Earmarking, Road Funds
and Toll Roads

A World Bank Symposium

Edited by
Frida Johansen

June 1989

Discussion Paper

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Earmarking, Road Funds and Toll Roads

Introduction

Periods of tight or curtailed public budgets normally revive interest in decentralization. It is hoped that dedicated funding will insulate from further budget cuts and guarantee a minimum level of financing for the activities covered. It is hoped that privatization will mobilize additional funds for high priority investments that the government is unable to finance. Furthermore, it is hoped that decentralization will increase accountability or even allow roads to function as public utilities.

Many officials working in the road subsector are strong advocates for decentralization, and privatization where possible. The provision of transport infrastructure normally requires some 10-20% of public budgets and an even larger share in the poorer countries. Roads tend to require the lion’s share as they handle around 90% of traffic in most countries. At the same time, the road network can often be operated as a "private enterprise" as ports or railways can directly cost-recovery through fees or fares. As a result, decentralization often takes the forms of road funds and of toll roads. Road funds, fed with dedicated sources, are normally instituted with the objectives of protecting funding for maintenance; improving liquidity; easing procedures and increasing flexibility; some times to service road debt. Road funds may or may not be complemented with budgetary allocations and their level of autonomy varies. Toll roads are often instituted on the rationale that revenues from tolls would be sufficient to pay for the road investment and financing costs; sometimes autonomous toll agencies, expected to be self-financing, are created; sometimes toll roads are left under the administration of the existing road agency and toll revenues are seen as just another source of general revenue.

Many developing countries are exploring these avenues, road funds and toll roads, and trying alternative schemes. Some of the poorer developing countries that suffered more deeply the recession of the 1980s, such as many sub-Saharan Africa countries, cut their road maintenance budgets and are looking towards road funds as a means of restoring minimum maintenance levels. While some of these countries have high trafficked sections where tolling seems viable, it is generally higher income, higher motorization countries that are putting forward new toll road proposals and inviting the private sector to participate in new types of schemes, concessions and BOT (build, operate and transfer) schemes amongst others.

There is a wealth of experience from which to learn. Dedicated funding has been used and studied for centuries; the economic principles are well established, as are the "practical" problems of implementation. Developed countries are strong advocates of both dedicating funds (such as Japan and the United States) and of not dedicating funds (such as Japan and the United States).
Federal Republic of Germany and Great Britain); of toll roads (such as Japan and Italy) and of untolled roads (such as Great Britain and Australia). Developing countries have had various types of road funds at various times, whose outcome is documented. The experience, however, seldom lives up to expectations. Expectations tend to be too high and too broad. Objectives may conflict; schemes may not have been thought through or implemented well; undesirable effects may set in. Still, the continuing challenge of road financing explains the persistence of sector specialist attempts to improve on earlier designs. Funding schemes with more realistic -limited- objectives, well set priorities and well designed procedures have proven more successful. Furthermore, new technologies, such as electronic pricing, offer the potential of overcoming some of the problems that limited the viability of some schemes, such as tolling congested roads.

The Symposium was organized to disseminate knowledge on theory and practice of road funds and toll roads, in developing and developed countries, to World Bank officials involved in the transport sector. They have to deal increasingly with questions on these topics; they have to help design schemes, to know what works where and when, and what doesn't, what are the costs and benefits, and the appropriate time frame. The theory was revisited and practice was reviewed in a limited number of case studies: road funds in Ghana, Zaire and Colombia, and toll roads in Malaysia, Yugoslavia and Mexico, each case study presenting different perspectives; systems in the United States among developed countries were also presented. We are most grateful to the authors who generously devoted their time and effort to prepare the papers and contributed to make the Symposium a success.

The resulting collection of papers, including references to further bibliographies but not a transcription of the discussions, is now offered here for those who did not attend. The volume is organized as follows: the more theoretical papers are presented first, followed by the case studies; within both groups, papers on road funds precede those on toll roads. I have chosen not to include a summary of conclusions, that would, of course, reflect my own judgement; the subjects are complex and one of the purposes of the papers is to acquaint readers with their complexity and the fact that views on them are far from reaching consensus, particularly when expressed by theoretical discussants as opposed to "practitioners". It can be said, though, that differences of opinion stem largely from differences in the broadness of objectives pursued, and that the clearest conclusion is that each "problem" has to be studied within its context to find an appropriate solution. We hope readers will find the material as useful as did the participants of the Symposium.

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December 1988
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OVERVIEW

Earmarking is the dedication or hypothecation of a specific government revenue to a specific public expenditure. Road funds represent one form of earmarking and toll roads offer the potential for earmarking; this feature is the reason why the two concepts were dealt with in the same seminar. The collection of papers starts with discussions of principles of earmarking in general and then of toll roads more specifically, leading to conclusions on what can be expected through the imposition of road funds and tolls on roads, and thus, whether and when such schemes are desirable. The collection continues with case studies on experiences in the United States and in selected developing countries; the experiences largely corroborate predictions derived from the principles.

Principles

Earmarking

As earmarking has economy-wide implications and applications beyond the transport sector, the discussion explores overall advantages and disadvantages with the objectives of defining when and how earmarking may be appropriate in general, and specifically, for roads. Three perspectives are offered: one rooted in academia; another one, in World Bank experience with public economics; and the third, from the International Monetary Fund and mainly economic adjustment perspective. The discussions touch on different aspects but the conclusions largely coincide.

Professor William Oakland, in relatively theoretical terms, states the usual criticisms of earmarking and then proceeds to analyze quite innovatively each of the reasons that can be advocated in its favor, to end with a summary of justifications as favorable as possible, and of the potential application to highways finance. He starts by pointing out that the debate on the merits of earmarking has been conducted from two rather different perspectives and that therefore there has been little headway in reconciling differences: those opposed, assume government decision-makers to be both omniscient and benevolent; those in favor, assume that imperfect governments can be led to increase their responsiveness to citizens' preferences. Critics hold the view that earmarking would reduce the utility obtainable from the limited public resources by constraining their use: it hampers effective budgetary control; it leads to misallocation of funds, giving excess funds to some services while others are undersupported; it imparts inflexibility to the revenue structure; it infringes on the policy-making powers of governments by bypassing periodic reviews and controls. Critics are challenged by the public choice supporters, who allege that citizen preferences are too diverse to define a community preference (problem of aggregation); that public officials may pursue their own interests (problem of incentives); and that public choices are not only based on costs and benefits of services (problem of redistribution). Thus, household and public budgeting processes are dissimilar, and the advantages of one budget for the household do not necessarily hold for the government. Earmarking could then be justified as a separation device, to reach allocative and distributional objectives of
governments; as a decentralization device, to enhance the political
decision-making for impure public goods, to reflect individual preferences;
and as a special case of special purpose government, to provide benefits to
a clearly defined set of taxpayers, provided that user charges are not too
costly to collect (along the lines of benefit taxation; services for the
public at large are not suitable candidates for separation). Other common
rationales for earmarking that need more scrutiny, are the servicing of
government debt; the mobilizing of private capital to complement public
investments; the funding of actions to correct negative externalities;
correcting for political failure. Partial funding through earmarking may
mobilize public support for tax increases that could not have been obtained
otherwise, and achieve the goal of separation over the short term. Prof.
Oakland concludes with his views on highway finance, that he sees as one of
the more justified areas for earmarking: the clientele is defined and it is
possible to identify a tax that is correlated with highway use. If a fuel
tax is used, collection costs are low; tolls can have a closer correspondence
with benefits, especially if congestion is a problem, but have higher
collection costs.

William McCleary defines four types of earmarking, categorized by the degree
of specificity of tax source and expenditure financed, and takes up the
question of whether rules can be developed for price/tax setting and for
expenditure of the proceeds. First, he discusses the cases against and for
earmarking as they have appeared in the literature. The traditional theory
of earmarking has been laid out in terms of balanced budgets (payments by
beneficiaries to equal the cost of the good or service). However, in the
presence of returns to scale, indivisibilities, externalities, and public
sector financial constraints, efficiency considerations would require unbal-
anced budgets and hence a mix of financing from earmarked and general budget
resources. Under these circumstances, it is not clear that earmarking has
any impact on the allocation of resources. In addition, in those cases,
where there is no benefit link, as with "sin taxes", there is no link between
revenue raised and appropriate level of expenditures. And given the fungi-
bility of funds, the possibility of increasing revenues by committing new
taxes to specific uses is unlikely to materialize. McCleary goes on to
discuss the applicability of earmarking to the road sector, where the
considerations requiring unbalanced budgets obtain. The basic question is
whether a set of road user charges can be devised which would lead to an
optimum size road network and allocate correctly the costs across users; the
question is complicated by the fact that road users are generally charged
also to contribute to general revenues, and by the limitations imposed by
collection possibilities. The conclusion is that earmarking would most
likely have to coexist with general budget allocations for road expenditures,
and thus, by itself, would not solve any problem. Finally, McCleary reviews
the earmarking of betterment taxes in Colombia and of extra-budgetary funds
in Turkey and draws the lesson that they have generally not been successful.
Overall, however, McCleary concludes that there is no general case against
earmarking; that earmarking works best where benefit pricing/taxation can be
applied, much as a user charge and in local government situations when there
is a strong connection between tax/price payors and users. The cases where
earmarking can be successfully applied are likely thus to be very limited.
Furthermore, earmarking cannot be expected to make up for institutional
weaknesses; rather, institutional capabilities should be prerequisites to earmarking.

Peter Heller remains more skeptical about earmarking than the previous authors. He generalizes the conclusions he drew from his experience and from the reviews of road funds in Ghana, Zaire and Colombia. He focuses on earmarking in the context of deteriorating macroeconomic environment, where the priority is to cut government deficits; earmarking limits the flexibility of budget managers and may result in costly imbalances across sectoral allocations. He admits that earmarking for purposes such as road funds may have a high rate of return if it can insulate outlays of high productivity sectors; in such cases earmarking to provide a certain "core" funding, far less than desirable but enough to provide some stability and certainty, may be justified. Even so, earmarking does not solve other problems: shortage of foreign exchange; poor effectiveness in the use of funds or in their allocation within the sector. He agrees with the previous authors, that the closer a public good approximates a private good, and revenues derive from user charges, the stronger the case that can be made for earmarking.

Toll roads

The principles of toll roads are also discussed from complementary perspectives: one rooted in academia, the other, in a long consulting experience in developing countries. As in the case of road funds, arguments have different foci but the recommendations largely coincide.

Professor Esra Bennathan discusses the economics of toll roads, potential advantages and constraints, and quite innovatively, the importance of the "contract" and acceptable increases over marginal cost pricing based on the cost of raising general revenue. Tolling permits in principle to charge users accurately, much more so than location-unspecific pricing; tolling may offer the alternative of private management or ownership of roads, and with it, alternative financing schemes; tolling may offer citizens a better control over the use of public resources than typical budgets. The advantages are limited by some characteristics of roads - they require lumpy investments, are location-tied goods, are "congestible" and generate negative externalities. This argues against decentralization; if all roads are run as a public industry, the enterprise can break even while following marginal cost pricing. However, there is no case for tolling all roads, and the coexistence of tolled and untolled roads creates other constraints. If tolling is decided by majority vote, the roads likely to be tolled are those mainly serving regional interests. Untolled roads would be allowed to deteriorate, raising the market power of tolled roads. Traffic diversion occurs. An element of double taxation may arise when tolls are added to other road user charges, and becomes general revenue taxation. It may still be decided to go ahead with some toll road schemes. The level of tolls, the question of subsidies, of the organization of the toll agency and its regulation become matters of policy, and where privatization is contemplated, they have to be settled before the contract is written. Where a monopoly arises, it will be difficult to avoid some restriction on toll rate levels, and it should focus on the average rate; toll rate setting should still be anchored in marginal cost principles, including reference to the marginal cost of raising public revenue. Where future demand is uncertain, rate control may be moved in part
to taxation of the toll agency. The longer the contract period, and the firmer the rights of the contractor, the better the incentives to invest and maintain. The nature of the contract becomes a main determinant of the appropriateness of a tolling scheme. Prof. Bennathan also points out that once a road is tolled, tolling should not be discontinued when the road related debt is paid: by then congestion pricing is likely to be needed, and tolling is ideally suited for that.

Joseph Revis pursues the toll road discussion in less abstract terms, including the topics of pricing, financing, investment and technical aspects. He starts by pointing out that tolling is a pricing rather than an investment decision, and proposes pricing criteria towards achieving efficient operations. He then proceeds to discuss the advantages and disadvantages of various forms of toll road financing: general revenues, tolls, concessions. General revenue financing has normally a lower cost but required tax rate increases may be unacceptable, as may be using the proceeds of a general tax for a road that may benefit a limited public. Toll financing is claimed to be equitable in that "users pay", and may increase resource mobilization for roads; on the other hand, tolls may constitute a supplemental tax, collection costs are high, road construction and vehicle operating costs are higher on tolled versus untolled roads, and the equity claim may be unwarranted. Concession financing allows private management and ownership of roads, and may increase investment in the sector by attracting foreign capital; to the extent that private investors expect high returns and require government guarantees against risks, costs to the public may be higher than with a public agency in charge. The road investment decision, however, should remain independent of the financing source and be based on standard economic criteria; whether tolling is warranted should be analyzed thereafter, as it reduces traffic -and economic benefits- and increases costs. The toll system itself -open, with barriers across the road; closed, with entry and exit controls; or mixed- should be carefully selected to minimize negative impacts of tolling; the open system is generally preferable at lower traffic levels. Tolling of urban roads can have extensive network repercussions and needs even more careful study, for instance in terms of number of entry and exit points and of collection methods: few cities have chosen to have urban toll roads.

The United States experience

Three papers deal with the US experience, ranging from a systemwide view of earmarking, through toll road rate setting and financing in general, to the experience of a particularly "successful" toll road.

Jenifer Wishart notes that earmarking is broadly popular in the US because it tends to reinforce broad notions of fairness, and concepts that taxpayers at large should not be asked to pay for special benefits to certain groups. Early highly visible success in constructing the national highway network with earmarked taxes paid into the Highway Trust Fund encouraged planners to set up trust funds for aviation, inland waterways, transit and harbor maintenance. But earmarking taxes has not clearly increased spending or protected transportation programs from budget pressures, according to statistical evidence. To the extent that additional spending for interstate highways has
occurred it may have been overinvestment, while disinvestment in minor
intercity road systems may reflect a rationalization of past overbuilding,
rather than a less favorable access to (earmarked) funding sources. She
concludes by noting that federal earmarking: has not assured that users pay
a large share of spending on all programs comes from non-earmarked funds;
it has not created difficult budget control problems -trust funds are subject
to the same appropriation procedures as other spending; and it has not
necessarily increased spending on favored programs -states simply substitute
federal funds for their own tax sources, or the trust fund share of programs
is too small to raise national levels of activity.

