope and methods for increasing the fiscal contribution of the coal sector, perhaps using the Colombia tax as a model.

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ANNEX 2: Review of Pricing and Cost Recovery in SARs:

EDUCATION SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing

1. There are no sector-specific guidelines within the Bank for pricing "outputs" in education projects. OMS 2.25 suggests the desirability of examining the scope for efficiency pricing of education services, and acknowledges the fact that neither marginal cost pricing nor benefit taxation has been traditionally used in the education sector. The practical limitations of these pricing approaches in this matter seem to rest on the contention that due to market failures (e.g., poor consumer knowledge of benefits; imperfect capital markets) and positive externalities in the consumption of education services, then pricing on the basis of the private demand would inadequately reflect the true social value of such services. Thus education is usually regarded as a public good, whose provision should be heavily subsidized by the government to induce wide participation.

2. More recent studies on the financing of the public education system particularly in the LDCs, however, have questioned the justification for subsidizing almost all types of education services and identified the prospects for improving cost recovery in the sector.¹ The main scope for improvement is the introduction of higher user charges at the post-primary education levels. Specifically, policy recommendations include the recovery of costs for higher education and reallocation of fiscal resources toward primary education; implementation of loan schemes for higher education and selective scholarships; and encouraging private provision of schooling. This set of policies would in the longrun help mitigate inefficiencies in the supply of services through increased competition in the sector, alleviate public budget problems, and improve the equitability of access to education.

A.2 Adjustments to Efficiency Prices

3. Efficiency pricing of education services has generally been dismissed on account of the issues cited above. As is true with health (see Annex 4), no specific range of cost recovery levels to be used as a rule of thumb exists for education projects, and Bank policies have focused mainly on the importance of taking into consideration equity and fiscal criteria. In practice, nonetheless, a tradeoff between these two criteria is unavoidable, and appears to have been tilted in favor of equity issues. It has been argued that levying charges on users could affect the extent to which the poor consume education services; thus the institution of low or zero price for education at large expense to governments. But recent studies on pricing/cost recovery in education have pointed out that low user

1/ See especially "Financing Education in Developing Countries: A Policy Paper" by E. Jimenez; and "Cost Recovery in Health and Education: Bank Policy and Operations" by N. Birdsall.

charges coupled with scarce fiscal budgets eventually result in poor quality services and inequitable access to education. Moving toward lower subsidies, with governments exercising major efforts in the support of rural primary schools--or in the design of selective loan/scholarship programs--that largely serve the poor, is therefore becoming an increasingly popular view.

B. THE PRACTICE

B.1 Project Sample

4. Twenty projects (in 12 countries: Sudan, Jordan, Oman, PDRY, Bangladesh, Nepal, Papua New Guinea, Indonesia, China, Peru, Brazil and Haiti) were selected for this review. The sample accounted for 50 percent of the total number of education projects approved by the Bank during FY84 and FY85.

B.2 Discussion of Cost Recovery Issues

5. Government recurrent expenditures on education ranged from US\$28,000 for Djibouti in 1983/84 to \$159 million for Oman in 1982, with a sample mean of a little over \$41 million. Expressed as a proportion of total government recurrent expenditures, the education bill amounted from 9 to 23 percent in the African countries (or averaged about 17 percent); 7-19 percent (11 percent) in the other countries reviewed. Despite the notable differences among countries in the size of education expenditures, budgetary allocations generally declined with increases in education levels. Thus primary education usually received the largest portion of the budget, followed by secondary education, and then by universities and colleges as shown below:

<u>LEVEL OF EDUCATION</u>	<u>AVERAGE</u> (% of Education Expenditures)	<u>RANGE</u>	<u>COMMENTS</u>
Primary	47.5	19-71	Less than 40% in 5 cases
Secondary	25.9	7-44	
Higher Education	17.2	0-36	0 in 2 cases
Teachers' Training & Other	9.4	0-25	0 in 9 cases

Nevertheless, annual expenditures per student rose sharply from primary to higher education in all the countries with relevant data, due mainly to the fact that higher education entailed much smaller student enrollments and more expensive type of services required. Thus per-student subsidy levels are consistently higher for higher levels of education.

6. Information on cost recovery through user charges was scanty, and was made available only in 10 out of the 20 SARs used for this review. Recovery of costs was nil in Djibouti and Sudan. Slightly over 3 percent of the recurrent education expenditures in Togo was recouped through parents' contributions for textbooks and participation by communities in the maintenance of school facilities; about 20 percent in Lesotho through student fees. Student fees levied at selected levels of education enabled a partial recovery of 13 percent of the expenditures for post-primary

education in Indonesia, and 27 percent of those for lower secondary schools in Papua New Guinea. Primary education by tradition is free in Bangladesh, Peru and Brazil so recovery of costs should be very small or zero at this level; however, as was true with Indonesia and Papua New Guinea, no information was reported for these countries on the proportion of the entire recurrent expenses for education that was recouped via user charges. Revenues from user charges as a percent of expenditures by education levels are summarized below based on the foregoing countries with available data:

<u>LEVEL OF EDUCATION</u>	<u>RANGE</u> (%)	<u>NO. REPORTING</u>
Primary	0	6
Secondary & Higher Education	0 - 27	4; 0 in 2 cases
Overall	0 - 20	4; 0 in 2 cases

7. Non-user fees were important to the financing of public education in a few of the sample countries. In Brazil, fiscal resources spent for education were raised partly through the so-called "education salary tax"; that is, a 2.5 percent tax applied on the wage bill of firms employing more than 100 workers. In Togo, Mali and Sudan foreign aid became an important source of financing recurrent expenses, versus the usual practice of using such funds largely for investment expenditures. Salaries of expatriate teachers and/or fellowships granted to students at the post-primary levels in Togo and Mali were financed partly through foreign aid, while in Sudan grants from abroad augmented fiscal resources spent for universities and technical institutes.

8. Pricing policies for public education vary markedly in the sample countries. Policies whereby tuition fees are charged among students at the primary, secondary and higher education were observed in Lesotho and Haiti. Djibouti and Sudan by contrast have free tuition at all levels of education. In between these two extremes were the cases of Bangladesh, Indonesia, Peru and Papua New Guinea with practices of free tuition for primary education only; and Papua New Guinea where fees are levied only among students in the primary and lower secondary schools. Books are supplied free of charge to all students in Djibouti and Sudan, and to all primary pupils in Lesotho, Bangladesh and Nepal. Such practices do not exist in Burkina, Togo, Peru, Brazil and Haiti where all students have to purchase their own textbooks. In Sudan and Papua New Guinea free boarding is provided among students in upper secondary schools and universities, on top of free tuition and books. Cash allowances are paid to students in Sudan. Provisions for free boarding are also found in Oman on account of inadequate transportation in that country. The distribution of the sample according to the above-mentioned policies is as follows:

<u>SERVICES</u>	<u>Free at All Levels</u>	<u>Free at Selected Levels Only</u>	<u>Not Free at All Levels</u>	<u>Not Reporting</u>
	------(No. of Cases)-----			
Tuition	2	6	2	10
Books	2	3	5	10
Boarding	0	3	4	13
			(no boarding provision)	

9. Scarcity of fiscal resources has led to increased concerns to improve both cost recovery and cost-efficiency in the education sector. Governments have indicated the need to increase student-teacher ratios in public schools (found in 7 cases) to reduce recurrent costs. Increasing student fees or soliciting financial contributions from parents for textbooks has been recorded in 6 cases. Two cases encouraged community participation in the maintenance of schools. Drastic curtailment of subsidies to religious private institutions, reduction in budgetary allocations for scholarships, and/or gradual elimination of cash allowances for students are important cost-saving devices being considered for implementation in 3 countries. In Indonesia where the government has been reluctant to increase tuition fees especially among university students, attention is now paid to the feasibility of expanding the student loan program. Such an expansion may facilitate efforts to raise fees in the future; consequently, improving the level of cost recovery at higher education while granting loans to needy students. The Indonesian Government is also studying the possibilities of assisting the private education system, which operates on a full cost recovery basis, in order to accelerate its growth and ultimately relieve the government of its heavy recurrent budgetary burden.

B.3 Use of Pricing/Cost Recovery Covenants

10. Except for one case, no covenants for cost recovery were found in the 20 education projects used for this review. It is only in the case of Bangladesh wherein an agreement was reached with direct implications for cost recovery; specifically, the conduct of studies which relate to the financing and pricing aspects of a proposed textbook program. As suggested in the SARs the Bank is very supportive of the governments' plans to improve cost recovery and cost-efficiency in the provision of education services. However, pricing/cost recovery covenants appear to be very rarely used.

B.4. Sources of Project Financing

11. The financing plans for the education projects reviewed are summarized below. On average, IBRD/IDA loans and contributions from governments financed 94 percent of project costs.

<u>SOURCE</u>	<u>AVERAGE</u> (% of Project Costs)	<u>RANGE</u>	<u>COMMENTS</u>
IBRD/IDA Loans	60.2	12 - 93	93% in Burkina
Other External Loans	5.9	0 - 68	0 in 14 cases
Government Budgetary Contributions	33.9	7 - 88	88% in China

C. THE MAJOR GAPS

12. Efficiency pricing per se is not particularly relevant in the education sector due to the importance of externalities, poor capital markets and inadequate consumer knowledge. However, a strong case for increased attention to cost recovery can be made on the grounds of equity and better resource allocation within the sector, as well as the obvious fiscal benefits. The Bank has undertaken and supported a great deal of research on the financing of education. Its results clearly indicate that major benefits can be achieved by a combination of user charges for higher education and wider access to loan/scholarship programs based on both ability and financial need. A guideline summarizing the research and providing practical policy options is available in draft from ETD.

13. Following publication of that guideline, the main gap will be between the policy and its application in Bank projects (including covenants) and in the developing countries. There are indications that some countries are already starting to implement higher cost-recovery schemes for education. Plans vary by country, and it is interesting that in only one case (Indonesia) is there yet a recognition of the linkage between an expanded student loan program and the acceptance of future tuition increases. The role of the Bank should be (i) to disseminate the results of its research showing the benefits of greater self-financing to those governments which are not yet persuaded; and (ii) for those governments which are already moving in that direction, to assist in designing pricing/cost recovery instruments that are attuned to the particular circumstances of each country.

14. In addition to cost recovery issues, economic costing can be an important tool for optimizing project design and checking sectoral priorities. Total costs per student per year are not routinely reported in SARs, nor are such cost comparisons between types of educational expenditure. A draft note from ETD suggesting a format for calculating economic costs is under review.

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ANNEX 3. Review of Pricing and Cost Recovery in SARs:

FERTILIZER SECTOR

A. THE POLICY

A.1 Interpretation and Calculation of Efficiency Prices

1. Fertilizer is a commodity that is widely traded internationally. Its efficiency price is thus clearly represented by the prevailing border price. Nonetheless, there are major difficulties in applying this border price directly as a guide for domestic prices because of the high degree of volatility it has exhibited in recent years.

2. Fertilizer price volatility is partly the result of technical and institutional imperfections in the international marketplace. On the technical side, economies of scale result in many plants having high fixed costs and relatively low marginal costs. This provides incentive to cut prices sharply on the export market in order to keep capacity utilization high when there is excess international supply. Conversely, when there is excess demand, long lead times in the construction of new plant mean that prices move sharply higher and can be sustained far above long-run marginal costs for extended periods. On the institutional side, as in the energy market, there has been collusion among the major producers of fertilizers in the past. In addition, much of the traded fertilizer is in the hands of a few large buyers who attempt to stockpile supplies during periods of low prices and sell them when prices are at their seasonal peaks (see Reference 1).

3. To protect themselves from the extremes of international prices, and to ensure supply availability during the critical planting period, most developing countries have chosen to shield domestic producers from international prices through some form of administered ex-factory price. In addition, farmgate fertilizer prices are subsidized in many developing countries as part of the overall agricultural pricing policy. The fiscal impact of this divergence between producer and consumer prices has become a major macroeconomic problem in a number of countries which, in turn, is leading to a reexamination of fertilizer pricing policies.

A.2 Constraints to Implementing Efficiency Prices

4. There are few implementation constraints to efficiency pricing in the technical sense. Production is always "metered" and charged for on a weight basis. Quality can be easily measured, and international spot price information is readily available. If imports were unrestricted and consumers could choose their source of supply, no administrative system for prices would be necessary. Where administered prices are used (i.e., in nearly all developing countries), the main costs are involved in setting the prices based on whatever system is used rather than in charging and collecting them. Fertilizer plants are large and therefore few in number to monitor.

5. There are major implementation problems with some of the existing systems of fertilizer prices -- but these are in large part due to their lack of reference to efficiency prices and to their role in furthering non-efficiency objectives. Implementation costs have proved to be substantial in some of the cost-plus systems of administered prices.

A.3 Adjustments to Efficiency Prices

6. Reference 1 lists five objectives for producer pricing of fertilizer:

- X-efficiency and rationalization of firms;
- Allocative efficiency;
- Financial health of enterprises and management evaluation;
- Fiscal impact; and
- Ease and cost of administration.

All but the third would be well satisfied by allowing prices to follow border values and mothballing domestic plants during periods when imports are cheaper than domestic production. (This is roughly the approach in Japan and the US.) However, only one of the ten developing countries surveyed in Reference 1 attempted a link to border prices, and even in that case the linkage has been loosened to permit continued operation of domestic plant during periods of cheap imports. Thus it appears that the financial objective has been paramount in developing countries.

7. Strategic arguments have been presented in support of the financial objective. Because fertilizer is a key agricultural input, and because its application is time-sensitive, countries have claimed that they must have a domestic production capability to insure against international price or supply disruptions. However, these arguments would equally support domestic storage arrangements which, in many cases, would be far cheaper than expanding domestic production. (Even with domestic production, storage facilities must be built to accommodate demand seasonality.)

8. The arguments for non-efficiency objectives in setting fertilizer producer prices do not seem compelling enough to justify the widespread divergence from efficiency pricing that is observed in developing countries. The high administrative costs of other pricing systems, their demonstrated negative effects on X-efficiency and the significant fiscal burdens they impose during periods of low international prices indicate that non-price instruments should be explored for serving non-efficiency objectives. For example, it would be useful to assess the cost-effectiveness of mothballing and restart operations and of building and maintaining domestic buffer stockpiles.

9. There has been a tendency in the Bank to separate the issues affecting the producer and consumer prices of fertilizers. Income distributional concerns and second-best issues are clearly important for the latter. Without an effective agricultural credit market, it may be necessary to subsidize inputs such as fertilizer for small farmers. In addition, in cases where farmgate prices for agriculture output are held below efficiency levels, then input may also need to be subsidized.

10. There is growing concern, however, over the widespread practice of subsidizing consumer prices of fertilizer. First, it is impossible to truly delink producer and consumer prices because the difference between the two has direct fiscal implications. In addition, it is not clear that fertilizer subsidies are efficient from the overall perspective of agricultural policy. In many countries, fertilizer use is unbalanced and inefficient due, in part, to its long history of low prices to farmers. There may be better methods to improve agricultural productivity; e.g., through a package of improved farming practices rather than through large-scale subsidies on one input -- or random subsidies on several. Further, non-price factors such as the transportation and distribution system for getting fertilizer to farmers often play an important role in its efficient application and use. Improvements in the distribution infrastructure, perhaps financed by an increase in fertilizer prices, could bring major gains in agricultural production. Even on the income distributional side, it is not clear that fertilizer subsidies benefit primarily poor farmers. They are cumbersome to target, and generally apply equally to all users, with proportionately more of the subsidy accruing to the larger ones.

B. THE PRACTICE

B.1 Project Sample

11. Our sample consisted of all five fertilizer projects (in India, Yugoslavia, China, Burkina and Nigeria) approved by the Bank during FY84 and FY85. Three were for new production capacity and two were for rehabilitation or energy savings at existing plants. All contained good coverage of the fertilizer pricing systems of the countries, at both producer and consumer levels.

B.2 Calculation and Discussion of Efficiency Prices

12. All SARs contained information on current border prices, which were compared with some or all of domestic production costs, ex-factory prices and farmgate prices. For the three cases reporting production costs, they were 97% and 88% of cif prices for urea, and 150% and 158% of cif ammonia or compound fertilizer prices. All SARs took the view that current cif prices are below the long-run equilibrium levels that should be considered when making long duration investments.

13. Ex-factory prices were higher than production costs in four of the five cases, where they were set on cost-plus basis. In the fifth case, Yugoslavia, ex-factory prices are set based on a number of factors including production costs, international prices and domestic prices in neighboring countries. This has resulted in financial losses for the fertilizer industry, but a 50% increase in ex-factory prices was planned to remedy this.

14. Most SARs provided a thorough analysis of the problems of the existing fertilizer pricing system -- and all five cases had major problems on efficiency grounds. The general solutions proposed were (i) to ensure the financial viability of fertilizer production by adhering to certain

financial covenants; and (ii) to raise consumer prices by certain amounts in order to decrease the overall fertilizer subsidy. No covenants proposed a link with international prices.

B.3 Discussion of Adjustments to Efficiency Prices

15. At the producer price level there is only one relevant non-efficiency objective: financial viability. However, this has a somewhat broader interpretation in the fertilizer sector than it does in others. The argument is made that current international prices do not reflect long-run equilibrium for the industry. This implies that existing firms would alternate between periods of large profits and periods of losses or possibly even closure in favor of imports. In order to ensure continued financial viability for the industry most countries have developed cost-plus pricing systems for fertilizer at the factory gate.