Norman Wuestefeld summarizes the practice of toll rate setting and toll road
financing methods in the US. Toll rate setting is based on many considera-
tions, such as competition from untolled roads in the corridor, nature of
users, cost of the project, and financial requirements; rates are normally
established after extensive sensitivity tests with traffic assignment models,
that take into account estimated values of time, incomes in the area, trip
purposes, mix of local and longer distance trips, and even perceived motor-
ists perceptions. Older projects have rates well below newer ones, reflecting
lower costs in the past, but disparities are gradually diminishing as older
projects begin to require costly rehabilitations. There is also great
flexibility in toll road financing; it depends on the terms and conditions
of enabling legislation, bond covenants, contractual relationships,
availability of alternative funding sources, fund pledges, and local and
federal law and policy. Financing has included general obligation bonds,
revenue bonds, taxes, private financing or combinations thereof. The
financial needs normally range from 1.2 to 1.5 times the capital cost of the
project, in order to cover the costs of administration, management and
interest on debt; the escalator is lower with general bonds than revenue
bonds, as interest rates -risks- are lower. In turn, annual net revenues are
generally required to provide at least a 1.25 coverage of annual debt service
in the first year of operation for successful financing. Assuming a US$ 5
million project cost per mile and an average US$ 0.035 toll rate per mile,
it is estimated that some 73,000 vehicles per day is the traffic level
required for successful debt financing. The fact that there is no major toll
road under private ownership in the US is noteworthy; current economics of
toll roads further indicate that there may be very few opportunities for
successful projects without support from the public sector, and indeed,
combinations of public and private funding are increasing. The notion that
toll facilities can (should) be self-liquidating is fading.

Edward De Lozier presents the case of the Dulles Toll Road, that has proven
a financial success. The road serves a commuter corridor with rapidly growing
traffic; projections deemed optimistic at the study phase turned out to be
about half actual traffic levels four years after opening of the road, in
1984. In 1988, traffic exceeded 125,000 vehicles per day. Widening of the
road, from four to eight lanes, is to proceed soon, and its extension is
being negotiated. Electronic tolling is also being considered to increase the
road's carrying capacity. Lack of financing prevented earlier construction
of a road even though its need was clear; when tolling was accepted, revenue
bonds were issued to cover the costs with the state and the county guarantee-
ing payments in case toll revenues were insufficient. The original bond issue
was sold at a 12% interest rate for a 20 year term; it was refinanced in 1986
at a lower rate and a longer term. In 1988, toll revenue was twice the level required for debt servicing and operations, and annual surpluses will pay in full for the road widening. Furthermore, some improvements required by traffic growth have been financed with conditioned proffers (contributions by developers) and a special voluntary taxing district. While the Dulles toll road is owned by the state and operated by a state agency, with numerous services contracted with the private sector, the proposed extension of the road will be owned by a corporation. The right of way would be donated by the land owners; even so, the corporation is negotiating a government pledge of funds to offset the expected start-up negative cash-flow.

Road fund experience in developing countries

Many countries have or had road funds; Ghana, Zaire and Colombia were chosen for review, partly because the documentation was available and partly because their circumstances were varied; the Central African Republic and Mali's road funds, inter alia, had been reviewed earlier. What difference if any have some road funds made, contrasted with what was expected, and was expectable? Did road funds make a difference on road expenditures as compared to what could have been expected in their absence? More specifically, the following was to be investigated:

a) effect of road funds on expenditures on roads, as percentage of the government budget and in terms of levels at constant prices; on the stability of funding, on planning, on unit costs, on quality of works, on degree of contracting, over time;

b) effect on functioning of the system, in terms of liquidity, diversion of funds, efficiency in use, decentralization, procurement;

d) related of course to

c) the road fund system: what taxes were earmarked; was there automatic indexation or annual revision of funding levels; did budget allocations supplement the road fund; approved uses of funds; procedures for procurement and disbursements; how were foreign exchange needs dealt with where domestic currency was not convertible.

The experience varies; at the risk of generalizing, most road funds are replenished from road user charges, roughly following the benefit taxation principle. The impact seems to be greater when the road fund is introduced and to decrease with time, until the road fund functions much like a line item of a budget but with the potential of avoiding discontinuities between fiscal years.

Thampil Pankaj finds the road fund in Ghana, dating only from 1985, to have been highly successful. The main source of funds is a tax on fuel; the public seems to have accepted higher charges because of the earmarking of revenues to improve roads, many of which had become unmanageable following a period of economic crisis and no maintenance. The road fund committed more

1/ Their review is attached in Annex.
funds and solved the problems of lack of synchronization between the road work season and the budget year and of dislocation of works from late budgets approvals and no carrying over of funds. This in turn has given a significant boost to contractors' cash-flows and capacity, has enabled better planning of works and effective competitive bidding and has resulted in lower unit costs for maintenance. On the other hand, the planned topping up from the budget did not materialize, even though road maintenance was declared a priority activity. The release of funds is not automatic and causes occasional delays.

Jean-Jacques Raoul finds that after an initial successful 3 year-period, the revised road fund reverted to make no difference in Zaire. The road fund dates from 1974, but most of the recurrent road expenditures depended on the general recurrent budget, that was erratic and declining. In 1982, the government increased the fuel tax and allocated the revenues to the road fund; the tax level was increased periodically since then, and the tax proceeds became available in a timely manner for road maintenance. The road fund system is considered to have functioned satisfactorily from 1984 to 1986, with increased resources. Subsequent country-wide problems resulted in much reduced contributions to the fund, to the extent that road maintenance was virtually discontinued: earmarking failed to insulate road fund allocations from the overall budgetary availability.

Malise Dick looked into Colombia's experience with a widespread and long practice of earmarking, including national and rural road funds. The national road fund was created in 1967, in principle for investment financing. The source of funds was the national budget, two-thirds from fuel tax proceeds, and a direct government contribution; since 1982, the latter has been largely replaced with toll revenues and foreign and domestic loans, and maintenance and the repayment of loans have been added to its uses. That is, the roads agency functions almost as a self-sustaining organization, although it depends on the government for periodic updating of the fuel tax, that was changed from an ad-valorem tax to a specific one, also in 1982. Since 1983, earmarked funds have grown roughly at the GDP rate; much less than government expenditure as a whole; and substantially less than government investment in other sectors. This is particularly true if account is taken of the growing proportion -20% by 1987- of earmarked funds used for debt service, that before was paid by the general treasury. The overall conclusion is that earmarked tax revenues were not excessive in relation to needs, and that the proportion spent on maintenance has been consistently acceptable; the composition of expenditures is not constrained. The rural road fund receives some 90% of its funds from fuel tax proceeds; total funds available evolved in parallel to the national road funding. Administrators of the funds consider that both the administration and the continuity of activities are facilitated by the availability of earmarked funds, even though congress has to approve yearly budgets. This occasionally results in delays, but much less than the delays produced by the complex procedures for allocation of general funds.

Toll road experience in developing countries

Developing countries in Asia, Europe and Latin America have a number of toll roads, their length generally minor compared to the road network length.
What has the experience been so far? Again at the risk of generalizing, most toll roads in developing countries are in heavily trafficked commuter corridors serving capital cities; they provide congestion pricing possibilities. Toll revenues mostly feed the general treasury, with road financing provided by general revenues or loans. Operation is by a government agency with various levels of autonomy and contracting. It seems that in general, toll road schemes reasonably follow economic and efficiency criteria. Direct private financing for road projects has not materialized so far, but governments are considering an increased use of tolling, mainly as financing or privatization devices. Concessions are starting to develop with the leverage of government equity contributions. The experiences with toll roads in Mexico, Yugoslavia and Malaysia were reviewed for the seminar.

Maurice Le Blanc reviews the Malaysia toll road experience. Some short expressway sections near Kuala Lumpur have been tolled since the 1970s; despite relatively low rates in recent years, these resulted in some 15% traffic diversion from the tolled sections. Revenues were minor compared with other sources -Malaysians already pay high road user charges- and collection costs were a high proportion of revenues. A government agency was responsible for the operations. To accommodate traffic growth, in 1978 the government of Malaysia decided that the 785 km North-South expressway, comprising the tolled sections, and an additional 143 km of side links, should be built over a 5-year period. Some construction contracts were awarded early on, but as implementation was slipping and funding was short, in 1980 the government decided to seek external commercial financing for the project, against future toll revenues to be guaranteed by the federal treasury. In July 1987, after considerable debate, the government signed a contract for construction of the remaining 504 km over 7 years and operation of the road over 30 years, with a quasi-private company UEM (major shareholders being government officials). UEM obtained as government equity 424 km already built, and assumed virtually no risk. The company had no equity of its own; it started collecting tolls on existing sections, and in spite of the guarantees, it spent much time unable to raise financing. Contractors are to be paid 13% of the value of their contracts with equity shares in the company. Toll rate increases sparked acrimonious debates; their effects are not yet documented.

N. Cengiz Yucel describes the toll road experience in Yugoslavia. The main road network, and in particular the Trans-Yugoslav Highway (TYH), link the various Yugoslavian provinces, and serve European transit and tourism traffic. Four lane sections are tolled, and though their lengths add to only some 600 km, they carry a great part of the road traffic. Alternate routes exist but are poor. About one fourth of the traffic on toll roads consists of foreign vehicles that generate considerable revenue, in foreign exchange: they are charged twice the rate applied to domestic vehicles. Toll road rate setting, revenue collection and administration are decentralized, the operating companies being under the control of the provincial committees that oversee general road policy; these committees approve operating budgets and receive the net toll revenues. Some 30% of toll revenues is allocated to routine maintenance, and some 10% to collection costs, on average; revenues are also expected to cover debt service. Collection systems differ across provinces, as do toll rates. Road authorities operate, to a great extent, on a self-financing basis; user charges contribute some 75% of the funds, the
main sources being a fuel tax (25% of the proceeds are earmarked for roads), and tolls a distant second but covering some 9% of road expenditures including debt repayment, in the provinces that have toll roads. With the completion of the TYH, with a total length of some 1200 km, and other toll roads, toll revenues will become an increasingly important source of road financing. The fuel tax revenues earmarked for roads are further earmarked by activity, causing considerable rigidities.

Two papers explain the Mexico toll road system: Robert Panfil describes the current system from its beginnings; Gabriel Castañeda explains recent innovations towards attracting direct private financing, and attaches the most useful text of the proposed standard contract. Mexico probably has the longest experience with toll roads in developing countries: the first opened in 1952. By now, 940 km, both four and two-lane roads mostly radiating from Mexico city, and numerous bridges, are tolled. They are operated by a national agency, that transfers the net toll revenue to the treasury; the treasury financed the road construction with some World Bank participation. Toll rates do not aim at full cost recovery; although rates have been increasing in real terms, they do not seem to have caused significant traffic diversion. As traffic grew nationwide and needed additional roads, the government, that was hard pressed in the midst of economic recession and debt problems of the 1980s, sought alternatives to general revenue financing for roads. Two projects, halted due to lack of financing, were recently awarded as concessions following direct negotiations with contractors, who agreed to finance 25% of the investment needed, through deferred payment. State governments also contribute 25%, the federal government contributing the remainder through a financial institution. Costs increases are to be borne by the government. The 20-year concessions are to recover their investment (based on the original construction cost estimates) and obtain a return through tolls, to be collected by the national toll road agency on a longer section than that which the concessions finance. The government is now experimenting with further privatization proposals.
INTRODUCTION

Earmarking is the practice of dedicating a specific government revenue source to the finance of a particular public expenditure program. It is to be contrasted with general fund finance under which revenues from all tax and non-tax sources are pooled to provide funding for each and every government spending program. Under general fund finance it is meaningless to try to associate any particular spending activity with any specific revenue source.

Important examples of earmarking in the United States are the dedication of gasoline taxes for the construction and maintenance of highways, the use of tuition and fees by public institutions of higher education, and the finance of social insurance programs such as social security and unemployment benefits through special taxes on payrolls. Earmarking also occurs implicitly when special government units are created to provide a single service, such as water districts, school districts, the postal system, etc. In this case any taxes or fees imposed by the special district are effectively earmarked to the service it provides.

Earmarking can provide partial or full funding for the targeted expenditure. With partial funding the balance of revenue is provided by the general fund budget. One frequent example of partial funding is the dedication of the proceeds of new "sin" taxes or lottery revenue to expensive public programs having broad appeal such as public education. In most such cases the earmarked revenue is but a small fraction of education expenditure.

Despite the variations in the form that earmarking can take, the literature has been confined almost exclusively to the practice of full-funding earmarking by general purpose governments—e.g., national, state, or provincial governments. This is unfortunate because many of the same arguments advanced to support fiscal federalism can also be used to support the case for earmarking. Moreover, a system of earmarking with only partial funding can be seen to have many of the attributes of general fund finance.

At the risk of oversimplification, the debate on the merits of earmarking has been conducted from two entirely different perspectives. As a result little headway has been made in reconciling differences between the two camps. The first and oldest perspective is rooted in the premise that government budget makers are fully informed of the benefits and costs of alternative public actions and that they will choose those actions that produce the greatest net advantage, e.g., benefits less costs. In effect, government decision-makers are assumed to be both omniscient and benevolent. Hence, any constraints on their choices such as may be produced by earmarking rules are neither necessary nor desirable.1 The second perspective is often associated with social and public choice theory where earmarking is sometimes seen as

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1/ See Buchanan (1963) for a list of standard sources for the orthodox view. Deran (1965) and the Tax Foundation (1965) also nicely summarize this position.
a potentially useful device for increasing the responsiveness of public policy to social priorities as reflected in citizen's preferences.²/²

Before turning to the analysis a basic ground rule for the discussion needs to be established. First, our discussion of earmarking is most germane for democratic or quasi-democratic governments where the success of public policy is measured in terms of its ability to enhance the well-being of its citizens. Moreover, the well-being of citizens is assumed to be reflected in individual's evaluations as opposed to those of an elite who claim to articulate individual preferences. This posture is not meant to deny that earmarking is inappropriate for non-democratic societies, but that its logical foundations are likely to be other than those discussed in this paper.

CRITICISMS OF EARMARKING

With very few exceptions, critics of earmarking belong to those holding the first perspective of public policy making.³/³ They view the public budgeting problem as analogous to that facing the individual household when allocating its income among alternative goods and services. Just as a binding constraint on the mix of consumer purchases would lower the utility obtainable from household income, earmarking constraints are alleged to reduce the effectiveness of limited public resources. To quote Elizabeth Deran (1965):

1. "Earmarking hampers effective budgetary control,...."
2. "Earmarking leads to a misallocation of funds, giving excess funds to functions while others are undersupported."
3. "Earmarking imparts inflexibility to the revenue structure,..." 
4. "By removing a portion of fiscal action from periodic review and control, earmarking infringes on the policy-making powers of state executives and legislatures."

These and other criticisms follow at once from the collective rationality implicitly attributed to the budgetary process. A case for earmarking exists only if some element of the rationality framework does not hold in practice. This seems to be overlooked by some critics who concede begrudgingly that earmarking may be appropriate for a public service which has a narrow clientele and for which there exists a suitable benefit tax -- e.g., fishing and hunting licenses to fund wildlife management programs. Here the use of earmarking is said to promote the principle of benefit taxation.⁴/⁴ Never-

²/² See, for example, Buchanan (1963), Buchanan and Brennan (1977, 1980), Eklund (1972), Oakland (1984), and Teja (1988).

³/³ This discussion draws heavily upon Eklund (1972).

⁴/⁴ Most critics of earmarking, while acknowledging its suitability for benefit taxation, nevertheless insist that, other than highway finance, such cases are empirically insignificant. See Brazer (1984).
Principles of Earmarking

Nevertheless, a moment's reflection suggests that, under the conditions posited, earmarking is at best redundant and likely to be inefficient. Benefit taxation could be achieved even if the proceeds of the special tax were deposited into the general fund and provision for the special public program were made through the budgetary process. Any discrepancy between desired and actual spending could be eliminated by adjustments in the tax rate. The use of earmarking however, imparts a degree of inflexibility because tax rates might be slow to adjust to optimal program levels.

PUBLIC CHOICE CONSIDERATIONS

Critics of earmarking often overlook the revenue side of the budgetary process, focusing only upon the disposition of given revenues. Whether such revenues are adequate or excessive is not addressed. Budget-makers are seen as the arbiters of rival claims for the scarce revenues. Constraints on their discretion would seem to be a denial of the legitimacy or efficiency of the arbitration process. It is small wonder, then, that the most outspoken opponents of earmarking come from those involved in the practice or study of public administration.

The public choice perspective on earmarking directly challenges the central tenet of the collective rationality framework underlying the public administration approach -- that citizen's preferences are perfectly translated into public action through the political process. First, it is alleged that citizen preferences are too diverse to permit of aggregation into a well-defined community preference relation. Second, even if it were, monitoring costs and informational asymmetries may enable public officials to pursue their own concept of the public interest, or perhaps worse, their own public interests. Third, because the budgetary mechanism can be used to redistribute income among individual citizens, budget choices will not be based solely on the inherent costs and benefits of government services, but also upon the ability of one set of taxpayers to pass the cost of programs which benefit them upon other groups of taxpayers. Each of these points will be discussed briefly.

Problem of Aggregation

The difficulty if not impossibility of aggregating diverse individual preferences into a well-behaved social welfare function has been authoritatively established by Arrow (1951). This result carries over to the problem of constructing a well-behaved voting mechanism. In effect there can be no unequivocal definition of the "public interest". Any decision making rule must by its very nature involve some compromise of principles, each of which would seem to be essential for an ideal political constitution.

In one of the first attempts to provide a rational basis for earmarking, James Buchanan (1963) dismisses the consumer budget analogy used to establish the superiority of general fund budgeting. Instead, he proposes that budgeting practices be analyzed as "alternative modes of resolving conflicts"
between divergent budgetary preferences" (of citizens). The most prevalent alternative, general fund budgeting, is alleged to promote an inefficient mix of public services because it requires voters to consume public services in fixed proportions. In effect, voters, when choosing a revenue level to support are confronted with public services in packages which may not conform to their preferences. Earmarking, by contrast, separates decisions on individual public services, permitting more effective correspondence between the voter with the median preference and the budgetary outcome.

While Buchanan's arguments are provocative, they are far from compelling. He provided no cogent reasons why public services must be provided in fixed proportions under general fund financing. In fact, general fund budgets are negotiated annually. Nor does he establish why the satisfaction of the median preference constitutes the social optimum. Such an argument neglects the intensity of voter preference. Finally, he puts no restriction on the revenue source to be dedicated to a particular expenditure program. But in absence of such restrictions, voting support for individual public services under an earmarking arrangement could be based upon the possibility of imposing program costs upon a minority of taxpayers rather than upon the inherent benefits and costs of the public service in question.

Some of the weaknesses of the Buchanan approach were rectified by subsequent work by Goetz (1968) and Browning (1975). While these studies relax the assumption of fixed proportions they are unable to support Buchanan's strong conclusions about the superiority of earmarking. This is not surprising given the impossibility of establishing clear criteria for social preference in the first instance.

### Problem of Incentives

Since the appearance of Niskannen's (1971) seminal work on bureaucracy, many economists and political scientists have explored the consequences of public officials using their offices to further their personal interests. Such an approach is consistent with public choice theory which extends the models used to predict private sector behavior to the public sector. In two papers directly addressing the earmarking issue, Buchanan and Brennan (1977, 1980) adopt the extreme assumption that the objective of government officials is to maximize the size of the public sector. This is because officials can enjoy a "profit" on each dollar of expenditure; i.e., officials can devote a part of each expenditure dollar for ends that benefit them but not the taxpayer. B & B suggest that earmarking can be used to reduce the "profit" rate on government expenditure. This will result if there exists a tax base which is positively associated with public expenditure for a particular public service. One example would be gasoline expenditures which are stimulated by public expenditures for roads. If a tax on gasoline purchases are earmarked, public officials will have an incentive to spend a greater

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5/ This characterization was made by Goetz (1968).

6/ In a recent paper, Teja (1988) provides an excellent discussion of the circumstances under which decoupling of issues can lead to a more efficient outcome.
fraction of such revenues than otherwise because of the possibility of stimulating even greater tax revenues.

The usefulness of this argument for earmarking is limited by the relevance of its underlying premises about the motives of government. And the latter are extreme for even the most ardent critic of government. Perhaps the major contribution by B & B is to call attention to the possibility that public officials may not always pursue the social interest. In such an event constraints on budgetary discretion such as those imposed by earmarking should not be rejected out of hand. Such arguments may be particularly telling for underdeveloped countries where expenditures having high social priority are not adopted because of the low political payoff to government officials; e.g., expenditures for road maintenance.

Problem of Redistribution

A third motive for challenging the framework of collective rationality stems from the observation that the provision of public goods is often accompanied by a redistribution of income, even when redistribution is not the basis for the public program in the first place. Redistribution results when the costs of public services which disproportionately benefit one group are financed by taxes which are disproportionately paid by another group. This will lead beneficiaries to seek extension of the service beyond the point where added benefits equal marginal social costs. At the same time those who do not benefit but nevertheless pay will attempt to block any provision of the service. If the decision is based upon majority rule the outcome could differ vastly even though the relative number of people in either camp differs only marginally. In any event, it would only be by pure coincidence that the outcome would be socially optimal.

EARMARKING AS A SEPARATION DEVICE

The above considerations make it clear that the household budget analogy is not an appropriate characterization of the public budgeting process. Thus, claims for the primacy of general fund budgeting, being based upon the applicability of the analogy, must be called into question. The political process is at best an imperfect device for making budgetary and revenue

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7/ The benefits could take the form of direct services or through higher incomes to suppliers of inputs to the public services—e.g., defense contractors.

8/ In the event that the voting mechanism allows for the expression of intensity of preferences, those who gain disproportionately from the program may be able to log-roll their program into being. It is generally not possible to infer whether this will lead to an extension of services beyond that obtainable under simple majority rule. Whatever the case, there is no reason the expect the outcome to be optimal.

9/ By optimal we mean that the conditions for Pareto-efficient provision are satisfied; e.g., the Samuelson Rule in the case of pure public goods.
decisions. Consideration of alternative approaches such as earmarking is thus appropriate. It is unlikely that any alternative can be developed that can produce the social optimum in all or even any circumstances. The choice is necessarily one of second best and different approaches may prove suitable for different classes of public services.

A major structural flaw of general fund budgeting arises from its commingling of the allocative and distributional powers of government. Programs which are primarily allocative in intent, e.g., public safety, justice, are decided within the same framework as those that are redistributional in nature, e.g., public housing. As a result decisions on allocation type programs become contaminated by redistributional considerations. The problem is not that the redistributional effects are inherently undesirable but that they can be better achieved by programs which are explicitly redistributional in character. As Musgrave so aptly puts it, if you want to redistribute income to people in West Virginia you don't do it by building a harbor in Charleston. Unfortunately, general fund budgeting invites the formulation of such programs. Indeed, some skeptics argue that almost all government policy is directed towards the redistribution of income, but that such redistribution is almost never of the type contemplated in the literature -- that of achieving greater equity in the distribution of welfare. Rather, the redistribution tends to be towards those who have amassed significant political power such as the rich and special interest groups.

Recognition of the desirability of separating the allocative and distributional objectives of government goes back as far as Wicksell (1896). He proposed that decisions on each public good be made simultaneously with the decision on how to finance it. An expenditure/tax program would be adopted only if it could command the unanimous support of the electorate. In this way only programs for which the aggregate benefits exceed aggregate costs can be adopted. Thus, programs which, under a system of majority rule, would be adopted because of redistributional gains to a dominant coalition would be ruled out.

Clearly, the requirement of unanimity renders the proposal practically useless. Nevertheless, Wicksell's scheme nicely illustrates the advantages that earmarking might bring as compared to a system of general fund budgeting. For earmarking is but a special case of Wicksell's plan where decisions on each expenditure category is made separately. The requirement that spending levels be determined jointly with provision for finance satisfies the strict definition of earmarking, for each expenditure category has its own dedicated revenue source.

The correspondence is not exact because the requirement of unanimity is not an essential characteristic of earmarking. Without unanimity earmarking can achieve efficient separation of allocation and distributional issues only if the earmarked tax is a perfect benefit tax. In this way no-one is asked to pay for services for which he/she does not derive net benefit. Additionally, the political system must be such that decisions as to the level of the benefit tax reflect the preferences of program beneficiaries. The latter requirement has often gone unnoticed in the literature. Benefit taxation, is not sufficient to insure an efficient outcome. It is also essential that citizen preferences be articulated by the political mechanism. Wicksell
accomplished this by giving each citizen the right to advance a tax-expenditure program. While such an open agenda cannot be achievable in practice, it would seem to be more closely approximated in democratic environments where decisions involve fewer rather than numerous public services, as one would find in decentralized democracy. The significance of earmarking is greatest for such societies.

Earmarking and Decentralization

In the absence of unanimity, the design of a benefit tax becomes problematic when benefits are subjective in character. In particular, if the service is what is known as a 'pure' public good, attempts to design a benefit tax will be futile because taxpayers will attempt to understate their benefits. In the absence of an objective measure of benefits received for such goods, the use of earmarked funds to finance them will inevitably introduce distributional considerations into the political decision. For this class of goods, therefore, earmarking has little a priori advantage over general fund finance with respect to achieving the separation of allocation and distributional issues.

There are, however, a wide variety of public services which do not fall into the category of pure public goods. There is a large number of public services which generate benefits within a limited geographic region, such as fire protection. In other cases, public services are enjoyed by a clearly identifiable subset of citizens, e.g., postal services. In both cases it may be possible to approximate the benefit principle. Goods which provide regional, rather than national, benefits can be provided by regional governments. On the other hand, goods whose beneficiaries are clearly identifiable can be financed through user charges.

The advantages of these arrangements over national provision through the national budget should be reiterated. With local provision of fire services, people in Atlanta cannot attempt to pass the costs of their protection to people in Boston and vice versa. Thus decisions as to the level of fire protection services to Atlantans will reflect only the value and cost of services to them, not the value of being able to pick the pocket of Bostonians. Such localization of provision also has the advantage of allowing the services to be tailored to the needs of Atlantans rather than to some mystical national average.

Similar arguments can be made concerning the use of user charges to finance postal services. Under general fund finance, heavy users of postal services are likely to have the impression that they can pass the cost of additional services to the taxpayer at large. Thus, they will tend to lobby for excessive postal services. Under user charge finance this bias towards overexpenditure does not exist, because beneficiaries will recognize that added services necessarily carries higher fees.

In both cases, therefore, decentralization of decision-making for impure public goods can enhance the ability of the political process to articulate the preferences of individual citizens. It would not be a violation of literary license to argue that such decentralization involves a form of earmarking. Funds raised by local governments are restricted to the finance
of the services they provide. Similarly, the receipts from the sale of stamps are restricted to the provision of mail services.

Benefits from decentralization can also be achieved at the state and local government level. Often it is advantageous to split off a function from the general purpose government, and have it provided by a single purpose government unit. It is not uncommon to find the provision of water services vested with an independent Water Board. The provision of educational services is frequently delegated to an independent School District. To be suitable for spinning off to a special purpose government, the beneficiaries of a service should be clearly identifiable. This will eliminate the tendency to pass the cost of the service onto non-users.

Earmarking as a Special Case of a Special Purpose Government

If an activity is fully financed from an earmarked tax, the differences to a special purpose district are very slight. Under earmarking, the program director is subordinate to the executive and legislature of the general purpose government, whereas a special purpose district is usually subject to the direct control of its constituents.10/

Given this close relationship, the conditions under which either arrangement is justified are very similar. The basic criterion is that the service in question should provide benefits to a clearly defined set of taxpayers. Services with important consequences for the public at large are thus not suitable candidates for separation. Defense at the national level, correctional and judicial services at the state level, and public safety services at the local level, clearly should be provided by the general purpose government.

A clearly definable clientele, while necessary, is not a sufficient condition for separation if its purpose is to redistribute income to the poor or to other targeted groups such as farmers or veterans. It would be self-defeating to finance such services by charges upon the beneficiaries of the program. Moreover, separation may not be justified if the service provided significant side benefits or costs to the public at large. Thus, although users of mass transit are clearly identifiable, the service has significant impact on highway users and business community at large. In effect, the relevant constituency is the community at large. Finally, to qualify for separation, a user charges or taxes collected by the district must not be excessively costly to collect. These costs are not restricted to administrative costs of collection, but also include inefficiency costs introduced by the imposition of the charge itself. For example, the use of fees to finance the services of an uncrowded park may unduly restrict the use of the park.

In the presence of spillover effects or significant collection costs, the appropriate choice between decentralized and general fund provision is not

10/ It is not unusual for the manager of special purpose districts to be appointed by the Mayor or the Governor. However, decisions as to the taxes levied by the district are usually subject to taxpayer referendum. Thus, control over the level of services is vested with the taxpayer.
clear cut. Spillover effects can vary in importance as can the waste introduced by collection costs. These disadvantages must be weighed against the improvement in responsiveness of public services to the wishes of its major clientele. The appropriate choice must be determined on a case by case basis.