16. The problems of cost-plus pricing are well recognized: a lack of incentive to minimize costs, a tendency to build "gold plated" plants, the difficulty of measuring management performance, etc. Examples of many of these problems are cited in the SARs reviewed. However, the general tendency has been to tinker with the cost-plus systems (e.g., to base prices on normative rather than actual costs for each plant, to target capacity utilization rates with bonuses for exceeding them, etc.) rather than to devise a system based on estimates of long-run efficiency prices or to compare the inefficiencies and administrative costs of the existing system with the costs of closing and reopening plant as the international market dictates.

17. At the consumer price level, both income distributional and fiscal objectives are important. In all five countries farmgate prices were below border prices, and in three countries they were below ex-factory prices. All three of the latter had major fiscal problems created by fertilizer subsidies, and two mentioned allocative inefficiencies resulting from inappropriate price differentials between different types of fertilizer. Two projects included covenants requiring increases in consumer prices in order to reduce fertilizer subsidies.

B.4 Discussion of Cost Recovery Issues

18. Because of the cost-plus systems for ex-factory fertilizer prices, cost recovery at the plant level was good in four of the five cases reviewed. Three of the SARs did not include financial covenants. The other two included covenants on debt equity (60:40 in both cases), current ratio (1.2 and 1.4) and debt coverage (1.2 and 1.3).

19. Project financing plans were quite diverse, as shown in the table below:

	<u>Average Percent</u>	<u>Range</u>	<u>Comments</u>
Internal cash generation	10	0 - 35	0 in 3 cases
IBRD/IDA	54	30 - 100	
Other loans	13	0 - 37	0 in 2 cases
Government loans	1	0 - 5	0 in 4 cases
Government equity	21	0 - 70	0 in 2 cases

Internal cash generation is relatively low, although this is presumably a function of the type of cost-plus formula used for pricing. The usefulness of financial covenants and traditional indicators such as internal cash generation is clearly reduced under such a pricing regime.

C. THE MAJOR GAPS

20. Efficiency pricing is clearly relevant to the fertilizer sector; border prices are easily observed and the metering/charging/collection process is straightforward compared with many other sectors. Yet no country in our small sample, and only one of the 10 discussed in Reference 1, attempted an ex-factory system based on efficiency prices. The general result is that a type of financial viability has been achieved in most cases, but at the cost of production inefficiencies, cumbersome administrative systems and fiscal drains during periods of low import prices. In addition, subsidized consumer prices are widespread and have resulted in serious fiscal problems as well as inefficient use by farmers. New approaches are needed for fertilizer pricing at both producer and consumer levels.

21. The recent fertilizer pricing seminar held by the Bank and reported in Reference 1 provides a good survey of the theoretical issues involved and of the existing pricing systems in a number of developing countries. It also contains a list of recommendations for further research into certain areas. In our view, however, these do not go far enough. What is needed is (i) a coordinated program of research/policy work aimed at developing a workable system of border price linkage for fertilizer producer prices coupled with (ii) an economic assessment of the cost-effectiveness of fertilizer subsidies at the farmgate level. (The latter is mentioned in Reference 1 but not included in the recommendations presumably because it does not relate to producer prices.)

22. Part (i) would include an economic analysis of the feasibility of mothballing and reopening plants to take advantage of market conditions and of building additional storage facilities to provide strategic back-up. It would also include a review of international prices and their historical

volatility. (Aside from the short and extreme peak at the end of 1974 -- probably caused more by factors in the energy and grain markets than those in the fertilizer industry -- it is not clear from the graphs that fertilizer export prices have exhibited particular volatility during the last decade.)

23. Part (ii) should focus on the effects of consumer price subsidies within the context of overall agricultural policy. If there are more cost-effective ways to achieve the same ends (including distributional and fiscal, as well as efficiency, ones), then these should be identified so that project staff in the fertilizer sector can propose appropriate alternatives. The separation of producer from consumer prices, while elegant in theory, in practice serves to sidestep the fiscal effects of fertilizer pricing policies, which have reached critical proportions in a number of countries.

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ANNEX 4. Review of Pricing and Cost Recovery in SARS:

HEALTH SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing

1. OMS 2.25 suggests a limited scope for applying marginal cost pricing principles to public health services. Both because of the difficulty of measuring true economic costs and because of distributional objectives, in practice health care has generally been provided free and financed out of general taxation.

2. Very recently, however, arguments have been set forth for a dramatic change in health financing policies by borrowing countries, with the emphasis on users bearing a larger share of health care costs.¹ The proposed pricing reforms are tailored within the context of different types of health services, and are summarized as follows: preventive services which are not patient-related (e.g., disease control programs, sanitation, education on health and hygiene) should be provided at zero, or even negative, cost to users since these services have strong "public good" attributes. Patient-related preventive services (e.g., immunization, maternal and child health care, visits by village health promoters), on the other hand, should not be provided free of charge. User charges for these services are feasible; but they should be below marginal cost because of externalities and users' lack of information. (Immunization is a good example.) These issues justify the provision of such services at subsidized costs to users in order to encourage demand.

3. For curative care (e.g., sale of medicine, outpatient and inpatient care), efficiency pricing should be applied as a benchmark, and any departures from it should be explicitly justified. Curative services typically account for at least 70 percent of a country's annual health expenditures, and the underlying issues on externalities and users' knowledge are less vague on this side. Increased recovery of costs from users can be implemented in combination with risk-sharing arrangements such as insurance schemes; increased privatization in the supply and finance of certain health services; and structuring public subsidies to the health sector to strengthen incentives for cost control.

1/ This section draws heavily from SWP No. 721, Paying for Health Services in Developing Countries: An Overview, by David de Ferranti.

A.2 Adjustments to Efficiency Prices

4. Both fiscal and equity objectives are important in the health sector. Bank policies have defined no specific range of cost recovery levels to be used as a rule of thumb for health projects, but pointed out the suitability of a pricing approach which weighs the social value of additional public revenues against additional income to project beneficiaries. Health financing practices in the LDCs which permit insignificant participation by users have led to chronic funding problems, poor quality services, and failure in implementing health improvement programs. While existing practices have been based partly on equity considerations, paradoxically they have contributed to inequities in the distribution of health resources. There is a clear need to reorient health financing policies to accommodate some reasonable balance between the fiscal and equity impacts of health projects.

B. THE PRACTICE

B.1 Project Sample

5. This review is based on 11 projects (in Burkina, Nigeria, Lesotho, Mali, Botswana, Jordan, Morocco, Brazil, Colombia, Indonesia and China). The sample represents slightly over 61 percent of the total number of health projects approved by the Bank during FY84 and FY85.

B.2 Discussion of Cost Recovery Issues

6. The SARs revealed no detailed information on pricing practices in health care, according to the different types of services discussed above. There were no references to efficiency pricing or the extent to which user fees were related to the economic cost of providing curative care. Nonetheless, the SARs provided an interesting description of the expenditures and financing of aggregate public sector health services in the sample countries. Total public sector expenditures for health ranged from US\$7.2 million in Lesotho in 1983 to \$7,560 million in China in 1981. The sample mean was nearly \$761 million (about \$81 million if China were excluded). Recurrent expenditures made up from 31 to 95 percent of total expenses, and averaged 39 percent.

7. Budgetary allocations were the primary source of health finance in six cases: Nigeria, Lesotho, Botswana, Jordan, Morocco and Indonesia, accounting for 81 to 100 percent of total expenditures. The relatively insignificant recovery of costs from users in these countries (ranging from almost 0 to 19 percent) was due to an explicit policy that health services should be provided at minimal expense to citizens. This was augmented by a failure to raise fees in line with inflation, inefficient collection, and poor quality of service which in turn affected people's willingness to pay. The reverse, however, was observed in Mali, Brazil and China where expenditures for health were largely financed via user charges, with respective levels of 54, 85 and 70 percent of total expenditures. Revenues from user fees were principally from the sales of drugs in Mali; insurance contributions in Brazil; and a combination of the two in China.

8. No precise estimate of health expenditures was reported for Colombia, but in 1981 the provision of public and private health services represented about 5 percent of the country's GDP. Health expenditures were then covered by the fiscal budget (33 percent) and user charges (40 percent). Other sources of finance included returns on investments, credit, and leasing of property especially by private health institutions. Only about one-sixth of the user fees were collected in the public sector. Governmental budgetary allocations and foreign aid were almost equally important sources for funding health expenditures in Burkina.

9. Taking the sample as a whole, contributions from the governments were the principal source of funds. User fees played a comparatively minor role in financing public health services, as demonstrated in the table below:

<u>Source of Funds</u>	<u>Average</u> (% of Total Expenditures)	<u>Range</u>	<u>Comments</u>
Government	62.7	15 - 100	100% in 2 cases
User Fees	28.4	0 - 85	0 in 2 cases
Foreign Aid & Other	8.9	0 - 31	0 in 6 cases

10. The exceptionally high cost recovery levels in Brazil and China deserve a further focus. The Brazilian experience could be attributed almost solely to the performance of the National Social Security Institute for Medical Assistance (INAMPS). INAMPS was formed by a merger of several social security programs for various groups of workers under the supervision of the Ministry of Social Insurance and Assistance. It is financed by a payroll tax for wage earners and equivalent taxes for the self-employed. Its subscribers include about 90 percent of Brazil's population. The impressive recovery of costs from users in China is also associated with the manner in which the health system is structured. The users are actively involved in the management of health services. Health services at the brigade level are mostly financed by cooperative medical care insurance schemes, which are in turn funded jointly by annual prepayments of individual members and by annual appropriations from the brigade's welfare funds. A certain proportion of the brigade's collective income, largely from sales of agricultural produce, is set aside as "welfare funds" to be used for educational, health, cultural and other public functions. At the commune level, health centers are mostly established by the communes themselves, and operations are financed through user fees and governmental subsidies. It is the "collectivity" aspect of health care provision and finance that allows members to closely monitor the performance and viability of the system.

11. The expenditures and financing of private sector health services were available only in 6 cases. Private sector spending for health care ranged from negligible levels (e.g., China and Burkina) to nearly US\$80 million per year (e.g., Indonesia). On average, about 40 percent of total expenditures (slightly over 59 percent excluding China and Burkina) were recovered through user fees. A comparison of the contribution of user charges in financing health services by sector, based on the six cases, is shown below:

User Fees as % of Total Expenditures

<u>SECTOR</u>	<u>AVERAGE</u>	<u>RANGE</u>
Private	39.5	0-80
Public	17.4	0-70
Overall	35.7	20-70

12. The private health sector in the African countries is comprised mainly of missionary societies and practitioners of traditional medicine. Apart from being an important provider of basic health services, the private sector participates in the distribution of drugs. By contrast, in such countries as Brazil, Jordan, Morocco, Colombia and Indonesia, the private health sector is made up largely of modern profit-seeking enterprises which are concentrated in the cities or main urban areas. These enterprises are the major suppliers of health services in some of these countries--accounting for about 59 percent of total health care in Indonesia; and around one-half of health facilities and 85 percent of specialty care units in Brazil. In Morocco and Colombia the private sector has a more limited role in health care provision. Of the 77 percent of the Colombian population having an access to health services, only about 10 percent use private health facilities. Private health services in Morocco are offered almost exclusively to high-income groups; nonetheless, nearly 95 percent of drugs used in the country are distributed via this sector. For the rest of the sample, the private sector is virtually non-existent. Private practice of medicine in China has been exceptionally minimal, and accounts for less than 3 percent of total health services. Private health institutions are not allowed to operate under the current laws in Burkina.

B.3 Use of Pricing/Cost Recovery Covenants

13. Agreements with implications for cost recovery in the provision of public sector health services were reached only in five projects. They include revision of the existing fee structure at government facilities (found in one case); evaluation of the possibility of establishing a national health insurance scheme (1); testing a drug cost recovery plan (1); and the conduct of studies dealing with health financing issues (4). Such studies were aimed to assess the efficiency/equity aspects of alternative financing schemes (e.g., budgetary allocations and user fees) or broadly to determine the feasibility of increased cost recovery in the health system. None of these covenants elaborated on developing pricing policies with distinctions based on the types of health services as discussed in para. 1. There were no covenants for cost recovery in six projects. In one of these cases (Botswana), however, the government had indicated interest in improving cost recovery in public health services possibly through increases in fees for private patients, development of a national health insurance plan for government employees, and formulation of a fee schedule for outpatient care.

B.4 Sources of Project Financing

14. Project funds came largely from IBRD/IDA loans and government contributions. Very little reliance was placed on fees from users as shown below:

<u>SOURCES</u>	<u>AVERAGE</u> (% of Project Cost)	<u>RANGE</u>	<u>COMMENTS</u>
IBRD/IDA	56.9	26-95	95% in Burkina
Other External Loans	7.3	0-36	0 in 8 cases
Government Budgetary Contributions	34.6	5-74	74% in China
User Fees & Other	1.2	0-13	0 in 10 cases

C. THE MAJOR GAPS

15. Considerable research has been done in the Bank with regard to pricing of health services. Of foremost importance are the studies by de Ferranti; Jimenez; and Birdsall which emphasized a methodology for selective pricing of public sector health services and identified certain complementary measures (e.g., risk-sharing arrangements) that can assist in institutionalizing recommended pricing reforms.

16. While efficiency pricing par se is generally infeasible in health because of the problems of measuring externalities; as in the education sector, there are important X-efficiency, fiscal, and even distributional benefits to be obtained through a systematic analysis of marginal costs and selective application of user fees. Examples exist in the private health sector in some developing countries and in the public sector in China. A number of the projects reviewed contain funds for costing or pricing studies, through which a good empirical basis should be gained. Recent sector work in countries such as Zambia, Uganda and Zimbabwe has focused on cost recovery issues. However, our SAR review shows that disaggregated cost analysis is still the exception rather than the rule in Bank projects.

17. A useful next step would be to combine the results of recent research with the country analyses to produce a practical guideline on how to categorize marginal costs and how such costs compare across countries. The X-efficiency, fiscal and distributional consequences of various levels and structures of user charges should be explored at an empirical level. The role and cost of the private sector in providing certain kinds of services should be compared across countries. Finally, ongoing health care costing studies should be closely monitored and used to produce practical recommendations for user charges that can be incorporated into future Bank operations in those countries.

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ANNEX 5. Review of Pricing and Cost Recovery in SARs:

HIGHWAYS SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing

1. Efficiency pricing of road services requires that user charges are set at a level that would reflect the opportunity costs of providing the service.¹ These costs consist of the variable maintenance costs and congestion costs (those that arise when an additional vehicle increases the costs of travel for all other vehicles). A congestion levy is appropriate to apply only on those roads (and, strictly speaking, during those hours) when congestion exists; it would be inefficient to charge a price higher than the variable maintenance costs in the absence of congestion as this would result in roads being underutilized.

A.2 Constraints to Implementing Efficiency Prices

2. Maintenance costs vary according to types of road (e.g., paved versus earth or gravel roads) and vehicle weights; thus ideally road user charges should adequately reflect the differences in maintenance costs due to these factors. "Ideal" prices are, however, difficult and costly to administer as they would require information on the damage caused by different types of vehicles to paved and unpaved roads. In addition, studies have shown that the use of tolls or other means to directly relate road use to charges is rarely cost-effective. Thus, in practice indirect assessments such as fuel taxes are often used even though these do not clearly reflect different costs imposed by users. This issue is often handled through differing tax rates on diesel and gasoline. Charging for traffic congestion is generally done via differential annual license duties, purchase taxes and/or import duties on vehicles. These levies are differentiated according to categories of vehicles which are used almost exclusively in the urban areas; for example, higher license fees are charged to vehicle owners living in the cities than to those in rural areas. In a study conducted by Churchill in Central America, it was concluded that the fuel tax would be the appropriate means of approximating the variable maintenance costs in rural areas and license duties would be the primary means of reflecting the congestion costs in urban areas.

A.3 Adjustments to Efficiency Prices

3. Efficiency pricing as defined above can ensure an optimum consumption of road services by users, but may fall short of attaining fiscal objectives. Most governments in LDCs have inadequate fiscal resources for development; consequently, it is often desirable to set prices above efficiency levels. Achieving a balanced road budget is a modest

1/ This section draws largely from Road User Charges in Central America by A. Churchill, and The Economics of Road User Charges by A. Walters.

fiscal objective, but one that would necessitate the recovery of all costs incurred in the construction, expansion and maintenance of roads. Setting a price for road services equal to the variable maintenance costs and congestion costs may not be compatible with such a fiscal objective. The Bank has no guidelines specific to road transport which define the appropriate level of cost recovery from users. However, fiscal issues have been accorded much importance in identifying criteria that would justify a departure from efficiency pricing. Relatively little emphasis seems to be placed on equity issues in setting road user fees.

B. THE PRACTICE

B.1 Project Sample

4. This review is based on a sample of 22 projects. Our sample accounts for about 67 percent of the total number of road transport projects approved by the Bank during FY84 and FY85.

B.2 Discussion of Cost Recovery Issues

5. Although efficiency prices are rarely explicitly calculated in the SARs, current pricing practices for road services in the sample countries are adequately discussed, including their efficiency and fiscal implications. Annual expenditures on roads and revenues collected through user charges are summarized below by country group:

COUNTRY	TOTAL EXPENDITURES		MAINTENANCE EXPENDITURES		TOTAL REVENUES	
	AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE
	(in US\$ million)		----- (As Percent of Total Expenditures) -----			
African	21.0	10-64	29.3	10-98	89.8	18-262
South & East Asian	384.2	15-714	24.0	3-70	75.0	18-183
EMENA	181.1	35-354	31.0	25-42	141.6	101-183
Latin American	731.2	454-1,008	33.0	30-36	54.5	30-79
Whole Sample	<u>203.7</u>	<u>10-1,008</u>	<u>28.6</u>	<u>3-98</u>	<u>83.2</u>	<u>18-262</u>

6. Total road expenditures include all costs incurred with regard to investments for new construction or extension of the road system, periodic maintenance of existing infrastructure, and routine maintenance operations. Given the diverse nature of the sample countries, total annual expenditures on roads varied markedly from an average of US\$21 million in the African countries reviewed to as high as \$731 million in the Latin American countries. The average composition of expenditures nevertheless is very similar across country groups, with outlays for road maintenance accounting for no more than one-third of total expenses. Cost recovery levels, i.e., total revenues expressed as a fraction of total road expenditures, ranged from an average of about 55 percent in the Latin American countries to 142 percent in the EMENA group. Thus revenues from road user charges greatly exceeded expenditures on road maintenance in all groups on average. This suggests that if traffic congestion is generally an insignificant problem, then road services on the aggregate are overpriced. Moreover, net fiscal contributions of the road transport sector should be significant for many countries. Over the sample, cost recovery levels varied sharply from 16 to 262 percent; the sample mean was 83 percent. Road user revenues were more than sufficient to cover both annual construction and maintenance costs in eight countries.

7. Road revenues are categorized into fuel taxes; import duties on vehicle, spare parts and tires; vehicle registration and licensing fees; and other (e.g., tolls, border transit vehicle tax, and road transport tax). The road transport tax as defined in the case of Brazil is a levy on inter-state and inter-municipal freight and passenger movements; the border transit vehicle tax is a system component unique to Burundi. Of the various types of road user charges, fuel taxes and import duties on vehicles are the most important sources of road user revenues as described below:

<u>USER CHARGES</u>	<u>AVERAGE</u>	<u>RANGE</u>	<u>COMMENTS</u>
	(As Percent of Total Road Revenues)		
Fuel taxes	58.7	16 - 93	-
Import duties on vehicles, spare parts, etc.	28.9	0 - 75	0 in 4 cases
Registration and licensing fees	10.4	0 - 44	0 in 1 case
Other	2.0	0 - 15	0 in 8 cases

Thus nearly 59 and 29 percent of total revenues were attributed to collections via fuel taxes and duties on imported vehicles, respectively; leaving only around 12 percent of revenues accountable to vehicle registration, licensing fees and other road-related levies. These estimates are based only on 14 cases, with 8 countries not reporting a breakdown of revenues by type of user charges.

8. Pricing and taxation of fuel was reported in only 15 countries. Retail prices of gasoline and diesel oil were mostly set well above c.i.f. prices. Exceptions are Ghana where fuel prices were only slightly higher than c.i.f. prices; Sudan and Yemen Arab Republic where diesel was locally

priced below import costs. Taxes on fuels varied sharply across countries: gasoline taxes ranged from 2 to 56 percent of its retail price, and averaged 33 percent over the 15 countries; taxes on diesel oil ranged from 0 to 55 percent of retail price (zero in one case), and averaged 22 percent. Gasoline-diesel tax differentials of 19 to 46 percent are found in 4 countries; 0 to 2 percent in 6 cases; and an average of 7 percent in the rest of the sample.

9. Three important points can be deduced from the fuel price and tax data. First, fuel taxes expressed as a proportion of their corresponding retail prices varied markedly among countries. Since these taxes were a major component of road user revenues, the observed differences in tax rates should account in part for the diverse cost recovery levels seen earlier across sample cases. Second, there is no doubt that in those countries with large tax differentials (e.g., Korea, Senegal, Uganda and YAR), gasoline taxation was being used primarily to generate fiscal resources. Third, a cross-subsidization from gasoline to diesel users was evident in several countries reviewed, varying only in degree as suggested by the differences in the gasoline-diesel tax margins.

10. Most road user charge systems have fallen short of the objective of relating levies to the costs that different types of vehicles are imposing upon the road network. Heavy vehicles in particular are reportedly not taxed appropriately to cover the damage they inflict on the roads. Such a shortcoming is manifested through taxation policies on different types of fuel, import duties and licensing fees, and regulations concerning vehicle dimensions and axle-load limits. Relatively lower taxation of diesel oil, which results in heavy vehicles making insufficient contributions to the costs of developing and maintaining roads, was acknowledged in at least half of the sample; the Yemen Arab Republic is the worse case in point, with no taxation applied to diesel fuel. Indonesia is another extreme case with heavy vehicles contributing only 2 percent to road costs while accounting for nearly 80 percent of road traffic. In 7 countries heavy vehicles are treated preferentially via lower charges or exemptions from custom duties or licensing fees.

11. The axle-load limit is one form of road transport regulation devised to control road damage that arises through overloading of vehicles. Regulations of this nature exist in most of the sample countries; however, they are often poorly enforced. Axle-load taxes were not found in any sample countries. Thus in instances where the axle-load limit is not effectively enforced, the lack of an axle-load tax manifests a discrimination in favor of heavy trucks and buses; and hence, a subsidization of their use of road services by light vehicles.

B.3 Use of Pricing Covenants

12. Of the 22 projects reviewed, 13 have some form of covenant with implications for pricing/cost recovery. They include agreements to increase fuel taxes or maintain the domestic prices of fuel at levels appropriate to enhance road user revenues (found in 2 cases); to conduct a road user study, or prepare an action plan for revising user charges, with the objective of relating charges to the costs that different types of vehicles are imposing on the road network (9); to cover a specified proportion of annual

maintenance expenditures (1); and to analyze the consequences of establishing a toll system on a country-wide basis (1). Other agreements include measures to ensure an effective enforcement of vehicle dimensions and axle-load limits (6) and to earmark funds for road maintenance operations (10).

13. Earmarking is a major issue in the roads sector. Despite user charges that frequently exceed marginal costs (and sometimes total financial costs), funds in the road maintenance budget are often insufficient. Fuel tax revenues accrue to the general government budget and are often regarded by officials as an important general revenue source rather than as a user charge from the transport sector. The link between consumer willingness-to-pay and the investment signal is thus lost. On the other hand, where earmarking has been used it has sometimes led to overinvestment, lack of cost control and misuse of funds. A review of the benefits and costs of earmarking is underway in TRP.

B.4 Sources of Project Financing

14. Project financing plans are shown below:

<u>SOURCE</u>	<u>AVERAGE</u> (As % of Project Costs)	<u>RANGE</u>	<u>COMMENTS</u>
IBRD/IDA Loans	54.8	22 - 94	
Other External Donors	10.2	0 - 44	0 in 11 cases
Government Budgetary Contributions	35.0	6 - 72	

C. THE MAJOR GAPS

15. Efficiency pricing has been given much attention in the roads sector, and road user charges in nearly all sample countries exceed road maintenance costs. The main pricing issues concern the structure and incidence of charges (i.e., the need to better relate charges to individual costs imposed) and their fiscal and X-efficiency dimensions.

16. On the fiscal side, it would be conceptually possible to separate the pure tax element from the benefit tax element in fuel taxes. This would clarify the discussion on whether the transport sector is being "overtaxed." However, a full analysis of this issue would require a comparison of the administrative as well as deadweight losses involved in raising a tax dollar from transport versus other types of taxes. This would be a worthwhile issue to address in several country case studies.

17. Earmarking and the allocation of congestion charges (or other user fees in excess of SRMCs) have important supply-side implications. Improving the efficiency of maintenance and construction activities may require new institutional and budgeting arrangements for the sector. This is an issue on which work has already begun in TRP; its results should prove useful to other sectors as well.

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ANNEX 6. Review of Pricing and Cost Recovery in SARs:

HOUSING SECTOR

A. THE POLICY

1. Urban projects typically include several components: land, access to services such as water and electricity, finance for housing construction or upgrading, communal site improvements such as roads and drainage and the house (or sanitary core) itself. Pricing and cost recovery policies for power and water are discussed in separate annexes; this Annex covers only the housing-related portion of urban projects.

A.1 Interpretation and Calculation of Efficiency Prices

2. Although little has been formally written about the efficiency price of housing, it is not a conceptually difficult issue. For a given plot plus improvements, the efficiency price would be the sum of the opportunity value of the land and the economic cost of the improvements. The latter can generally be calculated in a straightforward way, including shadow pricing of labor and foreign-purchased materials where relevant. The value of land will be more difficult to assess since, in a free market, it would reflect location characteristics, expected capital gains and the general demand/supply balance in the housing market (which is a function partly of past investment policies and population growth/age distribution). It will usually be necessary for the project analyst to use an indirect approach to land valuation by working from actual prices paid for land of similar locational characteristics.

3. Once the economic cost of the land plus improvements has been estimated, the next step is to determine the appropriate interest rate and other loan terms to use in calculating the corresponding "economic" monthly payment. Where there is an efficiently functioning domestic credit market, market-clearing loan terms can be observed. However, in many cases it will be necessary to make an independent judgement about the opportunity cost of capital, the expected inflation rate and the degree of risk associated with the borrower.

A.2 Constraints to Implementing Efficiency Prices

4. The lack of an efficient credit market has already been mentioned as one of the constraints to implementing efficiency prices in the housing sector. Property markets may also be imperfect where the tenure situation is irregular or where much land is publicly owned. In these circumstances it is difficult to determine the efficiency value of land through comparisons with similar market transactions. The other major constraint is the difficulty of enforcing sanctions for non-payment. Eviction is the obvious sanction, but it is so extreme -- particularly in upgrading projects -- as to be impractical in many cases.

A.3 Adjustments to Efficiency Prices

5. Income distributional objectives loom large in the housing sector. Indeed, in many cases, the project justification rests on the failure of the private housing market to address the needs of the low income urban population. Thus projects are clearly targeted to low income groups, and there is often little scope for cross-subsidy within the project, in contrast to water or power projects which serve the entire community.

6. A great deal of attention has been given to developing service standards and payment arrangements that make the project output affordable to the target population. There has been considerable research into housing demand by low income families, and affordability assumptions (initially 20-25% of income) have generally been lowered. At the same time, little attention has been given to the rental housing market, although in many countries the poorest households are more likely to rent than to own. Increasing the supply of inexpensive rental units may be a less costly way of reaching the target population than providing large land and interest rate subsidies. Empirical research in this area would be helpful.

7. In addition to distributional objectives, the housing sector aims at project "replicability". This term has been used to mean both economic replicability -- in the sense of recovering full economic costs -- and financial replicability -- in the usual sense of cost recovery. Generally it seems to mean the latter. As such it stems from the fiscal objective of minimizing long-run drains on the (usually municipal) budget. However, the concept of financial replicability has limited meaning when land is provided by government and is grossly undervalued, or when subsidized housing finance is offered. If replicability is to remain a key objective of housing projects, it needs to be clearly defined. If it is meant to be an economic (rather than a financial) measure, then much more emphasis will be needed on calculating economic costs per plot and on the division of those costs between land and improvements. In the past, the focus on replicability for the project as a whole has tended to obscure pricing issues. A clear mandate for economic costing would lay the groundwork for proper pricing, as well as enable a reexamination of whether full economic replicability is a viable objective in a public sector such as housing with limited scope for intrasectoral cross-subsidization.

B. THE PRACTICE

B.1 Project Sample

8. Our sample consisted of seven projects (in Djibouti, Malawi, Gambia, Chile, Mexico, Madagascar, and India) approved by the Bank during FY84 and FY85. Six of them included components for selling serviced plots and houses, two had components for selling serviced plots without houses and five included upgrading loans. Excluded from the sample was a multi-purpose project with housing, tourism and transportation components.

B.2 Calculation and Discussion of Efficiency Prices

9. There was virtually no discussion of efficiency prices in the SARs reviewed in this sector. Land was owned by government in all but one case. In half of the government owned cases, the basis for calculating the sales price of the land was not specified. In the other three cases, it was stated to be based on market values. Generally no breakdown of the total sales price was provided between the cost of the land and that of the house or improvements. Cost minimization was often discussed, but only in terms of the size of plot and type of improvements, not in land values due to location.

10. Economic rates of return in six of the seven cases were based on the difference between project infrastructure costs and the incremental rental value of the land. This calculation does not take into account the economic cost of the land itself.

11. Interest charges to beneficiaries ranged from 8 to 15 percent. Two of the projects provided no comparative information on the cost of those funds or the inflation rate. In four other cases, such information seemed to be contradictory. In Malawi, both the cost of funds and the inflation rate were said to be 10%, while the onlending rate to beneficiaries was 13%. Similarly in Madagascar, the cost of funds and inflation rate were stated to be the same while the onlending rate was two percentage points higher. In the Gambia the cost of funds was given as 7% while the inflation rate was 8% and funds were onlent at 9%. In Mexico, the cost of funds was given as 52%, the average inflation rate was 60% and the onlending rate was 9 to 15%. An explicit discussion of the interest subsidy incorporated in housing projects would help to clarify the real costs incurred.

B.3 Discussion of Adjustments to Efficiency Prices

12. Although the discussion is not couched in terms of adjustments to efficiency prices, SARs contain extensive information on the income levels of target beneficiaries and the proportion of their incomes expected to be devoted to housing. Five of the seven projects reviewed reported the percentile of the income distribution curve above which the project output would be affordable. This went as low as 7% in the case of home improvement loans, and generally fell within the 20-30% range for site and service components. The fraction of total household income spent on housing generally ranged from 10-30%.

13. Such figures appear to be treated as targets rather than as the result of housing demand studies in the target areas. Clearly by raising the proportion of income assumed to be spent on housing, the qualifying income level will fall. At the same time, due to extreme housing shortages in many of these cities, the demand for low cost housing far exceeds what the project is able to supply. Price rationing is not used because that would presumably exclude the target population. Instead criteria are generally developed for beneficiary selection and restrictions are introduced on the sale of property within the first few years of ownership. The efficacy of such measures in restricting project benefits to the target population should be explored through income surveys during project supervision.

14. Fiscal objectives in the housing sector generally relate to municipal finances rather than the central government budget. As was true in other sectors, insufficient attention is paid to the fiscal impact of pricing recommendations in housing.

B.4 Discussion of Cost Recovery Issues

15. Cost recovery has been a major problem in the housing sector -- both in setting reasonable targets and in achieving them. Four of the seven projects reviewed calculated an "expected cost recovery level". This was not precisely defined but probably reflects the ratio of total discounted revenues to total discounted project costs. Cost recovery levels averaged 30% from direct payments and an additional 20% from indirect channels such as increases in property taxes. This would imply a total financial cost recovery of about 50%.

16. An excellent review of cost recovery experience in projects under supervision was carried out several years ago in the East Africa region. It found that about one-third of households in sites and services projects were not paying their mortgages, and nearly two-thirds of households in upgrading projects were not paying. It attributed this poor collection rate to a number of factors including the lack of political commitment to the principle of cost recovery for low income housing, inadequate legislation for transferring titles and granting tenure, weak administration and collection infrastructure, and the absence of effective sanctions. However, collection rates were improving in "older" projects, and it was felt that many of these problems could be overcome as lessons were learned and transferred.

17. The financing of housing projects is shown in the summary table below. Internal cash generation, mainly in the form of down payments, provided an average of 10% of investment costs, external loans 62%, government loans 9% and government equity 19%.

	<u>Average Percent</u>	<u>Range</u>	<u>Comments</u>
Internal cash generation	10	0 - 40	0 in 4 cases
IBRD/IDA	57	14 - 93	
Other external loans	5	0 - 36	0 in 6 cases
Government loans	9	0 - 37	0 in 4 cases
Government equity	19	3 - 46	
TOTAL	100		

B.5 Use of Pricing Covenants

18. Some form of pricing or cost recovery covenant was included in all SARs of the sample. In three cases there was a requirement to set prices so as to achieve specific cost recovery targets: 100%, 50% and 100% of "chargeable costs". In two cases a study to determine appropriate levels of charges was to be undertaken. In one case specific percentage increases were required in existing rental rates for public housing. In one case decreases in the government subsidy to the sector were agreed, with the shortfall to be met by increased beneficiary charges. In one case the government was required to assume liability for any funding shortfall, and in another project revenues were earmarked for use in preparing follow-on project areas. Finally, a floor on interest rates charged to beneficiaries was agreed in one case.

19. These differences in approach reflect the widely differing project components and historical policies toward cost recovery in the public housing sector. However, it is significant that all are aimed at financial cost recovery rather than efficiency price considerations.

C. THE MAJOR GAPS

20. Efficiency pricing has not been a major point of reference in the housing sector. While there are sometimes problems associated with determining the value of publicly owned land; in general, the calculation of the efficiency price of a plot and its improvements should not present major difficulties. It would be useful to carry out this calculation for several prototype projects as an example. Based on those, a written guideline on the practical techniques for estimating efficiency prices could be prepared for staff in the sector.