Earmarking or Special Purpose Government?

Assuming it is desirable to separate the provision of a service from the general fund, under what circumstances will earmarking be the preferred alternative? If earmarking is selected, the function will remain within the oversight the general purpose government. Several considerations are relevant to the choice between earmarking or creating an independent special purpose government. First, creating a new jurisdiction increases fixed costs of election and administration. With a single election and possible economies of scope of management, general purpose governments have an inherent cost advantage over special purpose districts. Second, the service in question may require coordination with other government programs. For example, in urban areas, highway planning would be more effective if done in conjunction with planning for mass transit. Such coordination is best accomplished within the context of a single budget authority. Third, earmarking offers the possibility of more frequent budgetary review and oversight.

It is somewhat ironic that critics of earmarking frequently allege that earmarking removes the activity from normal budgetary scrutiny, with the consequence that wide divergences from optimal program levels may develop over time. Yet this defect would seem to be more characteristic of special purpose government, whose officials have a near monopoly over the agenda. With earmarking there is absolutely no reason why the program cannot come under the annual review of the general budget officers, with an eye towards tailoring expenditure in line with needs rather than available revenue. If revenues grow to be excessive, there are political gains to be made by reducing the earmarked tax.

These advantages of earmarking must be weighed against a reduction in preference articulation resulting from having decision-power reside with officials of the general purpose government. The latter are elected on platforms which involve many issues in addition to the service in question. While it might appear that the benefits of decentralized provision are thereby lost, this is not the case. Because the level of service is tied directly to the level of earmarked revenues, program beneficiaries are unable to pass costs on to non-users. This will clearly affect users' lobbying and electioneering activities. Moreover, counterlobbying by non-users will not be a problem since they are insulated from the effects of variations in program funding. This means that elected officials can consider funding levels of earmarked activities independently of other components of the budget.\footnote{Notice that this argument depends critically upon the availability of a benefit tax or user charge to finance the service.} Hence, it is in their political interest to be responsive to the lobbying efforts of program beneficiaries.
Given these conflicting considerations it would be surprising if the scales always tip in one direction or the other. Indeed, the preferred alternative might differ regionally because of varying local circumstances. Since special purpose government units are a pervasive feature of the fiscal landscape in the U. S. it is not surprising that earmarking is also pervasive.

OTHER RATIONALE FOR EARMARKING

Earmarking for Debt Service

The separation motive is the most common and rigorous rationale that can be developed to justify earmarking. Yet, it does not underlie one of the most common practices of earmarking -- the dedication of particular revenues for the purpose of servicing governmental debt. This practice is justified on the grounds, that, by giving the bond-holder first claim to a specific source of government revenue, interest costs are reduced. The ubiquity of this practice would seem to corroborate this position. However, even if interest costs are lowered it does not follow that total costs are reduced by such earmarking. If the risk of default is mainly attributable to uncertain economic events, the reduction of risk to the bond-holder is offset by increased risk to other parties such as creditors, government workers, and consumers of government services. If, on the other hand, risk is due to political expediency, earmarking could definitely reduce total costs. For example, future political leaders might be tempted to default on outstanding loans because the capital projects financed by the debt have already been put in place. Earmarking increases the political costs of such wanton action, because the earmarking rule would also have to be abridged.

It should be noted that the desirability of this type of earmarking do not depend upon the particular tax that is earmarked as long as the tax had previously been in place and was designated to the general fund. In such circumstances, the funds absorbed by debt service will come at the expense of other services financed by the general fund, and is thus independent of the tax which is earmarked. Needless to say this argument would not apply

12/ The use of debt financing may itself constitute an earmarking device to spread the cost of capital improvements over those cohorts who enjoy the services therefrom. In this case the debt service constitutes a form of negative earmarking.

13/ If the result is increased risk to workers or suppliers, the community might have to absorb these costs through higher input prices. Under such conditions, the use of earmarking to guarantee debt repayment would simply be done to satisfy the demands of the municipal bond industry, without any real gain to borrower or lender.

14/ This may be the existing situation with respect to much Third World debt.

15/ It should be noted that to the extent there are true cost savings from the debt guarantee, earmarking places the costs of the guarantee on the community at large.


if a new tax were adopted to guarantee the debt. In this case the usual justification for earmarking should apply; i.e., the earmarked tax should be a benefit tax.

Earmarking to Facilitate Planning

In a related argument, earmarking has been justified in those instances where the success of a public program depends upon complementary private investments of long-lived capital. For example, the success of public medical assistance may depend upon the construction of private hospitals and the purchase of sophisticated state-of-the-art medical equipment. It may also depend upon the availability of adequate medical personnel, who in turn need to make major investments in human capital. Earmarking might help to assure such investors that the medical assistance program will not be discontinued in the future, reducing the value of their investments. A similar situation arises even if the complementary investment is provided by the public sector itself. An important example would be state feeder road construction in connection with the completion of the national Interstate Highway Program in the U.S. The argument can apply to any program where success depends upon accurate long-range planning. By helping to assure continuity of funding, earmarking makes planning more effective. The similarity of this case to the debt service example is obvious. Earmarking is a device to reduce the risk that explicit or implied commitments by present political leaders will not be honored in the future.

While there is some merit to these arguments, they should be heavily discounted in most situations because: (1) earmarking arrangements are not cast in stone, but are subject to change; (2) experience shows that once a program is adopted it tends to have remarkable staying power, even in the absence of earmarked funds; (3) the reduction in risk afforded the program in question is transferred to other public programs which run the risk of even deeper cuts; (4) earmarking for such purposes should still satisfy the separation criteria, lest decisions be contaminated by distributional considerations; and if it does, earmarking can be defended on other grounds.

Earmarking for Negative Externalities

This justification has surfaced quite recently. It is based upon the observation that because of spillover benefits and costs, the market price of some goods and services will not reflect their social value. Economists have often proposed that in such cases market prices be adjusted via taxes

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17/ An important example of such a case may be the U.S. Social Security Tax. While many observers would prefer the income tax over the payroll tax to finance the system, the former tax is not easily earmarked, while the latter tax would be an extremely unpopular form of general fund finance and hence would not likely be expropriated for general budget use.

18/ A counterexample may be programs for nuclear power.
and subsidies so as to reflect spillover effects. For goods exhibiting negative externalities this tax would equal the value of marginal spillover damage caused by the production or consumption of the commodity.

To this point, none of this is novel. It is simply a restatement of the well-known principles of Pigovian taxation. What is new is the proposal to earmark the proceeds of the corrective tax to programs designed to ameliorate the problems caused by the spillover. This has an appealing ring in terms of equity. It places the costs of correcting the problem directly upon those responsible for it. As an example, the Superfund to clean up toxic waste sites is financed by taxes upon petroleum and chemical feedstocks, whose production created the waste sites in the first place.

Despite its intuitive appeal, this extension of Pigovian principles is not generally consistent with economic efficiency. A glimpse of the difficulty is obtained by considering one of the alternatives for "correcting" the problems caused by the negative externalities -- that of compensating victims using resources taken from offenders. The literature on Pigovian taxation has been loud and clear on this issue. Such compensation, however desirable on equity grounds, will lead to resource misallocation. To hold victims harmless, is to encourage them to engage in activities which exposes them to even greater damage -- such as moving closer to the source of pollution.

While there may be several ways of reducing or removing the damage caused which do not suffer from the latter defect, each possibility must have the property that the benefits exceed the resource costs of the corrective program. The appropriate level of funding for the preferred approach is independent of the level of revenues from the Pigovian tax. This is most easily seen by considering the case where it is not cost-effective to remove any of the damage. For example, it might be too costly to remove pollutants from the air once they are discharged. In such a case all of the proceeds of the tax on polluters should be deposited into the general fund.

The upshot of this discussion is that activities to correct damage done by negative externalities must be considered separately from the question of how to correct for the level of the externality itself. While the latter will depend upon the former, because the ability to correct for the damage directly affects the extent of the damage, the revenues of the Pigovian tax will bear no special relation to the optimal correction program. Thus, there is absolutely no basis for earmarking the tax to clean-up activities.

Does this mean that it is inappropriate to finance the Superfund from taxes upon polluters? If the alternative is to do nothing whatever, including abstaining from levying polluter taxes, the answer is probably no. Clearly some level of cleanup is in the social interest. Moreover, some level of polluter tax is also in order. While the levels of cleanup activity and Pigovian tax may not be optimal they offer an improvement over the no action alternative. While this may seem very faint praise because we have ruled out most of the attractive options, it may be that earmarked polluter taxes are the only politically viable means of budgetary support for impor-

1/ See Baumol (1972) for a concise statement of the issues.
tant cleanup activities. Benefits of cleanup may be so concentrated that support from general funds is difficult to achieve. At the same time, the use of Pigovian taxes to finance general public services has yet to win acceptance in many societies. Acceptance of such taxes may be conditional upon their use for corrective policies or victim compensation and nothing else. The major alternative of financing cleanup from charges upon beneficiaries is politically less attractive, and given that Pigovian taxes are otherwise not feasible, may be economically less attractive. Thus, the Superfund approach may be a second best optimum. The main caveat is that cleanup activities should be limited to those that make economic sense. The considerable lobbying power of the polluter industry may help to insure this outcome.

Earmarking to Correct for Political Failure

This rationale is the public sector counterpart to the market failure examples cited above. Here the problem is the failure of political institutions to reflect the public interest. One reason may be the lack of training of public officials, as say, in a developing country with little experience with self-government. Earmarking, while imperfect, would play the role of automatic pilot, steering resources in a relatively stable manner to those areas deemed to have high social priority such as education, public health and social infrastructure.

A second cause of political failure arises from excessively short time horizons of public officials. Political success often accrues only to those who are able to make a discernable impact in the relatively short-run. Thus programs with long-term payoffs tend to be underprovided. A good example here are expenditures for maintenance of infrastructure, such as highways. Regular, routine maintenance has been shown offer handsome dividends in the form of reduced future construction costs. Nevertheless, if repairs are not made, the road continues to be serviceable but its useful life is sharply reduced. During periods of budgetary stringency, public officials are thus tempted to defer maintenance and concentrate resources instead on programs which cater to immediate consumption needs of the populace or upon highly visible capital projects. If funds for maintenance were earmarked, however, expenditures would be much more stable and the return to investments in infrastructure much higher.

These examples do not exhaust the list of "political failures" that are at least partially correctable. Indeed, the debt service rationale cited above falls into this class. For with the proper time horizon, no politician would find it profitable to default on the public debt. Nor would there need to be assurances of the continuity of funding for purposes of effective planning -- if the need were genuine the necessary budgetary support would be forthcoming.

A major problem with this line of reasoning is where to draw the line on political failure. Will decisions made by officials in charge of earmarked funds be more efficiently administered than those of the general budget officer? Clearly, the temptation to build monuments will also confront the agency chief. Also where should the line be drawn on the services afforded the protection of earmarked finance? Won't powerful interests attempt to
have their programs brought under the safety net? Indeed, the difficulty is that stability of funding can improve the effectiveness of almost all government programs. To establish a case for earmarking, proponents of a program would have to demonstrate that increased stability to their program offsets the added instability on other government programs. But then, this sounds like the process of general fund budgeting. A more appropriate alternative to earmarking might be the creation of a stabilization program for the budget as a whole.

The defense of earmarking on grounds of political failure must thus be used with extreme caution and limited to the most blatant cases. There is, however, one important case where this injunction can be dismissed. If the program in question benefits from the financial system of an outside or overlapping government, the granting government might rightfully insist on earmarking as a condition of the grant. Such grants are frequently designed to increase the recipient government’s expenditures upon activities considered important by the donor government. In effect such programs create external benefits; i.e., external to the objective function of the recipient government budget setters. In some cases these are spillovers to future citizens, in others it is to citizens of other jurisdictions. Since the problem is one of inadequate incentives to adequately fund the program, the donor government or authority may rightfully require assurances that the receiving government will live up to its commitments by earmarking the receipts of some tax for the program. Thus, it is not unreasonable for an institution such as the World Bank to require the earmarking of taxes for the purpose of infrastructure maintenance. Nor is it inappropriate for the federal government to require that state’s earmark employment taxes for unemployment compensation.

Earmarking as a Device to Resolve Political Impasse

So far our attention has been given to the practice of using earmarked finance to provide the preponderance of the funds for a particular government activity. In practice, however, such an arrangement is relatively rare, with social security as the outstanding example. Because it is possible to make offsetting adjustments from general fund appropriations, however, partial funding through earmarking may have little if any effect on the budgetary outcome.

Partial funding through earmarking is often advocated as a means of gaining public support for tax increases that could not have been obtained otherwise. Here the proceeds of some revenue measure are initially dedicated to the support of some popular public program such as education. Frequently, this involves revenue derived from tobacco or alcohol or from publicly sponsored gaming such as lotteries. The basic objective is to expand the size of general fund revenue, by the means of replacing general fund support for the popular activity by revenues from the earmarked source. There is no intention of expanding spending on the earmarked activity, only to change the

\[20/\] Here it is not essential that the earmarked tax be a benefit tax because the objective is simply to insure adequate funding, as seen through the eyes of the donor.
source(s) of its funding. As long as general fund contributions are necessary to continue current program levels, i.e., the dedicated source only partially funds the popular activity, the outcome is identical to an unrestricted increase in revenue. While some observers applaud such an outcome because they believe that the public sector is grossly underfunded by the political mechanism, such a deceptive use of earmarking amounts to outright fraud and thus cannot be condoned in a democratic society.

Suppose, however, we are considering the introduction of a new program or a major expansion of an existing program. Suppose further that the earmarked tax is indeed a benefit tax and can win the political support of the electorate. In this case, even though the earmarked tax constitutes only partial support for the program, it will have the effect of achieving the goals of separation outlined above. Partial funding may be justified because spillover benefits to the public at large justify some contribution by the general fund. Unlike full funding, however, the expansion of expenditures achieved by earmarking may not be permanent. Over time budget officers have the opportunity to adjust the contribution from the general fund so as to negate the added finance provided by earmarked taxation. Nevertheless, earmarking has served the purpose of getting a valued program into existence, thereby providing it with the benefits of incumbency enjoyed by all existing programs.