21. A pricing guideline should also clarify the meaning of replicability and its relation to efficiency objectives and financial targets. At present SARs are heavily focussed on cost recovery issues for the project as a whole. This tends to obscure both efficiency and distributional objectives. To address the former, SARs should routinely include a comparison of proposed project prices and mortgage terms with their efficiency levels. In addition, disaggregated efficiency price information would be useful in project design; e.g., in examining trade-offs in cost-minimization between lower standard infrastructure and lower valued land. With respect to distributional objectives, the efficacy of existing mechanisms (e.g., selection criteria, restrictions on land sales) should be reviewed during supervision missions. Additional research on low income housing markets may be necessary to better target project benefits in the absence of price rationing.

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ANNEX 7. Review of Pricing and Cost Recovery in SARs:

IRRIGATION SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing

1. Irrigation water is becoming an increasingly scarce resource, and thus a very costly input for improving agricultural production. This underlines the importance of designing the level and structure of water charges in a manner that would ensure an optimal allocation of irrigation water and maximize the project's net benefit to the economy. CPN 2.10 defines the Bank policies and guidelines for pricing irrigation services in accordance with the principles of economic efficiency, income distribution and public savings.¹ Efficiency pricing should reflect the marginal supply cost relevant to a project; however, the Note acknowledges that its applicability may be appropriate only among pumping schemes and tubewells wherein the volume of water delivered can be assessed fairly accurately. Where volumetric metering of consumption is not feasible or too costly, then the use of a benefit tax can be a necessary alternative to strict efficiency pricing. Special levies on beneficiaries (e.g., crop rates and land betterment taxes) can be used to recoup partly, if not fully, the total costs incurred in providing irrigation services. Ideally, such levies should be designed to be discriminatory in the sense of placing the burden of recovery on project beneficiaries, and to be progressive such that beneficiaries with large capacity to pay would pay proportionately more than others. Efficiency considerations can then be satisfied by ensuring that benefit taxes are structured such as not to discourage farmers' participation, distort their production decisions, or encourage wasteful use of irrigation water.

2. In addition to volumetric metering of irrigation water, some countries have developed a system of marketable water rights. These are efficiency prices in the sense that they serve to allocate the right of access to scarce water resources based on willingness-to-pay. They are a type of rationing price which has been widely used in the western United States. Their applicability to developing countries should be assessed. The low incomes of irrigation beneficiaries would not necessarily rule out their use because water rights could initially be granted with land tenure.

A.2 Constraints to Implementing Efficiency Prices

3. Historically, irrigation water has seldom been metered. There are technical constraints to metering in gravity fed or canal irrigation systems that make volumetric pricing infeasible. There may also be cases where metering would be technically feasible but not cost-effective because, for

1/ See also SWP No. 218: A Policy Framework for Irrigation Water Charges, by Paul Duane.

because, for example, many small farmers are being served whose water use is individually low.

4. It is our impression, however, that in many cases metering has been assumed to be uneconomic without a quantitative analysis. There are numerous examples where, with hindsight, metering could have improved the allocation of water among users and postponed or prevented the need for drainage systems caused by overwatering. In addition to the allocational benefits of metering, the revenues that it generates would directly contribute to the provision of proper maintenance. Irrigation districts have not been thought of as public utilities, although many of the same pricing principles could usefully be applied.

A.3 Adjustments to Efficiency Prices

5. The compatibility of efficiency pricing with income distributional and fiscal objectives is a principal issue when dealing with irrigation projects. The Bank's traditional policy has been that to the extent that beneficiaries have incomes below the "critical consumption level" they should not be charged, even for benefits received. This has meant that many irrigation projects fail to cover even their ongoing operating and maintenance costs.

6. Unfortunately, fiscal objectives have generally been given less attention than income distributional ones. In many countries, fiscal resources are so scarce that revenues cannot be assumed to be available for irrigation from other sectors where beneficiary incomes are theoretically higher. At the same time, doubts have arisen about the methods for measuring beneficiary income. It is the land owners who benefit most from irrigation projects, while many of the poorest rural inhabitants are tenant farmers. For all these reasons, views are changing in favor of making a greater effort to charge efficiency prices for irrigation water.

B. THE PRACTICE

B.1 Project Sample

7. Fourteen irrigation projects (in nine countries: Tunisia, Mauritania, Madagascar, Indonesia, Sri Lanka, Bangladesh, Pakistan, India and Niger) were selected for this review. The sample accounts for about 64 percent of the total number of irrigation projects (excluding multi-purpose hydroelectric and irrigation dams) approved by the Bank during FY84 and FY85.

B.2 Calculation and Discussion of Efficiency Prices

8. There is very little discussion of efficiency prices as such in irrigation project SARs. Generally there will be a calculation of average operating and maintenance (O&M) costs, which in many cases will represent marginal costs.

9. Pricing and cost recovery instruments used in the projects surveyed are adequately discussed. For recovering O&M costs, these include volumetric water pricing (found in 2 cases), land tax (2), and crop,

seasonal and other types of rates per hectare irrigated (7). An arrangement whereby the beneficiaries are given the responsibility to operate and maintain their respective irrigation schemes is found in 5 cases. Overall management is coordinated through village cooperatives or water user associations, and members are required to contribute towards the needed provision for O&M. Contributions typically can be in cash, kind (e.g., agreed amount of paddy per ha), and/or labor. Instruments for recovering capital costs included land betterment levies (5), infrastructure improvement tax (1), land ownership transfer tax (1), and sales tax (3). An arrangement for cooperatives to pay only for the costs of pumping equipment is practiced in two cases.

10. The above-mentioned policy instruments have varying potentials for influencing water use. Volumetric water pricing and crop or seasonal rates, for instance, can result in better use of irrigation water than land or infrastructure improvement taxes, and even sales tax, since the obligations to pay with respect to the latter instruments are linked only indirectly with water supplies. Charges based on crops or seasons can induce an efficient water use, possibly with almost the same potentials as volumetric water pricing, if rates are assessed carefully according to water requirements of crops and irrigation systems are appropriately designed to control supplies on the basis of these requirements. None of the cases reviewed, however, claimed that the existing policy instruments for cost recovery actually resulted in an efficient allocation of irrigation water. Even in Tunisia and West Bengal (India), where volumetric water pricing has been practiced, it is doubtful that an efficient water use is attained considering claims that rates have been set too low and that irrigation service has been unreliable. These situations definitely would encourage overwatering. In several cases, particularly those where charges are based on unit irrigated area, farmers are reportedly encouraged to take more water than needed at the sacrifice of those users situated far from the water source. Presumably for self-managed irrigation schemes, the allocation of water among users should be within some acceptable degree insofar as group cooperation is required for its own survival.

11. Even though an efficient use of water is not generally achieved under current cost recovery practices, the mere presence of water charges helps reduce the conspicuous waste associated with conditions wherein water is treated as a free good. This is true especially in those cases where cost recovery policies have been effective in generating revenues. Meanwhile, no indication was made in the SARs if the various policy instruments have distorted farmers' production decisions (e.g., input mix or cropping pattern and intensity) or discouraged participation in terms of deciding not to irrigate their land. Given claims that water charges are acceptable to users (e.g., in Tamil Nadu and Mauritania) and that governments aim to provide strong incentives among farmers to utilize irrigation services (e.g., in West Bengal and Tunisia), it seems there is good reason to believe otherwise at least with regard to these cases.

B.3 Discussion of Adjustments to Efficiency Prices

12. The main adjustments have been taken on income distributional grounds. An index of ability to pay by beneficiaries is reported in 11

cases, based on some measures of critical consumption level (e.g., as a fraction of per capita GNP, national or rural poverty income threshold) and on certain charge limits. Shown below is a summary of information regarding the equity considerations in the projects reviewed.

<u>INDEX</u>	<u>RANGE</u>	<u>NO. OF CASES REPORTING</u>
% of project beneficiaries below CCL	10-44%	3
	Majority; no estimate reported	4
	67-100%	2
Limits on water charges	5-12% of gross value of output/ha	1
	Not to exceed 20% of gross farm revenues or 30% of net income	1

13. The existing benefit taxes appeared to be discriminatory as far as they are imposed solely on users. As a consequence the burden of recovery is borne mainly by beneficiaries. Furthermore, policies to recover costs incurred with respect to public irrigation projects have been based on the ability of beneficiaries to pay water charges, although oftentimes much attention is paid to the low capacity to pay of the majority of users. Specifically, it is only in the cases of Tunisia and Indonesia where the cost recovery instruments can be considered progressive--i.e., users having a large capacity to pay would end up paying proportionately more than those with small repayment capacity. Land taxes in these cases reportedly vary according to land productivity and size of holding, and as such are likely to be quite progressive. Water charges per hectare irrigated vary by type of irrigation schemes, seasons and crops, but they are basically flat rates within each of these categories, and therefore, are distributionally neutral. These flat rates have been set at levels related to the repayment capacity of those farmers realizing the lowest irrigation benefits. Land betterment levies in India as well as the infrastructure improvement tax in Madagascar are not structurally progressive. Should there be significant differences in the size of land holdings or incremental incomes due to irrigation among beneficiaries, then the current cost recovery policies in most of the cases reviewed could contribute to inequities in the distribution of income among households with irrigated farms and similar cropping patterns.

B.4 Discussion of Cost Recovery Issues

14. As far as cost recovery is concerned, it appears that recovery of operation and maintenance costs is the key issue with respect to irrigation projects. Governments in general aim to recover full O&M costs as embodied in irrigation ordinances which formally empower the government to levy water charges on users or through arrangement toward self-management of irrigation schemes by user groups. Lack of adequate revenues from the irrigation subsector imposes a heavy burden on fiscal budgets and subsequently results in poor maintenance of existing irrigation schemes. Full recovery of O&M costs is, therefore, rationalized on the grounds of reducing government subsidies and ensuring that irrigation schemes are properly maintained. In contrast, there have been no stated government policies which would achieve full capital cost recovery. In this regard policies are formulated to recoup only a "reasonable" share of capital costs, and only if feasible, in view of sociopolitical issues.

15. Although various cost recovery instruments exist in line with governments' objective to recoup fully O&M costs, our review shows that such an objective is not attained in all cases. The existing cost recovery levels in project areas at the time when the appraisal reports were prepared ranged from 0 to 100 percent of O&M costs. Four cases apparently had 100 percent recovery, another four reported very insignificant collections from water users, and three cases had levels that varied from 40 to 60 percent. No estimates were cited in three cases, but it was suggested in the appraisal reports that cost recovery was at satisfactory levels. Difficulty of enforcing irrigation ordinances for collecting water charges in rural areas or lack of an effective enforcement mechanism despite the presence of suitable legislation; unreliability of irrigation service; farmers' reluctance to pay in account of perceived right to free irrigation water; and equity considerations were some of the factors that had constrained full recovery of O&M costs. Meanwhile, only 9 out of 14 cases reviewed made indications of cost recovery levels as a fraction of capital costs. These levels ranged from 0 to 25 percent, with a mean value of about 5 percent. Thus, cost recovery as a proportion of total costs amounted to only between 0 and 37 percent, and averaged as low as 7 percent.

B.5 Use of Pricing/Cost Recovery Covenants

16. In general, projects have covenants that are aimed to achieve 100 percent O&M cost recovery. The only exception is the West Tarum Canal Improvement Project in Indonesia where no covenants exist for recovery of O&M costs; however, there are agreements for land reclassification and reassessment of the IPEDA levies which should eventually lead to improvement in cost recovery levels. Agreements were also reached for the partial recovery of capital costs in 9 projects, subject to beneficiaries' ability to pay. The implementation of the foregoing covenants is proposed through increases in water charges or revision of charge structure (found in 9 cases), elimination of existing subsidies to village cooperatives (1), enforcement of land ownership transfer (1), or internalizing construction and O&M costs via arrangements for self-management of irrigation schemes by user groups

(3). In view of these covenants, as well as Bank estimates of the value of incremental farm outputs, the projects' expected cost recovery indices would range from 6 to 42 percent, and average 24 percent.

17. Certain provisions were also incorporated for inducing an efficient water use, but relatively little attention was paid to improving the distributional attributes of existing policy instruments in project areas. These provisions include the formation or revitalization of water user associations in order to promote better water use at the farm level (found in 6 cases), introduction of rotational water supply schedules in each irrigable perimeter and/or modifications of irrigation structures to facilitate controlling of supplies (6), and experimentation with a volumetric water charge system (2). These provisions would be useful both in monitoring consumption among users who are willing to pay for irrigation services and in avoiding unauthorized irrigation. Such provisions demonstrate the Bank's concern for emphasizing incentives against wasteful use of irrigation water. In contrast, provisions for improving the progressivity of existing cost recovery instruments are rather rare; found only with respect to the proposed projects in Indonesia. There may be no urgent need to revise the distributional properties of policy instruments if the majority of beneficiaries falls within a given income category. Lack of progressivity, however, may lead to an inequitable distribution of project benefits and forego the potential to tap more revenues from the minority of users who have a larger capacity to pay for irrigation services.

B.6 Sources of Project Financing

18. Project financing plans are shown in the summary table below. On average, IBRD/IDA loans and government contributions accounted for 81 percent of project costs; beneficiary contributions were extremely low.

<u>SOURCE</u>	<u>AVERAGE</u> (as % of Project Costs)	<u>RANGE</u>	<u>COMMENTS</u>
IBRD/IDA Loans	53.1	26 - 72	
Other Loans	18.2	0 - 56	0 in 6 cases
Government Contributions	27.9	3 - 50	
Beneficiary Contributions	0.8	0 - 9	0 in 9 cases

C. THE MAJOR GAPS

19. Historically it has been felt that the technical obstacles to implementing efficiency prices in the irrigation sector gave it little practical value. However, problems with serious overwatering in some countries and with raising the funds for proper maintenance in others have led to a reexamination of the metering/charging question. As a first step, additional research is probably needed into the pricing mechanisms available (i.e., metering, transferable water rights, etc.) and the circumstances under which each will be practical and cost-effective. It would be useful to review experience with volumetric charges in Bank-financed irrigation projects. This would follow the existing suggestions in CPN 2.10 that the project analyst should seriously assess the possibility of implementing volumetric pricing via

metering of supplies or investigate alternative charging schemes with the potential for attaining similar efficiency effects.

20. The Bank has adequate written guidelines with regard to the pricing of irrigation services, which above all, define the desirable properties of a benefit tax. Most of these guidelines have been followed quite closely in the SARs, with the exception of the following:

- reflecting progressivity in the structure of benefit taxes (e.g., in the cases of Sri Lanka and India where only about 10 to 40% of project beneficiaries fall below the poverty income level); and
- relatively little emphasis is placed on the fiscal outcome, vis-a-vis equity aspect, of projects (e.g., fiscal impacts are discussed only in 4 out of 14 projects).

21. There has been a tendency to consider irrigation (and fertilizer, as discussed in Annex 3) primarily as inputs to the agriculture sector and, therefore, to view their prices as part of the overall system of agricultural input and farmgate prices. Where farmgate prices are held down as a matter of public policy, this may be a necessary frame of reference. However, the general approach to irrigation pricing should be based on the supply and demand for irrigation water. Once efficiency prices have been determined on that basis, they can be adjusted for second best or other reasons.

22. The rationale for adjustments on distributional grounds should be more carefully assessed. Irrigation projects have high economic rates of return, much of which is reaped by the beneficiaries. Further, the incidence of charges between tenant farmers and land owners will often mitigate the effect on the lowest income beneficiaries. Irrigation districts are often populated by a mix of income levels; and water usage will generally correlate with farm size. For all of these reasons, the feasibility of efficiency pricing in irrigation projects merits renewed consideration.

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ANNEX 8. Review of Pricing and Cost Recovery in SARs:

OIL AND GAS SECTOR

A. THE POLICY

A.1 Interpretation and Calculation of Efficiency Prices

1. In the oil and gas sector, the definition of efficiency prices is generally straightforward. For oil and refined petroleum products, the efficiency price is the border price plus internal distribution and marketing costs. Where oil is not directly imported (exported), the border price is generally the FOB price of the crude or products at the nearest world export center (e.g., Rotterdam, Persian Gulf, Singapore) plus (minus) the freight costs to (from) the domestic port.

2. For natural gas the definition of the efficiency price depends on the domestic demand and supply relationships over time. As set out in EGY Paper 24, the economic price of gas is composed of its LRMC and a depletion premium, which reflects the cost of future consumption foregone by using the resource today. Where supplies far exceed demand, this depletion premium will be small so that the economic price will be roughly equal to the LRMC. Where supplies are scarce relative to domestic demand, gas may already be replacing a tradable energy product (such as fuel oil) at the margin so that the depletion premium is equal to the full difference between the LRMC of gas and the border price of the fuel replaced. In the "surplus window" cases, where supplies today are larger than demand but the point of fuel imports at the margin to replace gas is within the next decade or two, then the depletion premium must be approximated.

3. The main definitional issue in this sector is the method of calculating the depletion premium for the "surplus window" case. Because of the movement up the demand curve as exhaustion approaches and the depletion premium and economic price rise, it is theoretically inappropriate to base the depletion premium estimate on supply side information only. However, estimating demand elasticities (both price and income are needed) is notoriously difficult. Given the lumpy nature of gas demand in most developing countries, such econometric estimation is probably also inappropriate.

4. The method suggested in EGY Paper 24 is a sector-by-sector analysis of the demand function for gas and then an aggregation of sector-specific results at the various alternative price levels. Gas use is generally concentrated in three or four sectors, and replaces different fuels and feedstocks in each, so the result is an aggregation of stepped demand functions. This aggregate demand information can be used in conjunction with supply projections (both production and reserves) to determine the date of economic depletion. The depletion premium can then be easily calculated, and the whole procedure cross-checked to ensure that the resulting economic price path for gas is consistent with the demand and supply paths from which it was derived.

5. Other definitional issues in the oil and gas sector include the joint costs arising from exploration and production activities common to both sub-sectors. Capital indivisibilities are handled by using the Average Incremental Cost formula for approximating LRMC. A start has been made on designing tariff structures for natural gas that follow the structure of LRMCs but much more work is needed to implement this approach in the developing countries. The shadow pricing of foreign exchange is sometimes an issue in making recommendations about the appropriate level of domestic petroleum product prices.

A.2 Constraints to Implementing Efficiency Prices

6. Implementation constraints are not a major issue in the sector. Oil products are always "metered" and charged on a unit basis. Sometimes the cost-effectiveness of natural gas metering for residential consumers is a question, and studies have been carried out to assess this. The conclusion has generally been that metering is justified even for small users.

7. Until recently second best considerations often limited the price that could be charged for natural gas and sometimes kerosene or diesel. Because substitution between fuels is easy and inexpensive, the existence of subsidies for one or two fuels often makes it necessary to subsidize other fuels to avoid uneconomic substitution. Since the 1979 oil price increases, however, most countries have raised their domestic energy prices at least to the level of world parity and often far above. Thus only in a small number of oil exporting countries are second best concerns still a major constraint to the economic pricing of oil and gas.

A.3 Adjustments to Efficiency Prices

8. If one compares efficiency prices of oil and gas with actual prices, one would probably conclude that the large discrepancies are due to fiscal objectives in the case of oil products and to financial objectives in the case of natural gas. Energy products in general, and gasoline in particular, have long been favored objects of taxation. Demand is relatively price inelastic and consumption is correlated with income. Even where prices are close to border levels, there is generally a large wedge between domestic production costs and world prices. It is natural that much of this "resource rent" should be captured by governments rather than left in the sector.

9. In many countries the above arguments are equally valid for natural gas. However, it is unusual for fiscal objectives to play much of a role in setting gas prices. Perhaps because gas has traditionally been viewed as a public utility, its price is often based on financial grounds. This often leads to prices being below economic costs because the depletion premium is ignored.

10. Distributional objectives sometimes influence the price of kerosene, the main fuel in the sector that is used by the poor. Because of its close substitutability with diesel, the efficiency costs of kerosene subsidies are often high, and the Bank has generally argued against them.

B. THE PRACTICE

B.1 Project Sample

11. Our sample consisted of 10 projects: six oil (in Yugoslavia, Hungary, Colombia, India, China and Benin), two natural gas (Argentina and Bangladesh), one with both oil and gas (Pakistan), and one a refinery restructuring (Thailand). Coverage of pricing issues was good, with all 10 SARs providing details of retail and border prices of petroleum products, and eight discussing natural gas prices. Six SARs included an analysis of producer pricing arrangements and contracts. The sample accounted for 91 percent of the oil and gas projects approved by the Bank during FY84 and FY85. Excluded from these figures are 13 technical assistance and exploration promotion projects for which pricing issues are less relevant and SARs are not prepared.

B.2 Calculation and Discussion of Efficiency Prices

12. With respect to oil products, comparisons were routinely made between domestic and border prices. Over the project sample, the consumption-weighted average domestic price was \$285/ton while the average border price was \$237/ton. Retail prices as a percent of border prices ranged from 91 to 174, with an average across the ten countries of 111. The relationship by petroleum product is shown below.

	<u>Retail Price as % of Border Price</u>	<u>Range</u>
Gasoline	165	106-351
Diesel	103	92-163
Kerosene	81	62-127
Fuel Oil	82	43-141

13. For natural gas, eight of the projects reported on the relationship between actual prices and efficiency prices. The former ranged from \$0.79 to \$3.04/MCF with an average of \$1.43/MCF. Average efficiency prices were nearly 90% higher, ranging from \$1.15 to \$4.59/MCF, with an average of \$2.70/MCF. In five of the eight cases, the efficiency price of gas was defined in terms of its fuel oil substitute at the margin. In two other cases (Bangladesh and Colombia) it was the LRMC plus depletion premium. In the final case (Yugoslavia) there is a border price since gas is imported at the margin. Domestic prices of natural gas ranged from 38% to 70% of efficiency prices in these sample countries. Clearly there is scope for price increases on efficiency grounds.

14. Questions of price structure were dealt with in the oil sector, but not generally in gas. Most reports commented on the differential taxation of competing oil products (such as gasoline and diesel) where this was perceived to be a problem, and the differential subsidization of kerosene and diesel.

15. Existing price structure for natural gas bear little relationship to the structure of gas costs. None of the projects surveyed used peak pricing or time of day or seasonal differentials. Six of the cases reported price differentiation by consumer category, but there was no uniformity across countries. For example, the power sector receives gas for less than its average price in four of the countries, and more than the average price in the other two. Feedstock uses are charged below average tariffs in two cases and above average tariffs in four. Residential gas distribution, which is the most costly, is charged above average prices in three countries and below average in two. More attention should be paid to price structure in the natural gas sector.

B.3 Discussion of Adjustments to Efficiency Prices

16. SARS in the oil and gas sector contain adequate discussions of financial and distributional adjustments to efficiency prices, but generally pay insufficient attention to the fiscal dimension. Tax policies are usually noted, but little discussion or analysis of them is provided. The exception to this general statement is in the energy pricing studies that have been financed under several projects in the sector. Terms of reference for those studies invariably include an analysis of the fiscal impact of the sector, and several of the studies have produced useful recommendations in this area. An Energy Paper summarizing the results of those studies is under production.

17. Another area that deserves more attention is the transfer price policy and tax treatment of publicly owned oil, gas and refinery companies. Significant anomalies exist in the way that domestic crude prices are set both for (government) producer companies and as an input into domestic refineries. Ex-refinery prices of petroleum products are seriously cut of line with efficiency prices in many countries. While these "intermediate prices" will have little effect on final consumption patterns, they play a major role in promoting or hindering the internal efficiency and financial viability of public enterprises. A confusion between these objectives, on the one hand, and the government's legitimate desire to generate a fiscal surplus from the sector, on the other, can lead to a transfer pricing mechanism that frustrates all three objectives.

B.4 Discussion of Cost Recovery Issues

18. Cost recovery is generally high in the oil and gas sector. It is sometimes difficult to apply the Bank's usual financial covenants to the enterprises because of the intricate tax and financing relationships some have with government. Of the 10 projects reviewed, only one specified a rate of return on revalued net fixed assets, while another asked for a "reasonable" return on capital employed. Internal cash generation covenants were used in four cases and ranged from 26% to 80% with one case unspecified. Debt service covenants were applied in two cases. One project imposed a 90% ceiling on the operating ratio, and one asked for a 15% discounted cash flow return after taxes. Two projects (China and Benin) did not contain financial covenants; in China's case because the company is not operated on a typical commercial basis so the normal financial covenants would be of limited real significance.

19. To the extent that the Bank project is representative of the sector as a whole, it is instructive to examine the project financing plan. The table below summarizes the average percent accounted for by each source of funds for the 10 projects of our sample.

	<u>Average Percent</u>	<u>Range</u>	<u>Comments</u>
Internal cash generation	32	0 - 70	0 in 4 cases; 53% ave. in other 6 cases
IBRD/IDA	30	13 - 59	
Other external loans	23	0 - 50	0 in 1 case (Hungary)
Government loans	4	0 - 43	0 in 9 cases; 43% in Hungary
Government equity	7	0 - 35	0 in 6 cases; 17% ave. in other 4 cases
Other	<u>4</u>	0 - 40	0 in 9 cases; 40% from private operators in 1
TOTAL	100		

20. Beyond the financial health of the enterprise, it would be useful to know the net contribution that sector revenues make to the government budget. This is generally significant in the oil producing countries, but such information is rarely included in SARs. Most of the pricing studies financed under project loans provide such figures.

B.5 Use of Pricing Covenants

21. Eight of the ten projects included at least one pricing covenant. In many cases these required specific changes in the level or structure of prices, sometimes following from the recommendations of pricing studies carried out under earlier loans. With respect to oil prices, four projects contained producer pricing covenants and two dealt with consumer prices. In Pakistan, producer prices were linked with border prices. In China a costing study was to be carried out to provide better management information and improve operating performance. In India and Thailand a cost-plus formula was agreed for producer prices of crude oil (India) and ex-refinery product prices (Thailand). Consumer prices were the subject of covenants in Hungary and Argentina. In Hungary the general principle of linking domestic prices to border prices was reaffirmed, while in Argentina specific increases in the prices of diesel and fuel oil were agreed to meet relative price targets in terms of gasoline prices. It is inappropriate to judge these recommendations out of context, but at least in this sample efficiency objectives were more often sacrificed at the producer price level than at the consumer price level.

22. Six of the projects contained covenants relating to natural gas prices. In Hungary and China gas utilization studies were to be carried out to look at many issues including prices. In India the producer price of gas was to be reviewed to ensure that financial targets were met. A specific price increase was mandated for Pakistan producer prices of associated gas. In Yugoslavia domestic gas prices would be increased in two steps to equal import parity, and in Bangladesh both specific percentage increases in average gas prices and a commitment to base the future price structure on LRMC were agreed. With the exception of the India covenant, all of these are based on efficiency price considerations.

C. THE MAJOR GAPS

23. Efficiency pricing is clearly relevant to the oil and gas sector and is the subject of much attention both in EGY publications and in the SARs. Definitional issues have been identified in research papers and specific procedures developed to deal with them. The research has been applied in case studies both for natural gas (Pakistan and Bangladesh on LRMC estimation and tariff structure design) and for petroleum products (at least six studies financed under Bank loans and closely monitored by EGY policy staff). While some of this work has been disseminated through the Departmental Energy Paper series, written guidelines are not yet available on either gas or petroleum product pricing.

24. On the basis of our sample, the areas that such guidelines should cover include, for natural gas:

- the rationale for and calculation of the depletion premium;
- the calculation of the LRMC for exploration, production, storage, transmission and distribution;
- appropriate fiscal objectives for the sector; and
- the design of tariff structures taking into account LRMCs, fiscal objectives and the depletion premium.

For petroleum products the pricing issues that are still causing problems are:

- appropriate fiscal objectives and tax mechanisms; and
- the basis for setting transfer prices (producer and ex-refinery).

25. Overall, this sector has come a long way toward developing a consistent and widely followed approach to pricing issues. It has made excellent use of pricing studies financed under its projects, and it recommends specific price changes through project covenants more often than most sectors. In the borrowing countries, more work remains to be done on the gas side, both in raising tariff levels toward efficiency levels and in refining tariff structures to reflect LRMCs. In oil most countries already use the sector to raise revenue, but more attention needs to be paid to the methods by which that revenue is raised (e.g., taxes or distorted transfer prices) as well as to the appropriate level of taxation, given the availability (or lack) of other fiscal instruments.

D. REFERENCES

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ANNEX 9: Review of Pricing and Cost Recovery in SARs:

PORTS SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing¹

1. Efficiency pricing in the port sector is interpreted as basing charges on shortrun marginal cost (SRMC). In a situation where the port is overbuilt (thus, LPMC is greater than SRMC), setting a price equal to LPMC would result in further underutilization of facilities; when demand turns out to be much larger than anticipated and services cannot be readily adjusted to the level of traffic (hence, LPMC is lower than SRMC), pricing according to LPMC would lead to inefficient congestion. Only if port charges are too costly or administratively difficult to change in view of random variations in demand then a longer-run concept of cost (e.g., a weighted average of the various SRMCs) becomes the proper criterion to use in pricing services.

A.2 Adjustments to Efficiency Prices

2. The design of port charges can entail a host of complex issues, and costs may provide only a floor on which a tariff system should be established. Departures from strict marginal cost pricing can be anticipated on account of various objectives: financial viability of the public enterprise, fiscal considerations, and distributional/social criteria (e.g., to use port charges as a means for promoting exports or keeping the domestic prices of essential commodities low).

3. Financial objectives often conflict with SRMC pricing. Port facilities cannot be constructed continuously. After any large investment, or where spare capacity otherwise exists, tariffs based on SRMC would be inadequate to cover capital costs. Even if facilities could be expanded continuously, economies of scale in ports are likely, and thus marginal cost pricing would result in financial deficits. To remedy this it has been suggested that port charges should include two parts: a) a fixed charge to pay for the fixed costs of the facilities and hence cover deficits, and b) a variable charge based on the marginal costs of supplying services. The requirement to recover costs would then serve as an incentive on the port authority to keep its expenditures and expansion plans under efficient control.

4. A different sort of problem arises in many LDCs where the high demand for limited port services causes congestion. The existence of congestion indicates that port services are a scarce resource whose marginal value exceeds its marginal cost to users. Congestion pricing can generate funds to expand services and encourage an efficient use of the port facilities as higher charges will divert traffic to other ports.

1/ This section draws largely from Port Pricing and Investment Policy for Developing Countries by E. Bennathan and A.A. Walters.

(Congestion pricing must be monitored, however, to ensure that monopoly rents are returned to government rather than absorbed through inflated sectoral costs.) In practice, tariffs in a congested port are usually kept low due to government regulation or the belief that a rise in port charges would distort the domestic prices for traded goods at the expense of local traders and consumers. Bennathan and Walters argue that even in the absence of congestion pricing shipowners would be quick to adjust freight rates according to queuing costs; thus making domestic producers and consumers pay for the real cost of congestion.

5. Finally, efficiency pricing is complicated by distributional issues. The port authority often has monopoly power and thereby the choice of setting prices above SRMC. If the participants in the market were mainly nationals, then the standard fiscal methods for regulating the distribution of monopolistic surpluses within an economy could be applied. But ports are usually confronted with organized and largely foreign-owned shipping cartels as buyers of services. Thus regulations may necessitate the use of differential pricing to control the distribution of costs and benefits between nationals and foreigners. For example, it is not unusual for ports to vary charges by classes of vessels, categories of customers, or type of commodities to achieve such a goal. The degree to which such price discrimination is effective is influenced by several factors, of which the most important are the elasticities of demand and the presence of alternative competitors. Even with price discrimination, it is difficult to assess to what extent variations in port charges are passed on to the residents of the country or absorbed by the shipping companies or foreign traders.

B. THE PRACTICE

B.1 Project Sample

6. Our sample covers all the 8 port projects approved by the Bank during FY84 and FY85. The sample countries include Mexico, Egypt, Portugal, Turkey, Tanzania, Indonesia, India and Senegal.

B.2 Discussion of Cost Recovery Issues

7. Efficiency pricing is not directly addressed in the SARs. Marginal cost estimates for supplying port services are not reported in any of the cases reviewed and information on pricing policies is scanty. The limited data so far show that tariffs often include port dues and mooring fees levied on vessels, wharfage or cargo-handling fees, and storage charges. In some cases there are concession levies payable by customers operating their own wharves, and charges for renting out equipment or land belonging to the port authority. Different sets of prices are applied to various classes of goods in Portugal, types of cargoes (e.g., containerized and bulk) in India, and types of shipping companies (e.g., domestic versus foreign flag liners) in Indonesia. No similar data are reported for the other sample countries, and tariffs for individual services are made available only in 3 cases.

8. Where reported, even in the aggregate, existing tariffs do not adequately reflect costs of service. The financial performance of port

authorities in Portugal, Indonesia and Senegal has been deteriorating due to inadequate tariff levels in relation to operating costs, or to tariffs that have remained unchanged for several years despite continuous cost increases brought about by inflation. Inadequate recovery of costs, especially with respect to infrastructure investments, via user charges is acknowledged as the key issue confronting the water transport authority in Mexico. In Egypt and Tanzania, overall port earnings have been sufficient to cover operating costs and generate a satisfactory return on assets; however, tariffs for individual services do not correspond closely with costs. By contrast, port services in India are priced in accordance with a tariff review undertaken as recent as 1983, and as such, may imply that existing tariffs reflect costs to some reasonable degree. A cost-based tariff structure is also reported for Turkey. Of the sample countries Turkey is unique in the sense that, since 1981, port tariffs have been calculated in equivalent US dollar rates thereby effectively offsetting inflation and depreciation of the Turkish lira.

9. The concept of cost on which tariffs have been based is not specified in the SARs. The interpretation of "a cost-based tariff structure" is therefore rather ambiguous, and can also mean a pricing strategy which relates individual tariffs according to the average total costs for each type of port services. As was found in a study by Bennathan (Reference 1), port authorities usually favor the use of the average total cost (or "full cost" per unit) as the basis of tariffs. Meanwhile, shown below are revenues strictly from user charges expressed as a proportion of total operating costs for 5 countries with available data. The estimates are based on 1983 data, and operating costs include working expenses plus a charge for depreciation of assets.

<u>COUNTRY</u>	<u>REVENUES/OPERATING COSTS</u> (%)
Portugal	75
Mexico	104
Tanzania	120
Turkey	238
Egypt	470

10. The financial covenants for the sample projects are summarized as follows:

<u>COVENANTS</u>	<u>NO. OF CASES</u> <u>REPORTING</u>	<u>COMMENTS</u>
Rate of return on revalued net assets	3	Ranged from 6 to 7.5% annually

Internal cash generation ratio	4	From 10% of annual investment requirements to 40% of average capital expenditures over a 3-year period
Debt service coverage ratio	5	

Financial performance targets are not specified in two cases (Mexico and India), but agreements were reached on generating revenues sufficient to cover operating costs and debt service requirements.