The need for earmarking to help establish desirable new or expanded governmental programs might be opposed by those who see such piecemeal financing as threatening public support for important but less politically popular spending programs. For example, resources for vital social service programs might fall victim to a system which allows the public to support separate expansion of popular public safety programs. The same problem may arise for any essential but low visibility programs such as general control and financial administration. Here it is not possible to reach a verdict. On the one hand, desired levels of certain public services may be impossible without the separation of spending decisions. On the other hand, support for other programs may be impossible to obtain because the benefits of the program are less visible or perceived as involving redistribution away from a majority of the electorate.21/

SUMMARY OF JUSTIFICATION FOR EARMARKING

The purpose of this rather lengthy discussion was to determine whether there can be an intellectually defensible basis for earmarked budget finance. Our finding is that there are a number of distinct bases for the practice. Each reflects some imperfection in the political mechanism for the provision of public services. The most basic imperfection has to do with the intermingling of allocation and distributional issues in the general fund budget process. While it is not possible to predict the direction of the effect of such commingling on the level of particular public services, the outcome is

21/ Most of the difficulties would seem to vanish, however, if the earmarked tax was indeed a benefit tax. For in this case it seems doubtful that the factoring out of some programs for the general budget would affect the salability of the remainder of the budget.
almost certain to be suboptimal. Where an appropriate benefit charge is possible earmarking might be used to moderate the imperfection. It accomplishes this by reducing the redistributional component in the budget process, focussing the decision instead on the question of net benefits vs. net costs. In this way earmarking achieves much the same effect as single purpose governments.

To lay claim for this justification for earmarked finance, a public service needs to have a clearly defined constituency so that a benefit charge can be levied. The costs of collecting the benefit charge should not be unduly large, nor should the service involve major spillover benefits or costs with other public services. Finally, the program must not be targeted to the poor or other groups such as the elderly or farmers; income redistribution must not be the sine qua non of the program.

This is a rather demanding list of requirements. Moreover, for many of the services which would appear to meet them, a special purpose district or government enterprise may be a more appropriate arrangement. There are a few notable examples which many observers would seem suitable for the earmarking arrangement: highways, social security, unemployment insurance and workman's compensation, and fish and wildlife programs. There are also some examples which are widespread in practice but which tend to go unnoticed. These include tuition and fees for higher education, admission fees to zoos and museums, fares for public transportation, and charges for public hospitals.

While the preceding is a rather formidable list, it remains true that many, if not most, instances of earmarking in practice do not satisfy the above requirements. Usually, this is because there is no relationship between the earmarked tax and the function to which it is dedicated. Revenues from alcohol, tobacco, lotteries, and pari-mutual betting are frequently earmarked. Yet it is difficult to imagine any service where such charges could be considered a benefit tax. There are also numerous examples of earmarking of general taxes such as the personal income tax and the sales tax. Applying our logic, such taxes should be designated to programs which provide services to the community at large. But then there is no advantage to earmarking over general fund budgeting because the legislature is the appropriate forum for the spending decision.

There are also several special cases where earmarking might be justified. In each case, the raison-d'être stems from imperfections in the incentive structure of elected officials. In the case of debt service, earmarking may be necessary to assure bond-holders that future politicians will not succumb to pressures to default because the capital is already in place. Also, if a program creates spillover benefits to non-residents, it may be appropriate for higher levels of government to require earmarking as a condition of grants-in-aid, so as to assure continued funding of the program. Similarly, if an outside granting agency, such as the World Bank, has a lower discount rate than budget-makers, earmarking may be imposed as a condition for the receipt of aid.

It is problematic whether the same logic can be applied to programs which provide mainly local benefits to the current generation, but where continuity of funding would improve planning or vastly increase the rate of return to
investments in infrastructure. Here the stability afforded the earmarked activity would be at the expense of instability for other programs. Since the decision as to whether the tradeoff is worthwhile is vested with budget officials, earmarking would seem redundant, and worse would add inflexibility to the budget process. While budget officials may be short-sighted, and hence make inappropriate choices, there is no objective way of determining the appropriate choice. A better alternative would be a revenue stabilization fund which provides stability to all government programs.

Finally, we have the justification that without earmarking, public support for useful public programs would be difficult if not impossible to achieve. By splitting off the decision on the function off from the general budget decision and using an appropriate benefit tax, it may be possible to gain political support for the program. While this argument is attractive, such gains may come at the expense of support for programs which continue to rely upon the general fund for support. It is therefore not clear that the overall expenditure program would be improved.

EARMARKING AND HIGHWAY FINANCE

Perhaps the most widespread use of earmarking occurs in the area of highway finance. How does this practice fit in with the criteria suggested above? A moments reflection suggests that highway expenditure, appropriately restricted, nicely meets the separation criteria. The clientele is clearly defined and it is possible to identify a tax which is closely correlated with highway use. Except in major urban areas, highways involve little in the way of spillover effects on other government programs. Moreover, the costs of collecting the highway taxes is relatively cheap if a fuel tax is used. Finally, highway expenditures have little redistributitional component.

The separation case for earmarking highway finance is even stronger when considered on a project by project basis. Some projects, such as major intercountry or interstate highways can be funded using toll revenues. Toll revenues are to be preferred to gasoline taxes because of the closer correspondence to benefits. Consequently, tolls can serve as an important check as to the efficacy of the project. For if they cannot cover the construction and maintenance costs of the highway, it is quite possible that the project is not economically efficient. One disadvantage of tolls, of course, is that they may be costly to collect, particularly if the highway is uncongested. Nevertheless, the advantage of securing the revealed preference of users through the price mechanism is considerable and should be given considerable weight. If congestion is a problem, tolls may actually involve negative collection costs. And under non-implausible conditions, crowded

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\[22/\] This reasoning is not complete because it fails to allow for possible consumer surplus as well as efficiency losses due to the collection of tolls. Nevertheless, if toll revenue were projected to be inadequate, planners should take a long hard look at these latter sources of benefits.
highways are optimally provided and fully financed by an earmarked congestion toll.\(^{23}\)

Earmarked highway finance might be justified on a number of other grounds. First, it might be appropriate for the national government, or international agency, to require earmarking as a condition of grants for highway construction. Such earmarking can serve the purpose of assuring a continued adequate flow of resources for maintenance programs.\(^{24}\) Secondly, earmarking might be justified for the purpose of debt service, since capital outlays for highways are often financed through borrowing. Lastly, earmarking of toll revenues could be defended on the grounds that it is the only way the public will tolerate tolls either for efficiency purposes or for revenue purposes. The efficiency basis for tolls is well-known. Less well known is the fact that revenue tolls would constitute an essential ingredient of an optimal excise tax system as long as delays were not excessive. Earmarking is the price one must pay in order to procure these advantages.

REFERENCES


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\(^{23}\) See Oakland (1972).

\(^{24}\) It should be noted that in the context of some countries, earmarking commitments might have a hollow ring if government leaders can reallocate revenues without regard to the law. This may be a particular problem for certain LDC's which have a short history of self-government.


Notes on the Principles and Practice of Earmarking

William A. McCleary

PART I: PRINCIPLES OF EARMARKING

A. Background

Earmarking is the practice of assigning revenues from specific taxes or groups of taxes to specific government activities or to broader areas of government activity. As such, it contrasts with general fund financing where monies are pooled to be used for general government purposes. In practice, earmarking has come into being via statute or via constitutional clauses mandating that certain revenues only be used for specified activities. The rules of the game may in some cases allow earmarked funds to be supplemented by revenues from other sources or allow earmarked funds to be diverted to other uses. In addition, in some cases, earmarking may have a benefit link, with the persons paying in tax or charges overlapping substantially with the group of persons receiving the benefits of the goods and services being provided. Despite the apparent connection, however, it is possible to have benefit taxation or earmarking without the other. Benefit taxes may be added to the central pool or revenues be earmarked for activities which do nothing for the contributing taxpayers. The distinguishing characteristic of earmarking, at least in its purest form, is that revenues collected from the earmarked source drive expenditures on the specified activity.1/

Four broad types of earmarking, categorized by the degree of specificity of tax source or expenditures financed, are shown in table 1. The most common forms are gasoline taxes/motor vehicle fees for highway expenditures and employer/employee contributions to social security and unemployment insurance funds. Revenue sharing between various levels of government is also common. A subcategory of type A forms what we will call "strong earmarking", the case where there is a benefit link between the charges assessed and the goods or services provided. These are cases where the goods or services involved have the characteristics of private goods -- little or no externalities, no claim by recipients for special treatment on income distribution grounds, and no significant inefficiencies resulting from the implementation of a charge.2/ Transactions in these goods give off market signals regarding the amounts desired and willingness to pay. It is also

1/ In fact, so long as there is an understanding that expenditures on a certain activity would be limited in total amount to the monies raised from beneficiaries of that activity, earmarking could be said to exist--at least implicitly--even if those funds were added to the central pool.

2/ Actually, "strong earmarking" could be extended to public goods as well, provided a way could be found to induce people to reveal their preferences about what they would be willing to pay for alternative amounts of the good, hence allowing a decision to be reached about the optimum quantity to be provided and the division of the tax bill for that quantity among citizens according to their preferences.
worth noting that public enterprises -- to the extent that they are allowed to retain control over profits -- represent a form of strong earmarking; the purity of each case would depend on its independence from the budget for subsidies or other special financing arrangements.

The remaining cases of type A and types B through D in table 1 are all examples of "weaker" earmarking in that the connection between assesses and beneficiaries is tenuous or non-existent and there are redistribution or other social welfare objectives comingled with allocative objectives. The designation of a liquor tax for the financing of education, for example, gives us no useful information about the appropriate level of education and represents a straight transfer between two groups of citizens. Similarly for the earmarking of a fixed (and arbitrary) percentage of general revenues for education. All of the cases of earmarking, even the ones with a benefit link, can be diluted by the possibilities for supplementary funds from general revenue or diversion of earmarked funds to other uses; in such instances, decisions about the appropriate level of the service are -- at least at the margin -- being driven by general budget considerations and not by earmarking.

Table 1: Varieties of Earmarking

<table>
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<tr>
<th>Type</th>
<th>Revenue</th>
<th>Expenditure</th>
<th>Examples</th>
</tr>
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| A    | Specific Tax or Fee | Specific End-use | - Gasoline taxes and motor vehicle fees for highway investments.  
- Social Security, Unemployment funds.  
- Public enterprises. |
| B    | Specific Tax or Fee | Broad End-use | - Lottery proceeds and sin taxes (tobacco, alcohol) to finance social sector programs.  
- Taxes/royalties from petroleum to finance development expenditure. |
| C    | General Tax | Specific End-use | - Fixed percent of total revenue devoted to specific programs (e.g., education).  
- Revenue sharing for a specific purpose. |
| D    | General Tax | General End-use | - Revenue sharing. |

The remainder of this paper is laid out as follows. Sections B and C sketch out the cases against and for earmarking as they have appeared in the literature. Section D takes up the question of whether rules can be developed
for price/tax setting and expenditure of the proceeds for earmarked goods and, if so, whether such rules appear to lead to desirable consequences. The section goes on to take up the questions of whether earmarking is justified in those cases where there is little or no connection between the beneficiaries of public expenditures and the tax/price payers and whether there are limits on the extent of earmarking. Part II of the paper quickly goes over the lessons that can be learned from several prominent cases of earmarking -- i.e., highway funding and Colombia's valorization tax. It also takes up the case of Turkey, where there has been a proliferation of earmarking in the form of extra-budgetary funds. The final section of the paper draws some preliminary conclusions and makes some suggestions about how further work might proceed.

B. The Case Against Earmarking

Among economists and public administrators, earmarking has but a few fans. The case against it is well known and can be stated quite briefly. The usual litany of objections contains the following items:

- It leads to a misallocation of resources, with too much being given to earmarked activities and not enough to others;
- It hampers effective budgetary control, to a degree depending on whether provisions are embedded in statutes or in the constitution;
- It infringes on the powers and discretion of the legislative and executive branches of government;
- It imparts inflexibility into budgets in that changes only come with a lag and earmarking systems continue after their usefulness has been served.

The litany boils down to saying that earmarking reduces discretion; by reducing the scope of the executive and legislative branches' command over the allocation of resources, it builds some rigidity into the system and reduces flexibility. Earmarked expenditures are exempted from swings in the availability of general resources; in times of general resource shortages, too much will be devoted to the earmarked areas compared to a situation where they had to compete with other uses (provided, of course that earmarked funding sources are more stable than general revenues). In addition, earmarking has been criticized because it removes expenditures from close public scrutiny. Earmarked expenditures may not have to meet the same rigorous evaluation as other budgetary expenditures, and hence funds may be diverted to low priority projects or squandered in needless overheads (e.g., elaborate buildings, overstaffing).

Clearly, the foregoing arguments have some merit. At a very minimum, they would lead one to conclude that expenditure of earmarked money should

\[2/\] The list is from Elizabeth Deran "Earmarking and Expenditures: A Survey and a New Test", National Tax Journal (December 1965), pp. 354-61, but similar remarks have been made in a number of places.
be subject to established, clear evaluation procedures and to strict accounting and auditing to assure that funds are not diverted from stated purposes and that each earmarked fund should be subject to periodic review as to the desirability of its continuation. Nonetheless, it is hard to make a case against earmarking under all circumstances. The defects cited by its critics are the virtues cited by its proponents who argue that there are circumstances under which limitations on the possibilities for reallocating resources and rigidity are in fact desirable. Moreover, the flexibility of general fund financing can be overstated. Monies are not readily moved from one expenditure category to another as expenditures for debt service, social insurance, and oftentimes administration and security take precedence, and expenditure programs, once started, take on a life of their own. In some cases, countries have established very strict control procedures to guard against corruption or the misuse of funds, safeguards so strict that it is difficult to begin expenditure programs or to obtain timely funding for them once approved. In such cases, earmarking is an escape from overly rigid general budget procedures.\footnote{For example, see R.M. Bird "Budgeting and Expenditure Control in Colombia", \textit{Public Budgeting and Finance}, (Autumn 1982) Vol. 2, No. 3, pp. 87-99.}

The existence of numerous instances of earmarking in the real world -- and the fact that a fair number are purported to be quite successful -- would argue that we should explore further why this should be so.

C. The Case For Earmarking

Adherents of earmarking -- few as they are -- cite a number of advantages:\footnote{The list is again from E. Deran, \textit{op cit}, p. 357.}

\begin{itemize}
  \item It applies the benefit principle of taxation (at least in some cases).
  \item It assures desirable minima will be met for worthy public goods, thus avoiding periodic haggling within the bureaucracy or between the bureaucracy and legislature over appropriate levels of funding.
  \item Greater stability and continuity of funding may lead to lower costs through speedy completion.
  \item By linking taxation with expenditures, it may overcome resistance to taxes and help to generate new sources of revenue.
\end{itemize}

To the extent there is overlap -- and we have seen above that this need not be the case -- earmarking takes on some of the same virtues as benefit taxation. i.e., the simultaneous linking of the expenditure and revenue sides of the budget, the provision of adequate financing for public goods and services, and the elimination of excess demand and shortages that occur when goods or services are provided below marginal cost or free. That is, the virtues of benefit taxation are similar to those of the price mechanism: it provides appropriate signals for the efficient allocation of resources, and
it helps to avoid the underfinancing of government activities and pressures for expansion of services that often accompany underpricing.