B.3 Use of Pricing Covenants

11. Pricing covenants are found in all projects. On the whole, these covenants seek an improvement in the pricing policies for port services, dealing specifically with such issues as the conduct of studies or periodic reviews required to implement a cost-based tariff system, and/or the formulation of new accounting systems to provide meaningful information for tariff-setting. Agreements on tariff increases of 50 and 10 percent are further obtained with regard to the projects in Portugal and Senegal, respectively. None of these covenants, however, have made a reference to disaggregated marginal costs as a benchmark for setting prices.

B.4 Sources of Project Financing

12. Project financing plans are summarized below. On average, IBRD/IDA loans and government participation in terms of equity contributions and credit accounted for about 70 percent of project costs. Cash generated internally provided around 14% of investment needs. This is a higher percentage than is found in the social sectors, but much lower than in sectors such as telecommunications where there is also scope for congestion pricing.

<u>SOURCE</u>	<u>AVERAGE</u>	<u>RANGE</u>	<u>COMMENTS</u>
	(As % of Project Cost)		
IBRD/IDA Loans	47.6	27 - 77	
Other External Loans	13.1	0 - 39	0 in 6 cases
Internal Cash Generation	13.9	0 - 35	0 in 4 cases
Government Loans	13.2	0 - 41	0 in 5 cases
Equity from Government	8.6	0 - 25	0 in 5 cases
Other Sources	3.6	0 - 28	0 in 7 cases

C. THE MAJOR GAPS

13. Efficiency pricing is definitely a pertinent issue when dealing with port projects. The theoretical concepts for pricing port services have been well elaborated by Bennathan and Walters; but have been applied in a very few cases (e.g., in Pakistan and Indonesia). Given the complex issues

involved in port pricing, perhaps more research in this area is needed in order to come up with a workable methodology for LDCs. In 1979, an office memorandum outlined the policy statements relevant to pricing/cost recovery in port projects (Carmichael); however, the Bank is yet to act on formalizing such guidelines. Some of the issues raised in these statements are as follows:

- SRMC of providing port services should be the minimum level of charges to levy on users.
- Attempts to implement marginal cost-based tariffs should concentrate on those services which are critical to overall port efficiency; tariffs for other services may be based on the average variable costs pending a review of the port's accounting and information systems.
- Accounting and information systems should be designed to provide regular comparisons between tariffs for individual services and their corresponding marginal costs.
- Measures to recover overhead costs may take account of various "non-economic" objectives for the port, but in such a way as to minimize distortions from an efficient use of port facilities.

14. In addition to these efficiency issues, the scope for revenue generation through port pricing should be assessed. This will be a complex issue since it involves demand elasticities and the degree of international competitiveness of individual ports. However, the evident congestion of existing facilities in many developing country ports suggests that there are both efficiency and fiscal gains to be achieved through selectively higher charges. Where this is the case, sights should be raised from merely attaining financial viability to capturing monopoly rents for the rest of the economy.

D. REFERENCES

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ANNEX 10. Review of Pricing and Cost Recovery in SARs:

POWER SECTOR

A. THE POLICY

A.1 Interpretation and Calculation of Efficiency Prices

1. Efficiency pricing in the power sector is interpreted as setting the price equal to LRMC, where LRMC must be evaluated within a disaggregated framework (e.g., differentiation of marginal costs by time of day, voltage level, geographic area, season of the year, etc.).¹ The degree of structuring and sophistication of the LRMC calculation depends on data constraints and the practicality of applying a complex tariff. Costs usually identified for LRMC calculation include capacity costs, energy costs, and consumer costs. Marginal capacity costs are basically the investment costs of generation, transmission and distribution facilities for supplying an additional kW. Marginal energy costs are the fuel and operating costs of providing an additional kWh; and marginal customer costs include those for connection, metering and billing.

2. Efficiency pricing as such, and peak load pricing in particular, avoid the problem of large price fluctuations associated with SRMC pricing in a sector with capital indivisibilities. In practice, capital indivisibilities are dealt with by using the Average Incremental Cost (AIC) formula for approximating LRMC. The AIC is a smoothing formula over future investments for each part of system costs; e.g., generation, transmission. With an appropriate choice of the peak period, LRMC-based tariffs with time-of-use pricing generally lead to the conclusion that peak period users (who are the cause of capacity expansions) should pay both capacity and energy costs while off-peak users pay only the energy costs.

3. Similarly, analysis of LRMC by voltage level usually indicates that the lower the service voltage, the greater the costs imposed on the system by consumers. Optimum pricing thus requires that tariffs should adequately reflect such cost differentials. Customer costs, meanwhile, are of two types. Fixed customer costs (e.g. service drop lines, meters and labor for installation) may be charged as a lump sum or as distributed payments over several years. Recurrent costs associated with meter reading, billing and collection may be imposed on users as a periodic flat charge.

A.2 Constraints to Implementing Efficiency Prices

4. Tariff structure may have to be kept simple owing to the practical difficulties of metering and billing. The degree of sophistication of metering depends on the net benefits of metering, problems of installation and maintenance, etc. Thus meters may vary from a very simple current

1/ This section draws largely from Electricity Pricing: Theory and Case Studies by M. Munasinghe and J. J. Warford.

limiting device for low-income consumers to highly sophisticated devices (e.g., time-of-day meters with synchronous clocks) applied to large industrial and commercial consumers. In some developing countries, there may be lack of technically skilled labor for installation and maintenance of sophisticated meters, or even reliable meter readers. The choice of appropriate metering is country-specific and entails many practical considerations.

5. Second-best issues are likewise a major constraint to the economic pricing of power. Where kerosene is subsidized, it may provide cheaper lighting than LRMC-priced electricity. In some countries diesel oil is also subsidized leading to competition from privately owned generators. The existence of these second-best problems sometimes makes it necessary to price electricity below LRMC.

A.3 Adjustments to Efficiency Prices

6. Both equity and financial objectives are important to the power sector, and have been used to justify deviations from efficiency pricing. Equity arguments are often advanced in favor of a subsidized "social" block or "lifeline" rate for low-income consumers. The argument is especially strong in places where the cost of electricity accounts for a large share of income among poor households. Sometimes income distributional goals are further manifested via preferential tariffs set for rural electrification to encourage industries to locate in rural areas.

7. Among state-owned power utilities, financial autonomy and self-sufficiency are an important goal. A marginal cost pricing policy which results in failure to achieve minimum financial targets for continued operation of the power sector is usually unacceptable in view of subsidy requirements and scarcity of public funds. On the other hand, it is politically unpopular when marginal cost pricing results in financial surpluses well in excess of revenue targets. Thus in either case a divergence from the strict LRMC-based tariffs is argued. This divergence can be minimized by discriminating between various customer categories and imposing the greatest adjustment in tariffs on that group with the lowest price elasticity of demand.

8. The use of power pricing as a tool for raising central government revenues is rarely applied owing to its political sensitivity. Fiscal objectives are therefore accorded less importance in the sector.

B. THE PRACTICE

B.1 Project Sample

9. Twenty projects were covered in this review. Our sample accounted for 69 percent of the total number of power projects (excluding multipurpose water supply, irrigation/flood control and hydropower projects) approved by the Bank during FY84 and FY85.

B.2 Discussion and Calculation of Efficiency Prices

10. The SARs provided an adequate discussion of efficiency pricing issues, and a comparison between actual prices and marginal cost of supply was routinely made. Although LRMC estimates (based on the average incremental cost concept) were reported only in 14 projects, marginal cost pricing was used in all sample cases as a benchmark for setting electricity tariffs. LRMC ranged from 2.4 to 15.6 US cents per kWh, and averaged 8.4 cents. Actual tariffs varied between 1.5 and 18.0 cents per kWh, with a sample mean of 6.5 cents. As shown below, tariffs as a proportion of LRMC differed sharply across countries.

<u>Country Group</u>	<u>Existing Tariffs as a % of LRMC</u>		<u>No. of Cases Reporting</u>	<u>Comments</u>
	Average	Range		
African	67.8	30- 99	4	Below 68% in 2 cases
Latin America and the Caribbean cases:	114.0	87-141	2	LRMC not reported in 3 specified tariffs as being close to LRMC in 1 case and far below LRMC in 2 cases
South and East Asia	77.0	32-118	6LRMC	not reported in 3 cases: specified tariffs as being higher than LRMC
EMENA	84.5	77- 92	2	in 1 case and lower in 2 cases
<u>WHOLE SAMPLE</u>	<u>80.7</u>	<u>30-141</u>		Over 100% in 3 cases

11. Tariff structures are often described with distinctions being made between energy and capacity charges. Energy charges, which were levied to recover expenditures for fuel, operation and maintenance, varied primarily by type of customers (found in 14 cases) or by voltage level (4). The two projects in Brazil applied a uniform tariff to all customer categories. Shown below is the distribution of the sample according to the nature of tariff schedules used for charging energy costs.

Item	Tariff Schedule				Comments
	Increasing Block	Decreasing Block	Flat Rate	Not Specified	
----- No. of Cases -----					
A. By customer category:					
Domestic	5	3	2	4	Rates were further differentiated by voltage level in cases: declining block tariff in cases and in increasing block tariff in 1 case if voltage level were correlated with consumption
Commercial	3	4	3	4	Declining block tariff in 3 case and increasing block tariff in case if voltage levels were correlated with consumption.
Industrial	0	6	4	4	Declining block tariff in 5 cases if voltage levels were correlated with consumption.
Other	0	3	6	5	
B. By voltage level:					
LV users	0	0	3	1	
MV or HV users	0	2	1	1	

The table indicates that an increasing block tariff was more often applied to domestic uses, a decreasing block tariff to commercial and industrial uses, and flat rates to other uses. When flat rates were used for all categories of customers (e.g., in St. Vincent), much higher tariffs were levied on non-residential users. LV users were also usually charged a higher flat rate than and HV users since low voltage uses imposed greater costs on the system. Meanwhile, a fuel surcharge was added on top of the basic tariff in 9 cases as adjustment mechanism which would ascertain an automatic recovery of fuel cost increases. This was true especially in those countries (e.g. Kenya, Tunisia, Haiti, Yugoslavia, St. Vincent and India) which had been relying heavily on imported fuel for power generation.

12. Capacity charges were selectively levied on large commercial and industrial customers or MV and HV users to take account of the costs of providing additional generating capacity to meet peak demands. Peak load pricing was observed in two forms: time-of-use pricing (found in 7 cases) and pricing by season (3). In addition, charges based on maximum demand were used in 14 cases. The latter will not allocate capacity costs to marginal users unless maximum demand coincides with peak hour use. Further, unlike time-of-use pricing, demand charges will not give consumers the incentive to switch from peak to off-peak periods.

13. Exports of electricity were recorded for Uganda and Nepal. Bulk sales to Kenya accounted for 46 percent of Uganda's output in 1985, and are expected to remain at that level until 1990. Over that period, tariffs in real terms would increase from 0.25 to 1.05 US cents per kWh sold to Kenya while sales inside Uganda would be priced from 1.50 to 2.11 cents per kWh. The lower price pegged to bulk sales was due to a 50-year contract that started in 1958, at the time Uganda was experiencing substantial excess of generation capacity over domestic demand. Nepal's bulk sales to India amounted to 8 percent of total sales in 1984, and are expected to decline to 4 percent in 1991. Tariffs in real terms would remain at 1.40 cents per kWh. Over the 1984-91 period, tariffs for domestic consumption would increase from 5.06 to 7.36 cents per kWh.

B.3 Discussion of Adjustments to Efficiency Prices

14. The divergence between actual tariffs and LRMC was often rationalized on the basis of financial and equity considerations. Financial objectives were cited in 7 cases (with tariffs of 92-141 percent of LRMC), and equity/social considerations in 5 cases (32-72 percent). In Uganda, a declining per capita consumption of electricity due to worsening economic conditions reportedly resulted in very low tariff level relative to LRMC (30 percent). No reason was given for the deviations from efficiency prices in the other cases reviewed. On the whole, the SARs did not provide insights on the importance of fiscal objectives for pricing electricity.

B.4 Discussion of Cost Recovery Issues

15. The financial covenants for the sample projects are summarized as follows:

<u>Covenants</u>	<u>Average</u>	<u>Range</u>	<u>No. of Cases Reporting</u>
Internal cash generation	21%	15-27% of investment requirements during project period	3
	28%	15-40% of annual capital expenditures	5
Rate of return on revalued net assets	7%	6- 9% per year	10
Rate of return on assets valued at historic costs	9%	6-14% per year	4

Of the 14 projects with rate of return covenants, only those in China (two projects), India and Nepal were found to base asset valuation on historic costs. The use of historic cost in the case of China was justified according to its low cost inflation and fairly constant price patterns over time. Debt service covenants and absolute debt limitations were also applied in 12 and 4 projects, respectively.

B.5 Use of Pricing Covenants

16. Agreements were reached in 9 projects to undertake a tariff study based on LRMC in order to formulate appropriate revisions of tariff levels and structures. Of these cases, the need to implement time-of-use pricing was specified in only one project (Malaysia). Covenants in the other projects simply entailed setting tariffs at levels adequate to ensure the achievement of financial targets; required tariff increases were specified in 5 of these projects and a methodology for calculating LRMC was included in one Indian project.

17. In light of the foregoing covenants, the expected tariffs during project completion were calculated in the SARs. Tariffs in real terms would then range from 2.1 to 20.5 US cents per kWh, and average 7.1 cents. This would be tantamount to an average annual growth rate of 3.1 percent over the entire sample. Tariffs would decline in real terms in 4 cases; Kenya, Panama and India (2 projects), at a rate of 1 to 5 percent per year. The relationship between expected tariffs and LRMC by country groups is shown below.

<u>Country Group</u>	<u>Expected Tariffs as a % of LRMC</u>		<u>No. of Cases Reporting</u>	<u>Comments</u>
	Average	Range		
African	72.2	42-100	4	100% in 1 case
Latin America and the Caribbean	106.5	102-111	2	
South and East Asia	88.7	47-118	6	At least 100% in 2 cases
EMENA	103.0	99-107	2	
<u>WHOLE SAMPLE</u>	88.6	42-118		At least 100% in 6 cases

Only five projects would have tariffs lower than the sample mean (89 percent of LRMC), and mostly in those countries where social considerations had been accorded much importance in the formulation of pricing policies for the power sector. Thus if the adjustments in tariff levels are executed as agreed, over the sample average revenues will grow from 81 to 89% of LRMCs.

B.6 Sources of Project Financing

18. The financing plans for the sample projects are shown in the summary table below. On average, external loans accounted for 63 percent of project costs. Cash generated internally financed only about 14 percent. This is in contrast with oil/gas and telecommunications projects where efficiency pricing has also been widely practiced, and where internal cash generation accounted for more than 30 percent of project costs on average.

<u>Source</u>	<u>Average</u> (As % of Project Costs)	<u>Range</u>	<u>Comments</u>
IBRD/IDA Loans	37.6	18-64	
Other External Loans	25.7	0-82	0 in 4 cases
Internal Cash Generation	13.6	0-40	0 in 6 cases
Government Loans	7.4	0-48	0 in 13 cases
Equity from Government	5.7	0-47	0 in 15 cases
Other	10.0	0-60	0 in 13 cases

C. THE MAJOR GAPS

19. Much of the theoretical development of efficiency pricing under conditions of capital indivisibility has taken place with reference to electric power. The theory has been applied in detailed case studies (References 3 and 4), and widely disseminated in the developing countries through courses and projects. In this respect the power sector provides a model for other sectors of the process by which efficiency pricing can be developed into practical guidelines and implemented through projects.

20. In power, the gaps that remain are (i) the incorporation of fiscal objectives into pricing structures; (ii) the development of better means to promote cost-minimization in public monopolies, consistent with economic pricing; and (iii) increased focus on implementation issues, including the structure of tariffs and the metering/billing/collection system. In many countries the power sector represents a neglected source of much needed public funds, both through direct taxes and through improvements in X-efficiency that can bring about financial surpluses. The potential and means for achieving such should be explored through case studies that include other public enterprises, in order to evaluate the role that the power sector should play within a broader fiscal context.

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ANNEX 11: Review of Pricing and Cost Recovery in SARs:

RAILWAYS SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing

1. Both short- and long-run marginal costs have been suggested as an efficiency pricing guide for railways. In expanding systems the two definitions often merge, while in stagnant or declining traffic systems, SRMC will generally produce a more efficient level of capacity utilization. Whichever is the better guide for a particular place, tariffs should be discriminatory in terms of reflecting the marginal costs at different points on the network, time or season, and in levying higher mark-ups on that traffic which is less price-elastic. The opportunity for peak load pricing, for instance, lies in the fact that some major cargoes are highly seasonal (e.g., agricultural produce) and the demand for passenger train services can be differentiated according to time of day (e.g., rush versus nonrush hours). The extent to which price differentiation can be implemented is influenced by the degree of competitiveness of railways vis-a-vis other transport modes. Trains have a comparative advantage in carrying dense flows of traffic over fairly long distances; nevertheless, price differentiation would be economically sound whenever the resulting net additional revenues more than cover short-run marginal costs.

A.2 Constraints to Implementing Efficiency Prices

2. A major constraint to implementing efficiency prices is the complexity of cost allocation to different types of load (e.g., passenger versus freight) and over different routes or times of day. Joint costs are everywhere in a well-managed railway, and marginal increases or decreases in one type of traffic have cost repercussions throughout the system. Even average cost figures, such as the frequently quoted cost/ton/km, are almost meaningless in a system with such a high ratio of fixed to variable costs. At the same time, long-run system costing is a more difficult exercise in the railway sector than it is in power or telecommunications.

3. A second factor that complicates the calculation of efficiency prices in railways is the difficulty of forecasting demand. Much railway use is a derived demand that is dependent on general economic conditions. Close substitutes exist on both the freight and passenger side. Public subsidies are prevalent throughout the transport sector, and policy changes in one sub-sector have immediate effects on the others. For all of these reasons, traffic projections have been a major problem in railway projects.

A.3 Adjustments to Efficiency Prices

4. Both financial and fiscal objectives are important in railways, and have been used to justify deviations from marginal cost pricing. In such cases, as suggested in OMS 3.78, the Bank's conditionality for lending has focused on the railway's operational efficiency. Such conditionality includes tariff increases, closure of uneconomic lines and services, improvements in managerial performance, the avoidance of uneconomic investments, and increasing the freedom of rail management in setting tariffs to ensure a viable competition with other transport modes.

5. Along with this emphasis on X-efficiency achieved via non-price measures, financial objectives appear to dominate the sector. Budgetary equilibrium is sought, which requires the enterprise to earn at least enough revenues to cover all working costs and to service debts. This principle has now been widely accepted, both for fiscal and managerial efficiency reasons. Public subsidies to railways have clearly been reduced in recent years in response to the Bank's renewed focus on fiscal constraints.

6. Equity considerations are sometimes important for pricing rural train service or non-express intercity lines. Generally, however, trains provide a higher standard of service (and for a higher price) than buses, so lower income households are not major consumers.

B. THE PRACTICE

B.1 Project Sample

7. A sample of 7 projects (in Zaire, Zambia, Korea, China, India, Brazil, and Mexico) is used for this review. The sample accounts for 88 percent of the total number of railway projects approved by the Bank during FY84 and FY85.

B.2 Discussion of Cost Recovery Issues

8. The foregoing should shed light on the nature of data collected for documenting current pricing/cost recovery practices in railway projects. Efficiency prices are not addressed in the SARs; and the adequacy of tariffs is gauged not according to the marginal costs of providing rail services, but based on the relationship between total

revenues and total expenditures. Annual expenditure and revenue data for the sample countries are summarized below:

<u>ITEMS</u>	<u>AVERAGE</u>	<u>RANGE</u>	<u>COMMENTS</u>
Total Operating Expenses (US\$ Millions)	1,624.0	47 - 4,776	
Working Expenditures (As % of total operating expenses)	72.6	48 - 88-	Over 70% in 5 cases
Total Revenues: As % of working expenses	124.0	93 - 186	Over 100% in 6 cases
As % of total operating expenses	90.3	49 - 145	Over 100% in 1 case

Total operating expenditures (also referred to in the SARs as "long-term variable costs") are comprised of working expenses, depreciation allowances and interest charges on outstanding debts, if any. Working expenditures include salaries, material and fuel costs, taxes and other cost components which are considered variable in the short run. Total revenues include passenger fares, freight tariffs, and charges for the provision of services other than transport; e.g., mail delivery, catering, etc. They are exclusive of government subsidies for those countries where compensation payments to the railway authority are being practiced.

9. Revenues from user charges varied between 93 and 186 percent of working expenditures, with a sample mean of 124 percent. It is only in the case of Brazil where total revenues amounted to less than working expenditures. Nonetheless, operating losses are found in the majority of the countries reviewed. Total revenues were only 49 percent of total operating expenditures in Brazil; 62 percent in Mexico; and ranged from 91 to 97 percent in the other sample countries. China is a major exception, with revenues of 145 percent of operating expenditures. The shortfalls in revenues relative to operating expenses have been attributed to low tariffs, lack of timely approval by government of tariff increases, and/or simply the reluctance of government to grant adequate adjustments in charges for rail services on account of social policies. Losses have also been associated with operational inefficiencies such as the continued operation of uneconomic lines, low locomotive availability, overstaffing, etc.

10. Freight tariffication is generally based on distance, weight and type of commodity. Passenger fares vary by class of travel (e.g.,

express trains, ordinary trains, and sometimes mixed freight/passenger trains for servicing outlying low density areas), and by distance. Disaggregated information on the relationship between average operating costs and average prices is very limited as shown below:

<u>ITEMS</u>	<u>RANGE</u>	<u>NO. OF CASES REPORTING</u>	<u>COMMENTS</u>
A. Freight services:			
Average revenues/ ton-km (US cents)	0.72 - 3.80	6	
Average operating costs/ton-km (cents)	0.47 - 1.66	3	Reported only for Brazil, China & Mexico
Average revenues as percent of average operating costs	73 - 153	3	Over 100% in 2 cases (China & Mexico)
B. Passenger services			
Average revenues/ pass-km (cents)	0.47 - 7.71	7	
Average operating costs/pass-km (cents)	0.54 - 1.96	3	Mexico, China & Korea
Average revenues as percent of average operating costs	54 - 135	3	Over 100% in 2 cases (Korea & China)

Thus profitable operations with regard to the provision of both freight and passenger services are evident only in China. This conforms with the earlier observation that revenues greatly exceeded total operating expenses only in this country.

11. Distortions in tariff structures are specified in 6 cases, where there is cross-subsidization from one type of service to another. In Zaire, for example, mineral exports are priced below cost of service. Losses on this particular traffic are compensated to some extent through higher tariffs for general cargo and passenger services, thus making overall tariffs not well related to costs. In Korea, ordinary passenger trains are operated at a substantial loss due to controlled low tariffs in furtherance of government's social objectives while express train services are charged highly profitable fares. Pricing practices that tend to subsidize passenger services, with preferential pricing often given to intercity passenger traffic or ordinary train services, and/or to certain types of products (e.g., grains, cement, fertilizer and iron) are likewise found in India, Zambia, Brazil and Mexico.

12. Government's provision of direct subsidies to railway authorities are found in Brazil, Mexico and Korea. In Brazil, the government makes normalization payments for the nonremunerative services which it requires the railway authority to operate--e.g., operations in the northeast region which are not commercially viable but nonetheless are maintained for social reasons; intercity passenger services at controlled low tariffs, etc. Normalization payments for freight services are made according to a simple formula representing a fixed percentage (e.g., 80 or 85 percent) of the net loss, whereas for passenger services the payments cover the entire loss. The existing form of normalization, as pointed out in the SAR, is unsatisfactory since it gives the railway authority little incentive to improve the efficiency of the services for which normalization payments are made. Annual normalization payments during the 1979-83 period represented about 20 percent of total operating revenues.

13. In Mexico, the government provides a passenger subsidy to compensate for the railway's losses arising from restrictions on raising fares. Apart from social considerations, which have kept passenger fares below cost of service, the government is also reluctant to grant adjustments in fares sufficient to cover operating costs on the grounds that the rolling stock is old and services provided are generally poor.

14. In Korea, losses on ordinary passenger train services are recovered partly through retroactive payments from the government. The subsidy approximates the underrecovery of operating costs, given the requirement that the railway authority should cover some of the losses via improvements in efficiency and profits on other services. Losses amounted to W51.2 billion in 1982, of which W35.4 billion was reimbursed by the government in 1983.

15. In addition to these cases of direct subsidies, in India the railway authority receives an indirect subsidy from the government through exemptions from payment of dividends on government funds invested in the construction of certain strategic lines or in maintaining nonremunerative branch lines. In China, practically all cash generated in railway operations is remitted to the State, while the latter finances all investment expenditures. The net flow of funds has been very profitable for the State; amounting to Y3.1 billion in 1983.

16. Financial covenants are reported for most of the sample projects. Rates of return on revalued net assets are found in two cases: 3 percent a year in Zaire and an average of about 5 percent per year in Korea. Three other countries have internal cash generation agreements ranging from 20 (Zambia) to 48 (Brazil) percent of total investment expenditures, with one case unspecified. Debt service coverage ratios are also used in three of these projects. Annual operating ratios amounting to an average of 1.03 are applied in the Brazilian project; no financial covenants are found for China.

B.3 Use of Pricing Covenants

17. Broadly stated, pricing/cost recovery agreements include: to complete a tariff costing system with the objective of relating tariffs to costs (found in two cases); to ensure government cooperation in terms of approving proposed tariff increases as endorsed by the railway authority or maintaining tariffs at levels necessary to achieve agreed financial performance criteria (3); to adjust freight and passenger fares to levels that will recover long-term variable costs or simply to ensure full recovery of operating costs (2); and to establish administrative mechanisms for the closure of not commercially viable lines (1). While these covenants are directly compatible with operational efficiency and profitability objectives, only the costing studies touch on the application of marginal cost pricing principles as a benchmark for tariff setting. Experience with such studies in the past has been that they provide useful insights but are rarely implemented.

B.4 Sources of Project Financing

18. A summary of the project financing plans is shown below. IBRD/IDA loans and government participation in the form of credit and equity contributions constitute the major sources of funds, altogether accounting for an average of 67 percent of project costs. Internal cash generation varies widely across countries.

<u>SOURCE</u>	<u>AVERAGE</u> (As % of Project Costs)	<u>RANGE</u>	<u>COMMENTS</u>
IBRD/IDA Loans	31.5	15 - 47	
Other External Loans	16.2	0 - 44	0 in 3 cases
Internal Cash Generation	16.4	0 - 72	0 in 4 cases; 72% in China
Government Loans	23.9	0 - 72	0 in 4 cases; 72% in India
Equity from Government	12.0	0 - 74	0 in 5 cases; 74% in Mexico

C. THE MAJOR GAPS

19. A great deal of attention has recently been focused on the severe financial/fiscal problems of the railways sector. This focus has resulted in a more systematic approach to cost recovery and more stringent targets

for operational efficiency. Our review of FY84/85 projects indicates that this new emphasis is bearing fruit in the countries with which the Bank is involved.

20. Once the underlying financial requirements for continued operation have been met, attention can be broadened to include issues of tariff structure and efficiency pricing. The sample SARs provided little coverage of tariff differentials, peak pricing, or even disaggregated costs. While recognizing the inherent difficulties of fine cost separation, it would be useful to compare user charge categories with attributable costs in advising on tariff changes. In addition to contributing to better railway utilization, such an analysis would be helpful in evaluating sector-wide pricing policy including road user charges and port fees.

21. To our knowledge, no practical methodology is available on efficiency pricing in developing country rail transport. An excellent "traffic costing" report was prepared 12 years ago (Reference 4), but it stops short of the transition from costs to tariffs. If staff are to devote more attention to tariff structure issues, a review of current practice and guideline for tariff design based on efficiency criteria will be needed.

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ANNEX 12: Review of Pricing and Cost Recovery in SARs:

TELECOMMUNICATIONS SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing

1. The application of marginal cost pricing concepts in the telecommunications sector is usually met with a number of difficulties, of which the most important are the issues of declining unit costs and positive externalities.¹ Telecommunications is a declining unit cost industry; thus if prices are set equal to the marginal system costs of supplying services then financial losses are likely to be incurred. Positive externalities are encountered in two ways: a) each time a new subscriber is connected to a network, the value of the other parties' telephones is increased in terms of more potential contacts; and b) making a call can be beneficial to both the caller and the party called. The presence of such externalities suggests that, in order to achieve an efficient allocation of resources, prices should be less than the installation costs and marginal call costs.

2. In view of the financial implications of declining unit costs and externalities, efficiency pricing is interpreted within the context of tariff structures. In cases where the excess demand for connections is not large and traffic congestion is not a significant problem, efficiency pricing can be approached by structuring tariffs to consist of a lump sum charge that would cover subscriber plus other non-marginal costs and call charges that would reflect marginal call costs. However, in most LDCs the usual scenario is one of tremendous unsatisfied demand for services, as evidenced by long waiting lists and high incidence of call failures. Efficiency pricing in this case requires that prices reflect not only the marginal system costs of supplying services but also the marginal opportunity costs of connections or calls. The marginal opportunity costs can be approximated by the maximum amount that potential users deprived of service would be willing to pay to obtain it. The application of efficiency pricing into practice would then mean adjusting charges to levels that would clear the market and allocate supply according to the costs of services and peoples' willingness to pay. This is attainable through various pricing strategies, the most common of which is the use of highly differentiated tariff schedules. Price differentiation in the telecommunications sector has been related to factors such as type of users, time of use, size of service area, and distance over which the call is made. Thus on the basis of supply

1/ This section draws largely from "Telecommunications Pricing and Investment in Developing Countries" by R.J. Saunders and J.J. Warford. Also, this review is focused on telephony alone.

costs and value-of-use, tariff structures should lean toward higher charges for calls made during peak than off-peak hours; toward higher connection charges for business than for residential users; higher unit charges for long distance than for local calls; and variations across subscription rates within a large service network.

A.2 Adjustments to Efficiency Prices

3. Telecommunications pricing is discussed in OMS 3.72 and in the 1983 book by Saunders et. al. (Reference 4). They suggest the use of efficiency prices as a benchmark and as one that would be compatible with mobilizing financial resources for expansion of the telecommunications network or for general government expenditure purposes. The financial viability of the enterprise and fiscal considerations thus play a major role in the design of appropriate tariff levels and structures. There are, however, certain practical limitations. For example, time of use pricing is sometimes constrained by technical difficulties in metering consumption and the choice of proper peak periods; or there is political sensitivity to increasing tariffs to meet financial and fiscal goals.

4. The importance of distributional issues in telecommunications pricing is well accepted in the Bank, although in practice equity issues are handled with relatively lower priority. It has long been argued that prices can be structured to reflect income differentials by user groups or to cross-subsidize from urban to rural subscribers, but in practice few examples can be found. This may be because telephone ownership and use is highly concentrated in higher-income households.

B. THE PRACTICE

B.1 Project Sample

5. A total of six telecommunications projects were approved by the Bank during FY84 and FY85. All these projects were used in this review. The sample countries included Algeria, Oman, Ethiopia, Kenya, Guatemala and Nepal.

B.2 Calculation and Discussion of Efficiency Prices

6. Neither the calculation of efficiency prices nor a comparison of existing tariffs with the economic costs of service is reported in the SARs. As noted below, all projects provided for costing studies to be undertaken, presumably reflecting inadequate data at time of appraisal. Nonetheless, existing price structures for telephone services in the countries reviewed seemed to conform with some of the general aspects of efficiency pricing discussed in para. 2. On the whole, tariffs are structured to consist of the following elements: a nonreimbursable fee for initial connection to the network; a monthly subscription fee for terminal equipment and continued connection; and charges for local, long distance and international calls. In five

cases the installation and/or monthly subscription fees are differentiated according to various factors. For instance, installation fees vary by type of users in Oman where connections for business purposes are charged ten times more than residential users; and by distance in Guatemala as well as in Kenya. In Kenya installation charges increased at an increasing rate with distance (reportedly reflecting overall cost patterns), subject to a maximum ceiling. The opposite is true in Guatemala where connections within the capital city are levied a much higher fee than those in other places, due to smaller service network in the latter. Subscription fees increased with subscriber capacity in Algeria; are differentiated by type of users in Guatemala; and vary according to both categories in Ethiopia. In these two countries business users pay at least twice as much in monthly rentals as residential users. Meanwhile in Nepal connections to the network are charged an exceptionally high fee, and there is a requirement to pay a deposit which is refundable upon termination of service. It thus appears that in Nepal available services are rationed largely through these price instruments.

7. Local calls are typically not timed or subject to any time limit. This is true in Algeria, Ethiopia, Kenya and Nepal; moreover, rates do not vary by time of use. In the other sample countries calls are pulse coded, allowing a much longer pulse duration for calls made at night than during the day. Thus while the unit call charge is fixed as in the case of Oman, rates effectively differ for calls made during peak and off-peak hours. Peak and off-peak pricing of local calls is also practiced in Guatemala, with different charge schedules for business and domestic uses. Long distance calls are levied charges that progress according to specified distance intervals. The per kilometer rate in most cases is lower for calls over longer distances. The costs associated with long distance transmission and switching decline rapidly with distance. Time of use pricing is generally practiced with respect to long distance calls, but rarely applied to international calls. Shown below is the distribution of the sample according to the foregoing discussions on tariff structures:

<u>Fees</u>	<u>With Price Differentiation</u>			<u>Without Price Differentiation</u>
	<u>By Customer Category</u>	<u>By Time of Use</u>	<u>Other</u>	
		No. of Cases		
Installation	1	Not applicable	2(By distance)	3
Monthly Subscription	2	Not applicable	2(By size of network)	3
Local call	1	2		4
Long distance call	0	5	5(By type of call; e.g. STD versus operator-assisted)	0
International call	0	1	1(By distance alone) 4(By country)	2

Evidently, there remains a wide scope for improvement in pricing policies for telephone services. Attention should be paid specifically to time of use pricing of local and international calls, and price differentiation by type of users. Only one country in the sample applies the business-residential distinction to both the monthly and call charges.