The linkage between expenditure and tax/price decisions forms an important thread in the long search for a fair or just system of taxation, a thread that stretches from Adam Smith through Wicksell and Lindahl down to Samuelson, Musgrave and Buchanan. A fair tax system, it is said, would be one in which people paid according to what they received, and taxes would be set according to the marginal benefits received by taxpayers. Expenditures -- both in total and for individual public goods and services -- would be expanded so long as the marginal benefits received by all individuals exceeded marginal costs. Thus the total level of expenditures and its composition, together with the total level of taxes and its distribution across taxpayers, would be determined simultaneously. As elegant as such a system would appear in theory, its design in practice has proved to be another matter, since it leaves open the problems of how to handle taxes and expenditures that have distributional objectives (i.e., how to finance the redistribution) and how to induce the public to reveal its preferences in the case of pure public goods -- especially if it knows that such revelations will be the basis for increased tax bills. Nonetheless, this strand of public finance theory points up the importance of thinking about expenditure and tax/financing questions together and the fact that this linkage is essential to arriving at correct resource allocation decisions. Indeed, the "public choice economists" (i.e., Buchanan et al) would argue that there are cases where the linkage is essential to reaching any collective decision to expand the size of government activity.

One interesting aspect of the benefit approach to expenditure and taxation decisions is its reliance on individual decisions and an approach.


7/ To some extent, the budgetary process may be thought of as a method of inducing a kind of quasi-preference revelation. Elected officials must be sensitive to voter desires and voters know that they will be taxed to finance the expansion of any government activity only if other voters are likewise taxed. However, knowledge of voter desires -- especially as to the amounts and quality of public goods and services to be provided -- is at best imperfect and, given larger numbers, voters know that they individually can obtain a free ride. That is, it is not at all clear how accurately the budgetary process translates the public's wishes into concrete expenditure and tax programs.
Notes on the Principles and Practice of Earmarking

to government as a means of translating individual desires into collective action. The criticisms of earmarking rest mainly on a notion of government as a single will or government decision making as a perfect reflection of the wishes of the population under which expenditure and taxation decisions are made so as to maximize some (even if implicit) social welfare function. Analogously to household utility maximization, if allocative choices are made so that the net marginal social benefits are equated, any constraints on choice would lead to a lower level of welfare. If, on the other hand, one drops the notion of a single will and recognizes that political processes are imperfect and that societies consist of many groups with differing preferences, benefit taxation/earmarking may take on a more favorable coloring as a means of accommodating differences at a point in time and over time. If collective decisions are nothing more than the expression of individual choices through constitutionally agreed rules, general fund financing may have its limits. Expenditures and taxes are considered separately, with the level of (planned) expenditures determined annually at budget time on the basis of projected revenue from a tax system that has been implemented piecemeal over a number of years. The only links between expenditures and taxation in this process are the marginal adjustments in either that must be made to accommodate macroeconomic stabilization considerations.

These characteristics of general fund financing, coupled with unstable majority coalitions, mistrust among competing groups, or general "tax weariness" may make it difficult to raise additional resources. Voters and legislators will be unwilling to vote for more taxes without assurances about how the money will be spent or to vote for more expenditures without the details about how the tax burden will be distributed. Without assurances about both sides of the equation and some guarantee that agreements will be honored, it may not be possible to obtain a majority of voters or legislators in favor of a change. Both Buchanan and Goetz have shown that earmarking enforces a "tie-in" which ensures that taxes will be used for certain purposes and that the relationship will be stable through time. Thus, there are circumstances under which earmarking would break through the impasse and allow money to be raised that otherwise might not have been possible.

8/ In fact, if voters had identical preferences or if the same voter group had the median preferences with respect to both expenditure composition and taxation (budget size) then the solutions under general fund financing and earmarking would be the same.


10/ In Buchanan and Goetz's scheme of things, the impasse results when the majority in favor of a given expenditure (tax) program feels that its preferred tax (expenditure) program will not be adopted. With expenditure and tax decisions made separately, the decision to do nothing may be the only one which can command a majority. However, such an impasse can be broken if there are combinations of expenditures and tax finance which a majority would favor. This is not to say that the change brought
Earmarking has also been viewed as strengthening the case for cost recovery in the case of goods or services where charging a price is feasible. Cost recovery, the argument goes, makes more sense if the monies raised are retained for particular public goods or services in the sector.\(^{11}\) Beneficiaries will be more willing to pay if they know their monies will be used for activities that directly benefit them. Officials involved in the provision of a particular good or service will be more willing to enforce fee collection if they know that their clients will be benefited and/or the quality or quantity of services provided by their sector will be enhanced. Hence, earmarking may contribute to improved collection performance, and perhaps even a better utilization of the monies since concerned users and officials are better monitors of performance than more distant authorities.\(^{12}\) In addition -- and this argument likely applies better to public enterprises than to government departments and agencies -- the knowledge that the size of the institution's investment program is directly related to the amount of self-finance it can generate may in some cases be a spur toward greater production efficiency. In sum, the above arguments point to earmarking as a means to improve the performance of public sector institutions. The arguments make sense, but whether they hold up as a general rule can only be determined by an examination of real world experience.

There is also a connection between earmarking and functional and locational decentralization. While on one hand decentralization is likely to reduce the diversity of preferences, which is an important rationale in the arguments of Buchanan and Goetz, it also results in easier identification of beneficiaries, more opportunities for clearer articulation of voter preferences about amounts and methods of finance and about types and amounts of government services, and reduced possibilities for passing the costs of programs to non-beneficiaries. Thus, with decentralization, one finds numerous examples of cost recovery and earmarking schemes ranging from public enterprises (or government departments or agencies that function like separate firms) to special assessments (betterment or valorization taxes) and special districts (e.g., for water and sewerage or schools) to various services provided for a fee (e.g., garbage removal, parking, public transport, and other public utilities). In addition, with decentralization comes one of the most pervasive forms of earmarking -- revenue sharing for about will be "Pareto optimal". The decision needs only a majority vote and clearly some persons could be hurt by the change.

\(^{11}\) Obviously earmarking is not essential to cost recovery. Cost recovery -- with the funds flowing to the central pool -- can be justified by the need for the public sector to mobilize resources generally and by the contributions of benefit taxation to efficiency and equity.

\(^{12}\) For example, a recent study of the Philippines showed that schools that rely more heavily on local sources of finance have lower costs, holding enrollments and quality variables constant. See E. Jimenez, V. Paqueo, and L. deVera, Does Local Financing Make Primary Schools More Efficient? The Philippine Case (World Bank Working Paper Series, WPS 69, August 1988).
general or specific purposes between different levels of government. Nonetheless, despite these opportunities, one finds a mix of methods of government financing in decentralized systems with general fund financing still predominating. The reasons lie in the limitations to decentralization: (a) fractionalization in decision-making between different public agencies (as well as spillovers between different government activities -- e.g., transport modes, public health and public sanitation); and (b) the possibilities of spillovers into other geographical areas. Given the conflicting forces for and against decentralization and the creation of specialized firms and agencies, the chances strongly favor the existence of mixed systems, with the mix varying according to local circumstances.

Earmarking has also been justified on the basis that it corrects for political failure. Government expenditures on socially desirable goods and services in less developed countries are said to be lower or growing more slowly than justified because of inefficient procedures and bureaucratic delays, the diversion of funds to non-essential uses (e.g., defense, showcase investments, government salaries), and outright mismanagement and corruption. Earmarking -- especially with the setting up of a quasi-independent agency -- isolates administrations from interfering bureaucrats and legislators, greatly simplifies decision-making, and limits the discretion of decision makers. All of these are said to guarantee greater stability and continuity and a more appropriate mix of projects. Unfortunately, there is no guarantee that any of these advantages follow. The administrators of the independent agencies may be no more professional than ordinary civil servants. Earmarking isolates officials from public scrutiny and from accountability in some cases. Hence it can result in relatively low priority expenditures being protected. Furthermore, it is not even clear a priori that earmarking imparts greater stability to expenditures. That would depend on the variance of the earmarked source relative to that for general revenues and the priorities decision-makers set in response to fluctuations in general revenue.

This section makes the strongest case for earmarking. It appears that, under certain circumstances, the practice may help achieve improvements in the allocation of resources that would not have been possible under general fund finance, and/or it may be a way around general budgetary procedures that are cumbersome and inflexible. The argument has some merit but, as it stands so far, it is not compelling in that it doesn't give us very clear guidelines about the circumstances under which earmarking is justified. Moreover, even if one were convinced that earmarking is justified in some circumstances and willing to leave the decision as to when to administrators or legislators, there are still a number of unanswered questions, which we will consider in the next section.

D. Toward Some Principles for Earmarking

The literature on earmarking is remarkably non-analytical. Part addresses itself to the question of the conditions under which earmarking would be advantageous but never addresses the question of how earmarking might be implemented in practice or what criteria it would have to meet to be considered satisfactory. The remainder of the literature looks at the experience of earmarking in various countries and/or sectors and attempts an assessment of its success or failure, usually with rather mixed conclusions. The
The traditional theory has been laid out in terms of balanced budgets—charges paid by beneficiaries/taxpayers will be just sufficient to cover the (current and capital) cost of providing the good or service. For example, in Samuelson's general equilibrium model of the efficient provision of private and social goods, all goods are provided under constant returns to scale, the quantity of each social good consumed is the same for all taxpayers (by definition) and its output is expanded so long as the sum of the marginal benefits over all taxpayers exceeds the (constant) marginal cost of its provision. The equilibrium solution involves the determination of quantities of all public and private goods, taxes levied on each taxpayer for each social good according to the marginal benefit that he receives, and the sum of taxes paid for each social good equal to the total cost of supplying that good. Although there is no earmarking in the sense of segregated funds, earmarking in fact takes place because every public expenditure comes with its own source of finance and no public good would be provided without such financing. With constant returns, the budget for each public good would be balanced.

This, of course, abstracts from the "free rider" problem. If all public goods must be consumed in equal quantities by all and one person's participation in the benefits of any public good does not affect the benefits received by others, then there are no incentives for taxpayers to reveal their preferences, especially when large numbers are involved. They benefit whether they pay or not.
Analogous is the case of the public sector providing pure private goods under conditions of constant returns to scale (abstracting for a moment from questions of scale economies, indivisibilities, externalities, or public sector financial constraints). Given the level of demand for the good, the optimum output involves the equality of price with short- and long-run marginal cost (and hence with short- and long-run average costs). A price in excess of short-run marginal cost provides an incentive to increase production using variable factors of production while a price in excess of long-run marginal cost would lead to increased investment to expand capacity and lower (short-run) costs of production. The optimally adjusted capacity, for a given demand, involves the equalities listed above and results in total revenues equaling total costs. Earmarking (and cost recovery) would in this case involve a balanced budget. This would not be so, however, if capacity had not been adjusted to the optimum level or if some of our assumptions were altered.

Without the assumptions listed above, economic optima and earmarking appear to involve unbalanced budgets. The reasons why this is so are well known and need only be outlined here.

**Returns to Scale.** With increasing (decreasing) returns to scale, the long-run optimal output still involves the equality of price with short- and long-run marginal cost, both of which fall short of (exceed) short- and long-run average costs. That is, optimal adjustment to any given level of demand will involve continuous losses (profits) for an indefinite period.

**Indivisibilities.** With constant returns to scale but with lumpy investments which add non-marginal increments to output, the output at which price is equal to both short- and long-run marginal cost -- for any given level of demand -- may be impossible to attain. The decision about whether the correct output should be below or above the (unattainable) optimum is the familiar investment decision comparing additional (non-marginal) benefits and costs. In either event, the appropriate price will either exceed or fall short of long-run marginal cost and involve continuous excess profits or losses.

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14/ All short-term equilibria (with short-run marginal cost unequal to long-run marginal cost) involve either excess profits or losses.

15/ The results still hold in the face of fluctuating demand, keeping the assumptions of constant returns and no indivisibilities. In the so-called "peak load pricing" case, non-peak users pay a price equal to short-run marginal cost while peak users pay a price sufficient to cover the variable and fixed costs of peak use. Optimality thus involves a balanced budget. See O.E. Williamson, "Peak Load Pricing and Optimal Capacity under Indivisibility Constraints", American Economics Review, 56 (September 1966), pp. 810-827.

16/ Put differently, any earmarking rule that required a balanced budget would violate optimality conditions.
Externalities. Optimization in the presence of externalities involves equality between marginal social benefits and marginal social costs. With the good or service in question produced under constant returns to scale, external economies involve a higher output than would be generated by private demand and supply considerations and a subsidy to consumers to induce them to consume the larger quantity. External diseconomies in turn would involve a tax on output which results in a lower equilibrium output than would be generated by private demand-supply considerations.

Public Sector Financial Constraints (pure taxation). The government’s desire to raise revenue to finance general public sector operations may lead to use of excise and sales taxes (as well as pricing of public enterprise products at above marginal cost) -- i.e., financial constraints may dictate indirect taxation which drives a wedge between the price consumers pay and marginal (private and social) costs. Any monies raised in this fashion belong to the general budget.

The above sketches a number of examples when economic efficiency and earmarking considerations would appear to require inequality between revenues and outlays for variable and fixed factors of production and hence some sort of relationship with the general budget (or perhaps with financial markets should borrowing or lending be allowed). For example, the excess profits generated at the optimum level of output in the increasing costs case are not a signal for increased investment. For capacity is already correct: the excess profits should either revert to the general budget or, at a minimum, be held in interest bearing financial assets until increased real investment is justified. Similarly, the losses dictated by optimality considerations in the cases of decreasing costs or positive externalities would have to be met from general funds. It appears then that there are cases where it would not be desirable to run an earmarked budget in isolation from the general budget.

The literature on earmarking -- in its more theoretical aspects -- is one of balanced budgets, at least for marginal changes. What we have shown in the preceding paragraphs is that efficiency considerations dictate (marginally) balanced budgets only under a restrictive set of assumptions about returns to scale, divisibilities, and externalities. Depending on which conditions hold, meeting efficiency conditions may or may not require unbalanced budgets in the earmarked sector. In practice, one can find

17/ Efficiency considerations dictate that taxes and pricing of all goods and services--private and public--be considered together in order to minimize distortionary costs. The discrepancy between price and marginal cost should be relatively higher on goods where the ratio of marginal revenue gain to the marginal distortionary cost is relatively high and conversely, optimality being reached when the ratio is the same for all goods.