8. Excess demand is common among the sample countries. On average, nearly 33 and 19 percent of long distance calls and local calls, respectively, failed due to circuit congestion at busy hours. Congestion problems are least acute in Algeria where the proportions of uncompleted calls to total call attempts are usually below the sample mean; they are most serious in Kenya with about 55 percent of uncompleted local calls and a failure rate for long distance calls of as high as 87 percent. Furthermore, lines in service as a proportion of total demand for telephone line connections ranged from as low as 33 percent in Nepal to 67 percent in Ethiopia. The sample mean is about 50 percent--suggesting considerable waiting lists in the countries reviewed with about half of the demand not being met.

9. In the absence of marginal cost estimates, the internal financial rates of return (IFR) for the projects should be useful in evaluating the adequacy of tariff levels. IFR on average amounts to slightly over 15 percent, and is higher than the generally accepted measure of 8 to 10 percent for the opportunity cost of capital. Since projects' benefit and cost streams have been valued at constant prices, this suggests that tariffs at their prevailing levels are above the average system costs of supplying service. However, the presence of substantial waiting lists and traffic congestion implies that existing tariffs are still inadequate vis-a-vis marginal opportunity costs associated with frustrated demands. Such pricing strategies as raising installation fees, monthly rentals and/or call charges together with properly differentiated tariff schedules are thus required for an efficient allocation of supply among competing users.

B.3 Discussion of Adjustments to Efficiency Prices

10. Efficiency prices are not reported in the SARs. Thus both the extent to which existing tariffs diverge from the efficiency prices and reasons for such divergence are not dealt with in the appraisal reports. However, tariffs in the sample countries remained virtually unchanged between the late 1970s and early 1980s. Reportedly, cost escalation and the absence of periodic tariff reviews have led to inabilities of the telecommunications authorities to sustain efficient operation and execute development plans. The SARs provide an adequate discussion of the need to adjust existing tariffs on the basis of efficiency pricing principles, taking also into consideration nonefficiency objectives. Sufficient emphasis is placed on financial and fiscal issues. This is evidenced by agreements on pricing and financial performance targets which are designed to ensure a viable operation of the enterprise; and an analysis of the fiscal impacts of projects is almost routinely included in the SARs. Equity issues are directly addressed in only two cases (Ethiopia and Guatemala) which

cited adjustments to accommodate a cross-subsidization from urban to rural subscribers.

B.4 Discussion of Cost Recovery Issues

11. Cost recovery is usually high in the telecommunications sector. All six projects used for this review have rate of return covenants based on revalued net assets, which generally amount to at least 11 percent a year. Rates of return on invested capital serve as a measure of the extent of cost recovery from users of the services provided. In three cases an internal cash generation target is specified, ranging from 23 to 50 percent of capital requirements during the implementation period of projects. Debt service and debt limitation covenants are applied in one and two projects, respectively. Fiscal objectives are well addressed in the SARs, and an analysis of the fiscal impacts of projects was done in five cases. The net fiscal surplus that would accrue to the governments as found in these analyses is shown below:

<u>Country</u>	<u>Amount (US\$Million)</u>	<u>Period</u>
Ethiopia	106.9	1984-88
Algeria	282.6	1983-88
Nepal	45.0	1986-92
Kenya	20.3	1984-88
Guatemala	82.0	1984-87

B.5 Use of Pricing Covenants

12. It is only in the cases of Kenya and Nepal that tariff increases--30 and 20 percent, respectively--are specified as conditions of loan effectiveness. In all cases, studies were required to compare tariffs with costs of services and to lay down principles on which to base future price adjustments. These studies in general include a) traffic congestion analysis with emphasis on peak call use; b) local, long distance and international call rate analyses; and c) assessment of the sensitivity of demand for each services offered with respect to changes in prices. In all cases tariff studies are based on efficiency price considerations.

B.6 Sources of Project Financing

13. Project financing plans are shown in the summary table below. In sharp contrast to most other sectors, cash generated internally was the primary source of funds, followed by IBRD/IDA loans and other external donors.

<u>Source</u>	<u>Average</u>	<u>Range</u>	<u>Comments</u>
	(As % of Project Costs)		
Internal Cash Generation	39.1	15-69	15% in Nepal
IBRD/IDA Loans	27.7	10-41	10% in Oman
Other External Loans	29.7	0-52	0 in 2 cases; 52% in Nepal
Government Loans	3.5	0-21	0 in 4 cases

C. THE MAJOR GAPS

14. Clearly, efficiency pricing is relevant to the telecommunications sector; and the theory and application to LDCs have been well defined in works done within the Bank. Nonetheless, there still remains a wide scope for improvement of pricing practices in the sector. The pricing studies carried out by consultants under Bank projects have not been very satisfactory. The need for more applied work in this area and the development of specific guidelines for tariff analysis in telecommunications projects have been the subject of a recent memorandum on telecommunications pricing. This Memo suggests that a guideline for tariff analysis should be prepared along with a simple computer model for cost/price/revenue analysis.

15. Our review indicates that more attention is needed in the following areas:

- time of use pricing and price differentiation by type of users;
- the application of marginal opportunity cost concepts in LDCs; and
- the design of appropriate equity objectives for the sector.

There is good reason to believe that borrowing countries would take genuine efforts to put pricing recommendations into practice. Telecommunications is one of the few public sector enterprises that can earn a surplus for governments. In view of scarce fiscal resources for overall economic development programs, this should provide a powerful incentive to implement rationing prices where those are appropriate.

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ANNEX 13: Review of Pricing and Cost Recovery in SARs:

WATER SUPPLY AND SEWERAGE SECTOR

A. THE POLICY

A.1 Interpretation of Efficiency Pricing

1. Efficiency pricing in the water supply sector is generally interpreted as long-run marginal cost because of the lumpiness of investment.¹ In the presence of capital indivisibility, a condition typical of water supply projects, short-run marginal cost pricing would result in sharp fluctuations in price which consumers are bound to resent. To resolve this situation, Saunders et al proposed the use of the longrun average incremental cost concept as an approximation to optimal pricing. Efficiency considerations would then require that price should equal the average unit cost of incremental output. Average incremental costs can be calculated by dividing the discounted value of future supply costs by the (similarly discounted) amount of additional water to be produced.

A.2 Constraints to Implementing Efficiency Prices

2. The main constraint to implementing efficiency pricing for water supply is the cost of metering. The case for metering large industrial and commercial consumers is often not a matter for serious dispute since the cost of metering is normally small relative to the value of water consumed. The crucial issue is whether or not to meter domestic and small commercial consumers. Especially in rural areas, the costs associated with meter reading and maintenance tend to be high due to low population density. In addition, where consumption is lower, the potential gains from conservation of water are limited. Thus, the appropriate source of supply may be communal standposts or wells rather than house connections in rural areas.

A.3 Adjustments to Efficiency Prices

3. Both equity and financial objectives are important in the water supply and sewerage sector. When average costs are falling (and thus marginal cost is less than average cost), marginal cost pricing would entail financial losses for the enterprise. This situation could be temporary; e.g., where there is excess capacity, or of some permanence; e.g., if longrun average costs are declining. In practice a two-part tariff is often used (e.g., consumers pay a sum per thousand gallons equal to marginal cost and a lump sum to cover fixed costs) or charges are based on "what the traffic will bear" (e.g., industrial consumers are charged higher prices than residential users).

1/ This section is based mainly on SWP #259, Alternative Concepts of Marginal Cost for Public Utility Pricing: Problems of Application in the Water Supply Sector, by R.J. Saunders, J.J. Warford and P.C. Mann.

4. In several instances the willingness-to-pay criterion is modified to provide cheap water to low income groups. An increasing block tariff, with the first block normally priced at "lifeline" rates, is used to ensure access to services by poor urban dwellers. A rule of thumb used in the rural areas is that the poorest households should not spend more than five percent of their income for water.

5. Relatively little emphasis has traditionally been placed on fiscal issues. Recently, however, a draft paper from WUD proposed that more emphasis be given to cost recovery in rural water supply projects because fiscal resources are inadequate to support sector expansion.

B. THE PRACTICE

B.1 Project Sample

6. This review is based on 14 projects (in 11 countries: Yemen, Tunisia, Algeria, Jordan, Honduras, Colombia, India, Korea, Mali, Nigeria, and Liberia). Ten projects are for urban water supply and four are intended to supply potable drinking water in rural areas. Eight projects have a sewerage component in addition to water supply. The sample represents 67 percent of the total number of water supply and sewerage projects (excluding multi-purpose projects with major provisions for power distribution and irrigation/flood control) approved by the Bank during FY84 and FY85.

B.2 Discussion and Calculation of Efficiency Prices

7. Efficiency pricing issues are adequately discussed in the SARs. The longrun average incremental cost concept was used in calculating the efficiency prices. LRMIC for water supply services was reported in 13 projects, ranging from 10 to 117 US cents per m³, and averaging 55 cents. Small agglomerations of rural population or locational mismatch between water sources and consumption centers resulted in relatively high investment costs for some projects (e.g., Yemen and Jordan). The water tariffs at the time when the appraisal reports were prepared ranged from 4 to 72 cents per m³, with a sample mean of 29 cents. Thus tariffs on average represented 45 percent of LRMICs.

8. Differences in the structures of water tariffs are quite evident. Tariffs, which were levied on metered consumption of water, varied primarily according to customer categories (e.g., residential, commercial and industrial) as observed in seven cases; location (i.e., urban and rural areas) in three cases; supply system (i.e., piped and standposts) in Tunisia; and type of water (i.e., raw and treated) in Korea. The tariff schedule was uniform across different classes of customers in Liberia. Furthermore, 10 of these 13 cases applied, or had given government approval to institute during project implementation, an increasing block tariff on residential users with the first block being priced at a rate considered affordable by low income families. Flat rates and increasing block tariffs levied on other users were reported in seven and six cases, respectively. More importantly, commercial and industrial users were generally charged a much higher price per unit of water consumed than residential users. The higher unit price was

intended to give commercial and industrial customers an incentive to use water efficiently, and thus postpone the need for future capital outlays.

9. Meanwhile, the incidence of metering varied notably among countries. Metering of consumption had never been widespread in Yemen. In Nigeria metering was applied to only about five percent of all house connections. In Tunisia, around 15 and 70 percent of the rural and urban population, respectively, with access to public water supply systems were served through metered connections; the corresponding figures for Jordan were 60 and 90 percent. All house connections in Bogota (Colombia) were metered. Metering ranged from 34 to 60 percent of connections in Honduras, India and Liberia. No information on the extent of metered connections was available for Algeria and Korea, while the issue was not relevant in the case of Mali.

10. Unmetered consumption of water was charged fixed monthly fees. These fees usually differed according to customer categories. In some areas in Colombia, for example, fixed monthly fees were based on a socio-economic index which defined the capacity of various users to pay for water supply services. Residential, commercial and industrial users were each grouped further into sub-classes and were charged monthly fees that progressed according to their respective socio-economic indices. Residential users in Nigeria with unmetered connections were levied fixed monthly fees that varied by type of dwelling. Equity issues and sociopolitical pressures against metered tariffs had contributed to the incidence of unmetered consumption of water in rural areas. Also, the administrative costs associated with metering consumption in areas with small and dispersed communities imposed a constraint on the economic feasibility of metering in these places.

11. Of the eight projects with sewerage components, only four reported the LRMC of supplying sewerage services which varied from 7 to 82 cents per m³ of water consumed. Existing tariffs ranged between 4 and 63 cents per m³; and accounted for about 75 to 143 percent of the average incremental costs of installing, operating and maintaining sewerage disposal facilities. The highest tariff levels relative to LRMC (143 percent for sewerage and 95 percent for water) were recorded for the project in Bogota, where the water authority reportedly was allowed to raise tariffs in order to finance investment requirements.

12. The structure of sewerage tariffs was reported only in four sample countries. Charges for sewerage services in Honduras, Colombia and Liberia were formulated as a fraction of water bills--ranging from 30 to 60 percent. Sewerage tariffs in Jordan, by contrast, consisted of a surcharge linked to water consumption plus a four percent annual tax on the rental value of property. Only in Jordan were sewerage connection fees levied. These fees amounted to 25 percent of the annual rental value of property to be paid in a lump sum.

B.3 Discussion of Adjustments to Efficiency Prices

13. As made explicit in the SARs, adjustments to efficiency prices were ruled by equity objectives. The wide divergence between existing tariffs and LRMC was influenced by such factors as the social character

of providing water supply services especially in rural areas; opposition to raising tariffs in view that potable water is a "public good"; and the equitability of access to services through cross-subsidization from large (high income consumers) to small communities (low income consumers). The affordability index used in each sample project for assessing the equity aspects of pricing domestic water consumption is routinely provided in the SARs. The index, defined as the water bill expressed as a proportion of monthly income of the poorest households in the project area, ranged from 1.3 to 5 percent. The sample mean was 2.7 percent (about one-half the generally accepted norm of 5 percent).

14. Of the cases reviewed, Mali was unique in the sense that no direct charges were instituted for rural water supply. These services nevertheless were not totally free. Rural communities paid for handpumps and were delegated the responsibility of operating and maintaining the water points in the villages. Such an arrangement reportedly had been widespread throughout the Sahelian Region as it resulted from reflections on the excessive burden on governments' capacity to sustain large scale maintenance of water supply systems. Recovery of capital costs, except for those related to handpumps, had never been possible on account of low rural household income.

B.4 Discussion of Cost Recovery Issues

15. Financial covenants were used in all projects except Mali. These covenants were stated in reference to target rates of return on revalued net assets (found in five cases) and internal cash generation ratios (8). Target rates of return on revalued assets averaged slightly over four percent per year. Internal cash generation ratios averaged nearly 12 percent of capital expenditures. In addition, debt service coverage and absolute debt limitation covenants were applied in six and two projects, respectively.

B.5 Use of Pricing Covenants

16. Covenants dealing with pricing water supply services were reached in all projects, except the Fourth Bogota Water Supply and Sewerage Project in Colombia. These included adjustments in tariff levels and/or revision of tariff structures (found in 11 cases); changes in tariff policies toward more metering of consumption (3); and ensuring financial participation of project beneficiaries in the construction, operation and maintenance of the water points (1). Covenants related to pricing sewerage services were comprised of adjustments in tariff levels (1); and the development of a cost recovery mechanism with subsequent implementation of user charges sufficient to cover full O&M costs (5). These pricing agreements were mostly based on efficiency considerations.

17. On the basis of the preceding agreements on pricing and financial performance of the water authorities, estimation was done with respect to the expected levels of tariffs for water supply and sewerage services upon project completion. The relationship between expected tariffs and LRMC is summarized below:

<u>Services</u>	<u>Expected Tariffs in Real Terms (¢/m³)</u>		<u>Expected Tariffs as a Percent of LRMC</u>	
	<u>Average</u>	<u>Range</u>	<u>Range</u>	<u>No. of Cases</u>
Water Supply	50.0	5-117	50- 57	2
			80- 96	4
			100-131	6
			80	Mean value using 14 cases
Sewerage	28.0	6-77	94-157	4
			118	Mean value using 4 cases reporting LRMC
			59	Mean value based on 8 projects with sewerage component

Thus on average, water tariffs would represent 80 percent of LRMC once projects become operational; sewerage tariffs would account for 118 percent. The lowest proportion of 50-57 percent for water supply services were for those projects in Korea and Yemen where strong public opposition to raising tariffs was coupled with policies to cross-subsidize consumption in small towns and rural areas. Nonetheless, the above estimates show considerable success with marginal cost pricing rule within the limits imposed by the social character of these services.

B.6 Sources of Project Financing

18. The financing plans for the sample projects are summarized below. IBRD/IDA loans were the major source of funds, accounting for more than half of project costs on average. Cash generated internally provided a smaller share of project financing than did government equity.

<u>Source</u>	<u>Average</u>	<u>Range</u>	<u>Comments</u>
	<u>(As % of Project Costs)</u>		
IBRD/IDA loans (India)	53.0	37-100	100% in 1 case
Other External Donors	9.2	0- 43	0 in 10 cases
Internal Cash Generation	10.4	0- 49	0 in 5 cases
Government Loans	1.5	0- 21	0 in 13 cases
Equity from Government	22.6	0- 54	0 in 5 cases
Other	3.3	0- 24	0 in 10 cases

C. THE MAJOR GAPS

19. Efficiency pricing has been carefully applied in the water and sewerage sector, even in the face of distributional and financial objectives. Refinements in the tariff structure have been employed to

reconcile diverse aims. The priority for future pricing work in the sector is different for the cases of urban and rural water/sewerage.

20. For urban systems, LPMC is clearly an important benchmark. This is well reflected in SARs, and major tariff studies are often financed under Bank projects to refine LPMC estimates. Yet experience with achieving targeted rates of return (using tariffs as the benefit measure) has been poor. This is partly due to slippages in the chain leading from tariff approval to revenue collection. In particular, the metering/billing/collection systems of many urban utilities produce unreasonably high proportions of unaccounted for water. A shift in effort is called for from sophisticated LPMC analyses to the practical aspects of improving collection efficiency.

21. In addition, demand estimates have been consistently optimistic. Research into the determinants of water demand in developing countries may be needed to gain a better understanding of the relationship between price, income and other factors affecting consumption.

22. For rural water systems, fiscal constraints have become dominant. A recent draft report from WUD suggests that unless governments are willing to commit themselves to sector programs stressing cost recovery, the Bank should not be involved in rural water in those countries. It focuses on the development of financial intermediaries and locally based enterprises to fund and maintain rural systems. The report's recommendations are controversial, but it provides an excellent stimulant to a reexamination of the problems that rural water supply programs have faced.

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