18/ In addition, there are a number of reasons why departures from marginal cost pricing in any (or all) sectors may be necessary: the need to raise government revenues, tax luxury consumption, or correct for price distortions in other sectors -- i.e., the kinds of factors covered in the literature on optimal taxation and second-best. Revenues raised for these purposes from any sector need not be expended in that sector.
Numerous cases of imbalances between earmarked revenues and expenditures, the differences being made up by transactions with the general fund (or, in some cases, borrowing). Thus, while social security and special assessment schemes tend toward balanced budgets, most other forms of earmarking are characterized by imbalance. The question then arises “Under what circumstances does earmarking really matter?” or, put slightly differently, “If the link between expenditures and earmarked revenues is imprecise, does earmarking have any impact on the capacity or size of output in a sector or is it an illusion?”

We sketch only the outline of a response here. The answer appears to depend on the degree of interdependence between tax/price and expenditure decisions in the sector. Take two extremes cases, both of which involve setting a user tax or charge and earmarking the proceeds for use in the sector. If, for the sector, taxes or prices are set arbitrarily or without consideration of optimality conditions and earmarked revenues have to be supplemented by general revenues, then expenditure levels and the amount of resources devoted to the sector will be determined by a balancing of general resource availability and the demands of other sectors. Then it is the dictates of the general budget that determine the sector’s size and not the presence of earmarking. That is, despite earmarking, the amount of resources devoted to the sector is determined by balancing its needs against the needs of other sectors; the presence of earmarked money has little influence on actual output levels or capacity in the sector — especially at the margin.19/20/ At the opposite extreme are our examples of pages 13 to 30: if prices are set at an optimum for the sector (with marginal social benefits equal to marginal social costs),21/ then any resulting revenue/expenditure imbalance is irrelevant (at least from a resource allocation point of view, if not financially). The size and output of the sector has been determined by efficiency considerations — and not by considerations of general revenue availability or by comparisons of the value of using funds in the earmarked sector versus using them in other sectors. The fact that optimality involves

19/ This example is not a “straw man”. There are numerous examples of highway funds financed with specific rate fuel taxes which then become eroded through inflation. General budget resources, to the extent possible, finance the excess of expenditures over earmarked funds. Earmarking in such cases serves only to provide a floor below which sectoral expenditures will not fall even if general resources get very tight. Expenditures above this minimum are determined by evaluation of the needs of the sector versus those of other sectors.

20/ The appropriate test would be to ask what would happen, in this case, if earmarking were abolished. Would expenditures in the sector fall by the amount of lost revenue or would the effects be spread across a number of sectors?

21/ The equality of marginal social benefit and marginal social costs holds as a definition of optimality in all our cases except that of “pure taxation” where the tax introduces a differential between marginal benefits and costs. In the case of indivisibilities, equality is still the objective but lumpy investments may prevent the optimal output from being achieved.
transfers of funds between the earmarked and general budget is thus inciden-
tal. Therefore, it appears possible under restrictive assumptions for
earmarking under unbalanced budget conditions to have a meaningful impact on
the allocation of resources.

Up to this point, we have confined our attention to earmarking cases
which have a strong benefit link -- a large, if not total, overlap between
the tax/price-payers and the expenditure beneficiaries. A number of real
world cases, however, do not meet this condition: e.g., the use of so-called
sin taxes (alcohol, tobacco), or lottery proceeds to finance the social
sectors, the setting aside of a fixed proportion of income taxes for specific
purposes, and the like. These cases seem to have almost no redeeming fea-
tures. There is no connection between the amount of revenues raised and
the appropriate level of expenditures or services; indeed, because the goods
or services are provided to users below cost, there is a tendency toward
excess demand, necessitating the use of non-price devices (e.g., queuing,
congestion, entrance examinations) to restrain demand. In addition, since
in most of these cases earmarked funds are supplemented by general budget
funds, the real function that earmarking is playing is not clear. Earmarked
sources are supplying an arbitrary amount of resources for the sector; the
additional amount of resources coming from the general fund depends on the
needs of the sector as against those of other sectors. The main virtue
touted by proponents is that government can extract more resources from
taxpayers by committing them to specific purposes. However, given fungibility
and given that earmarking cannot play much of a role toward assuring the
appropriate level of output in such cases, such commitments appear to border
on deception and ought to be discouraged.

Our final question deals with the limits to earmarking. Real world expe-
rience shows that in countries where earmarking is prevalent (say 20 percent
of the government budget or more), there is strong evidence of widespread
abuse and a strong case can be made for sharp retrenchment. There is no
rationale for earmarking on the scale being practiced and a severe fraction-
alization of government decision-making has resulted. There are several
reasons why there may be limitations. First, earmarking ought not to be
extended to cases where benefit taxes/prices cannot be applied (e.g., pure
public goods, programs with redistributive objectives). Second, effective
earmarking -- where revenues and expenditures actually reach appropriate
levels -- is not easy to apply in practice. Third, economies of scale and
spillovers (between parts of government and geographical areas) limit the
extent of decentralization of decision-making. Fourth, there are clear
tradeoffs between revenue raising for earmarked and for general fund purpo-
ses. Raising additional revenue for earmarked uses may pre-empt resources
being mobilized for the general budget. Moreover, if earmarked revenues are
more stable, then general revenues will become less stable than otherwise and

Indeed it is not clear that they would be justified even in the event of
greater overlap between tax/price-payers and beneficiaries. If, for
example, a substantial number of students (or their families) were
smokers or drinkers, it doesn't follow that taxation of tobacco and
alcohol would generate the appropriate level of resources for the
education sector.
Notes on the Principles and Practice of Earmarking 33

non-earmarked expenditures less certain and predictable. And fifth, the proliferation of earmarked funds appears often to lead to conflicts and contradictions with general government economic policies (e.g., expenditures financed by import surcharges in contradiction of government efforts towards trade liberalization, export taxes levied to subsidize private investment in countries trying to adopt more outward-looking development strategies). While the effect of these factors would be difficult to isolate and quantify (except perhaps for the first), together they appear to severely limit the scope for justifiable earmarking.

PART II: THE PRACTICE OF EARMARKING

A. Cost Recovery and Earmarking in the Highways Sector

The highways sector is a particularly fruitful one for study. First, it has a number of characteristics which make it interesting from the point of view of pricing and cost recovery decisions -- e.g., the presence of returns to scale and indivisibility questions, external diseconomies in the form of congestion and pollution, and the possibility of luxury taxation. Secondly, taxes on fuel and vehicles form a significant fraction of government revenues in both developed and less developed countries, and in both there are numerous examples of earmarking in the form of highway funds. This section begins by briefly reviewing the evolution of the Bank's attitude toward earmarking, discusses the nature of costs that pricing must take account of, outlines several cost recovery theorems developed by David Newbery, evaluates the effectiveness of various cost recovery instruments, and then closes by drawing some preliminary lessons for cost recovery and earmarking.

After an initial period of enthusiasm, the Bank's attitude toward earmarking for highway expenditure has cooled considerably. Early Bank work -- at least for some specific countries -- called for earmarking on the argument that greater stability in funding would provide steadier support for the development of entrepreneurship and would help to lower unit construction costs by speeding completion. In addition, some crude statistical work purported to show a correlation between earmarking and the proportion of investment devoted to highways. Later Bank work has been more skeptical. In a number of African countries, for example, earmarking has not provided adequate funds for highways, and funding appears to have fallen below what might reasonably have been expected from general fund financing. Only in the Central African Republic, post-1981, where a separate agency was established and a substantial proportion of earmarked funds was devoted to highway expenditures, has there been anything approaching success, and, even now, Bank supervision reports complain that the rise in real operation and maintenance allocation has not met Bank covenants. The Bank's Transportation

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23/ P. Eklund, Earmarking of Taxes for Highways in Developing Countries (IBRD; Economics Department Working Paper No. 1; June 6, 1967).

Policy Note No. 1 (1985) stated that earmarked funds were often diverted to other uses or to non-priority uses within the transport sector and concluded that, with some qualifications, earmarking ought to be avoided wherever possible. The qualifications recognized that where public sector mismanagement was rampant the alternative might be worse and allowed for earmarking where (a) there was a public agency with the demonstrated capacity to carry out the program; (b) funds would be devoted entirely to a maintenance program of finite duration where priorities had been carefully articulated; and (c) there were clear controls (ex ante and ex post) against the diversion of funds.

The Bank's position is based on the by and large poor performance of earmarking for highways in developing countries. In its qualifications, it clearly recognizes the importance of institutional capacity and the existence of a priority expenditure program based on economic criteria; there is no way that earmarking can make up for their absence. It also recognizes that commitments to earmarking ought not to be open-ended; there ought to be periodic evaluations to determine whether continuation is justified on the basis of past performance and likely future needs. Nonetheless, the Bank's qualified position still raises questions. Even acknowledging that inadequacy of maintenance funds is a general problem in LDCs, it is not clear that all maintenance programs take precedence over construction projects or that, given fungibility, earmarking really does lead to an improved mix of highway expenditures. Moreover, the Bank still has not been successful in addressing the critical issue -- the appropriate level and structure of highway user charges and its connection to the appropriate level and composition of expenditures.

The basic problem is whether a set of road user charges can be devised which would lead to an optimum size road network and at the same time correctly allocate the costs of constructing and using that network across users. The non-private costs of road use involve wear and tear on the

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25/ IBRD, Interim Guidelines - Road Funds from Earmarked Sources (Transportation Note No. 1; November 5, 1985).

26/ This is not to say that the Bank has not been interested in cost recovery for highways or its relationship to the variety of costs society incurs from the construction and use of highways. Quite the contrary. It is merely to say that the Bank's work in this area doesn't seem to have influenced its attitude toward earmarking. For examples of the Bank's work in user charges, see A.A. Walters, The Economics of Road User Charges, World Bank Staff Occasional Papers No. 5 (The Johns Hopkins Press; Baltimore; 1968) and A. Churchill, Road User Charges in Central America, World Bank Staff Occasional Papers No. 15 (The Johns Hopkins Press; Baltimore; 1972).

27/ The following paragraphs rely heavily on D.M. Newbery, Road User Charges and the Taxation of Road Transport (prepared for Fiscal Affairs Department, IMF; February 11, 1987); and On Cost Recovery from Optimally Designed Roads (prepared for Fiscal Affairs Department, IMF; July 28, 1994).
system and a variety of externalities: congestion, pollution, accidents, and
the fact that the wear and tear caused by any vehicle journey increases the
vehicle operating costs of subsequent vehicles.\footnote{28} It turns out in practice
that only road damage and congestion are important to take into account.
Pollution costs have turned out to be negligible in a number of cases and
costs of accidents are partly internalized through insurance and not terribly
significant as a marginal cost in most traffic volume-cost studies.\footnote{29} Wear
and tear externalities can be ignored because, while an extra journey causes
road damage and hence imposes costs on other vehicles, it also hastens the
day for needed maintenance which will lower costs for those vehicles; in any
network where roads are of a uniform age and maintenance is carried out
according to predetermined rules when road quality deteriorates to a set
level, the two effects will cancel each other.\footnote{30}

Thus, in most cases, the major (non-private) costs to be considered are
wear and tear on the roads and congestion. Vehicle trips damage the road
surface and hasten the time when maintenance (or more costly reconstruction)
must be carried out. The damage is proportional to weight with damaging
power rising as the fourth power of axle load. The damage done by trucks can
be several thousand times that done by a car and much of wear and tear is
attributable to trucks. On the other hand, congestion costs do not vary
significantly across types of vehicles, at least by comparison with their
large variation by location and time of day. While part of the congestion
costs are internalized to the vehicle making the journey, the costs imposed
on others are likely to be many times as great.

As to the appropriate relationship between user fees, internal and
external costs due to highway construction and use, and the capacity of the
system, D.M. Newbery has constructed three important theorems under restric-
tive assumptions, the most important of which is that highway capacity has
reached optimal size.\footnote{31} The theorems are:

a. "If there are constant returns to scale in road construction and in
road use, then the optimal congestion charge will cover the capital
costs of the road network and the non-allocable fraction of road
maintenance expenditure." (where the non-allocable fraction is due
to weather)

\footnote{28} Vehicle operating costs are not considered here as these are private
costs which owners will take into account in determining the frequency
and timing of trips.

\footnote{29} These are obviously empirical questions which would have to be considered
on a case-by-case basis. See D.M. Newbery, Road User Charges and The
Taxation of Road Transport, op cit., p. 6.

\footnote{30} Ibid.

\footnote{31} That is, all investments have been undertaken for which the reduction in
vehicle operating costs and congestion costs exceed maintenance and
capital costs. The theorems appear in D.M. Newbery, "On Cost Recovery
from Optimally Designed Roads", op. cit., p. 8.
b. "If there are constant returns to scale in road construction and road use, then the optimal road user charge will recover the capital costs of the road network and the total expenditure on road maintenance."

c. "If there are constant returns to scale in road construction and use, if heavy vehicles are confined to slow lanes, and if all road damage is attributable to traffic, then the optimal road user charge will recover the capital costs of the road network and twice the total expenditure on road maintenance."

The importance of Newbery's theorems lies in tying the various elements of price, user costs, and capacity decisions together and in spelling out for us what must be answered before appropriate cost recovery decisions can be made. The theorems -- and their qualifications -- also seem to point to a number of cases where appropriate cost recovery would not be equal to the total expenditures on maintenance and capacity.

What would the foregoing lead us to conclude about the design of an appropriate structure of charges for the highway sector? Unfortunately the answer is complicated by the fact that the Government may have other objectives beyond cost recovery and by real world constraints on tax and price instruments that would reflect (marginal) damage and congestion costs. The government may have general revenue requirements and/or income distribution objectives which would lead it to set taxes or prices above marginal costs. In the first instance, the problem is for the government to extract a given amount of resources from the economy in a way that imposes the least deadweight cost; it is the problem of choosing optimal departures from marginal cost pricing for all privately or publicly sold goods that is addressed by Ramsey rules and their like. In the second instance, it is clear that purchases of personal vehicles, fuel, etc. are income elastic and thus form a higher share of expenditures in higher than lower income groups; where it is difficult to achieve appropriate progression in the tax schedule from more general taxation, it is quite legitimate for governments to use excise taxation for this purpose. In both instances, the result is "pure taxation", charges over and above those levied on users for the costs they impose. Such "pure taxation" should be imposed on consumers -- not at intermediate stages -- in order not to distort production efficiency. Moreover, any monies so raised should revert to the treasury to be used for general purposes; it should not be earmarked for expenditures in the highway sector.

Turning to the question of road user costs, it is evident that there are practical limitations to imposing charges which are based on careful estimates of road damage and congestion costs and which vary precisely by type of vehicle (and axle configuration), distance traveled, time period, and location. With the present state of technology, tolls carefully calibrated to account for those four factors are not cost-effective. What we have

instead is an ability to measure the costs of constructing and operating the system (including rough estimates of externalities in some instances), to apportion these costs roughly across vehicles according to their contributions, and to use a combination of instruments to affect decisions about vehicle choice (including loading and axle configuration), distance traveled, and, to a lesser extent, periods and routes of travel. It is worth noting that where full cost recovery is effected, it resembles more average cost pricing than marginal cost pricing, especially in those elements reflecting congestion. The main instruments, together with comments on their likely effects and major advantages and disadvantages are shown in table 2. For getting at road damages, a combination of licensing and legal restrictions to assure appropriate vehicle choice and guard against overloading plus taxes related to distance and weight (e.g., ton-mileage taxes, fuel taxes) would appear to be appropriate. For congestion, distinctions across vehicle types are not so important and the need is for instruments which can distinguish time and location; tolls, on a widespread basis, are presently impractical but there are possibilities for area-specific licenses, parking fees, and possibly public transport subsidies.

There are several clear lessons for earmarking that can be drawn from the foregoing. First, there is a clear interrelationship -- fairly precise in theory and potentially also in practice -- between cost recovery, road damage and congestion costs, and optimum capacity decisions. Any attempts at cost recovery should take this fact into account in determining levels of money to be raised and allocating costs as best possible to the parties responsible. Secondly, because of scale economies, externalities, and "pure taxation" considerations, it is not at all evident that revenues collected by government should equal its expenditures on maintenance and capital expansion. Thus, earmarking -- should it be deemed desirable -- will most likely have to coexist with supplements from or contributions to general budgetary revenues. And lastly -- the clear lesson from practice and a rather obvious one -- is that earmarking by itself solves nothing. It doesn't guarantee appropriate funding for the sector, make up for weak institutions, or assure that expenditures will be dedicated to the highest priority areas. In fact, perhaps the reverse would be appropriate: the assurance that these conditions would be met should be a precondition for earmarking.
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<tr>
<td>and final consumption may occur</td>
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<tr>
<td>outside the transport sector.</td>
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<tr>
<td>d) There has been some success</td>
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<tr>
<td>in taxing these differentially</td>
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<td></td>
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<tr>
<td>in road use from other areas in</td>
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<tr>
<td>developing countries, it is</td>
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<tr>
<td>probably beyond the administrative capacity of</td>
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<tr>
<td>most LDCs.</td>
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<tr>
<td>2. Import-type taxing (e.g.,</td>
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<td></td>
</tr>
<tr>
<td>fuel taxes)</td>
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<td></td>
</tr>
<tr>
<td>a) Quite appropriate as fuel tax</td>
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<td></td>
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<tr>
<td>varies with type of vehicle, use</td>
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<td></td>
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<tr>
<td>and distance and offers potential for reducing substantial</td>
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<tr>
<td>fraction of road damage, esp. by trucks which are major</td>
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<td></td>
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<tr>
<td>users. Similar to tire taxes,</td>
<td></td>
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<tr>
<td>except for potential danger that heavy taxation can encourage over-use.</td>
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<td></td>
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<tr>
<td>3. Metering acceptances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Potentially the appropriate way to handle congestion on charges could be varied by</td>
<td></td>
<td></td>
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<tr>
<td>time period, place, and vehicle type.</td>
<td></td>
<td></td>
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<tr>
<td>4. Vehicle Ownership (Taxes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Licenses fees (complemented by legal restrictions) can be instrumental in getting consumers to choose appropriate weight and size configurations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Fees likely be instrumental in lowering demand from marginal purchasers, probably roughly equally in congested and non-congested areas. High purchase fees, however desirable on equity grounds, may give incentive toward smaller, older cars which may offset some of the favorable congestion effects. Annual license fees likely to be more feasible toward reducing congestion since there is possibility of tailoring them to location of residence/occupation of work.</td>
<td></td>
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<tr>
<td>c) Import duties on vehicle purchases can have effects similar to purchase/license taxes in reducing demand and encouraging use of public transportation, but are inferior in the sense of opening up possibilities for import substitution at high costs.</td>
<td></td>
<td></td>
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<tr>
<td>5. Public Transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Subsidies (i.e., pricing below marginal use costs), together with privileged access routes and taxation of private vehicle use can divert traffic from private to public systems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Parking fees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Parking fees (or taxes of private parking) can, to some extent be made time period and location-specific affecting entry into congested areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Problem in that subsidized services often lead to inefficient operations, excess demand and deteriorating services which leads to return to private vehicles; subsidized services also discourage private sector operations.</td>
<td></td>
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</tr>
</tbody>
</table>
B. Colombia's Valorization Tax\(^{33/}\)

This tax represents the purest form of earmarking that I have been able to identify to date. This purity results from several characteristics of the practice of valorization:

a. the fact that taxpayers and beneficiaries overlap to a substantial degree;

b. the use of benefit-cost considerations (*"appraisal" or "analysis" would be too strong a word) and the conscious and conscientious attempt to allocate tax assessments according to how people benefit from the project; and

c. the strong link between valorization revenues and expenditures (i.e., no supplements from or diversions to general fund financing, at least in principle).

In addition, valorization appears to reverse the usual sequence of earmarking whereby available revenues drive expenditure levels: instead, the identification of desirable projects, often within the scope of prepared investment programs, appears to call forth efforts to raise financing from prospective beneficiaries.

The valorization charge is similar to what has been called special assessments or betterment taxes in other countries. Valorization, as practiced in Colombia, is a system by which the costs of public investments are apportioned and recovered according to the distribution of the benefits received. While practice has evolved over time, Colombian municipalities, as well as some specialized agencies such as water and sewer authorities and the Ministry of Public Works, have been given the right to recover costs and considerable flexibility in determining how to measure and allocate benefits. Over time, the scope of valorization has been extended to include street construction, local paving, parking facilities, urban development, and what are called "green spaces" and "zones of historical interest". The amounts raised through valorization are certainly not trivial, amounting to about 14 percent of total municipal tax revenue in 1979.

Projects selected for valorization in many instances are already parts of sectoral development plans. This is clearly the case for streets (including parking) and sewers, less so for "green spaces" and urban redevelopment, but is not the case for local paving. Upon a project's selection, a "zone of influence" is demarcated, the area over which benefits are expected to be

---

felt. Benefits are estimated as the total resulting rise of site values, and allocated across the properties within the zone according to formulas which take into account a number of characteristics such as size, shape, topography, frontage, distance from project, and a number of economic factors. This allocation then determines how the project costs are allocated across properties. Costs eligible for inclusion are: (a) cost of land; (b) cost of construction; (c) cost of administration, estimated at 20 percent of (a); (d) contingencies, estimated at 5 to 10 percent of (a) plus (b); (e) interest on the value of (a) and (b) during the construction period and (f) honoraria for representatives.

In principle, there is nothing to stop authorities from attempting to recapture some or all of the project (net) benefits, but in practice only full recovery of the costs listed above is sought. Care in selection is exercised to make sure that projects yield benefits in excess of costs; in practice the rapid development of most cities plus inflation has left a sizable margin for error. In addition, consideration is given to problems that the poor or persons with few liquid assets might have in paying the tax. Low income persons can be exempted altogether and others are allowed to stretch out the valorization tax payments over several years if otherwise it would absorb a significant fraction of their annual income.

The valorization tax as practiced obviously has a number of desirable features -- the benefit connection, the efforts to select economically desirable projects, and the flexibility with which it has been adopted in differing circumstances. As a tax on the unimproved value of land, the tax would have no adverse incentive effects, and in fact the combination of the tax and improvement serve to raise income and increase the potential profitability of investments which should have a desirable incentive effect. It has raised sizable revenues and financed a significant fraction of improvements in Colombia's cities.

Despite these favorable features which would cause us to give valorization an overall positive evaluation, in practice there are a number of imperfections. First, quite aside from the fact that authorities attempt to capture only the incremental costs out of the incremental benefits, collections fall far short of 100 percent. The reasons appear to be cost overruns, generous exemptions (e.g., the Catholic Church, charitable institutions, and public enterprises), generous exceptions or payment schedules given to the poor and those with liquidity problems, and the influence of powerful interest groups. Second, the concept of the "zone of influence" has its limitations, with a sizable fraction of beneficiaries falling outside the zone, and it is hard to implement with a number of projects simultaneously affecting a number of overlapping zones. Lastly, valorization revenues have proven to be quite unstable in part because of collection problems and in part because of administrative deficiencies in planning and implementing projects.

34/ Apparently this has been the experience with betterment taxes around the world.
C. Turkey's Extra-Budgetary Funds

Turkey has been included in this paper as an example of the proliferation of earmarking. Extra-budgetary funds (EBFs) -- some quite old but most of recent origin -- have grown from the equivalent of 8 percent of central government budget revenues (1.6 percent of GNP) in 1983 to 20 percent of government revenues (3.5 percent of GNP) in 1985 and are estimated to have reached 4.5 percent of GNP in 1986. This in a country where central government revenues and total government revenues (all levels including EBFs) have been falling as a share of GNP since 1981 -- the former from 18.2 percent to 13.2 percent and the latter from 20.7 percent to 17.5 percent.

The purposes and sources of funding for the major EBFs are shown in Table 3. The purposes are quite varied, ranging from quite specific (e.g., support for defense industry investment, housing subsidy, fertilizer subsidy) to more general (e.g., export and investment subsidies, export promotion through marketing and advertising) to even more general (an EBF to raise money for other EBFs). Revenues for the EBFs are obtained from tax (68 percent) and from non-tax (32 percent) sources. Some funds have authority to borrow but to date the amounts involved have been quite small. Major tax sources were import duties (18 percent of total revenue), export taxes (13 percent), petroleum taxes (20 percent), financial transactions (10 percent) followed by excises on tobacco, alcohol, and beverages. Non-tax revenues included the proceeds of lotteries and gambling houses, various fees and penalties, operating income from infrastructural facilities and interest income on financial assets.

In general, EBFs are established by decree following approval by the Council of Ministers. The decree specifies the EBF's purposes, eligible expenditures, sources of revenues, and rates of tax or surcharge and/or rates of subsidy involved. In some instances, the decree is so specific that the Council of Ministers determines the EBF's charter, policies, operating framework, and budget. Then the EBF has no separate management board and the fund is merely an account held at the central bank. In other instances, the fund has a separate board and management body. There is no single authority which supervises all the EBFs. There are no published accounts or standardized audits.

The proliferation of EBFs is mainly the result of trying to get around cumbersome budgetary procedures. This is about the only thing that can be said in their favor and even this is a questionable compliment, since wholesale avoidance of facing the problem of budgetary reform is hardly a desirable strategy. In addition, earmarking as practiced in Turkey seems to contain a number of serious drawbacks. First, it does not seem to be contributing much, if anything, to Government efforts to raise more resources. The rise of the EBFs has accompanied falling shares of government expenditures and government revenues in GNP. While overall EBFs run a surplus, their growing absorption of resources may make it difficult for Government to

35/ This section (except for our own elaborations in the evaluation) is a summary of IBRD Fiscal Policy and Tax Reform in Turkey (No. 6374-T.), Vol. I, Chapter VII.
<table>
<thead>
<tr>
<th>Name</th>
<th>Established</th>
<th>1985 Revenue</th>
<th>1985 Projected</th>
<th>Major Sources of Revenue</th>
<th>Major Areas of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defence Industry Support Fund (FISP)</td>
<td>1985</td>
<td>104.6</td>
<td></td>
<td>Incentive tax on fuel, tobacco; direct tax on corporate and personal income; non-tax revenue.</td>
<td>Support to investment in the domestic defence industry, civilian research.</td>
</tr>
<tr>
<td>Development and Support Fund (DSF)</td>
<td>1986</td>
<td>112.1</td>
<td></td>
<td>Tax on luxury imports and transfers from other funds.</td>
<td>Price support of animal feed-meat and meat products.</td>
</tr>
<tr>
<td>ECF Fund (ECF) g/</td>
<td>1986</td>
<td>15.0 g/</td>
<td></td>
<td>Tax on imports of iron and steel and some chemicals from EEC g/</td>
<td>Transfer to other funds (mainly REFP).</td>
</tr>
<tr>
<td>Export Encouragement Fund (EF)</td>
<td>1986</td>
<td>27.9</td>
<td>91.6 g/</td>
<td>Tax on imports, exports and non-tax revenue.</td>
<td>Support to private investments and transfers to other funds. (Mainly REFP and EFP).</td>
</tr>
<tr>
<td>Export Improvement Fund (EIP)</td>
<td>1988</td>
<td>0.0</td>
<td>0.0 g/</td>
<td>Contributions from private industry.</td>
<td>Export promotion through marketing and advertising.</td>
</tr>
<tr>
<td>Financing Fund (FP)</td>
<td>1986</td>
<td>22.4</td>
<td>25.9 g/</td>
<td>Deferred tax on corporate income.</td>
<td>Support to private investments.</td>
</tr>
<tr>
<td>Investment Goods Manufacturing Encouragement Fund (IGMEF) g/</td>
<td>1986</td>
<td>g/</td>
<td></td>
<td>Foreign credits and transfers from other funds. From any source.</td>
<td>Credit to investment and transfers to other funds. (Mainly REFP and EFP).</td>
</tr>
<tr>
<td>National Assistance and Support Fund (NAP) or &quot;Poor People’s Fund&quot;</td>
<td>1986</td>
<td>g/</td>
<td></td>
<td>Transfer from budget and other funds; non-tax on corporate and personal income; non-tax revenue.</td>
<td>Income transfer to poor.</td>
</tr>
<tr>
<td>Housing Fund (HF)</td>
<td>1986</td>
<td>128.0</td>
<td>168.7</td>
<td>Tax on luxury imports, share of supplementary VAT and transfers from other funds.</td>
<td>Subsidised housing credit.</td>
</tr>
<tr>
<td>Petroleum Consumption</td>
<td>1986</td>
<td>108.6</td>
<td></td>
<td>Tax on fuel consumption</td>
<td>Financing investments of local government and highways and rural development.</td>
</tr>
<tr>
<td>Petroleum Exploration Fund (PEF)</td>
<td>1987</td>
<td>16.2 g/</td>
<td>66.9</td>
<td>Tax on domestic petroleum.</td>
<td>Transfer to other funds (mainly PEP).</td>
</tr>
<tr>
<td>Public Participation Fund (PPF)</td>
<td>1986</td>
<td>209.7</td>
<td>405.7</td>
<td>User charges on public infrastructure; taxes on economically sharing cost.</td>
<td>Public investments in infrastructure.</td>
</tr>
<tr>
<td>Petroleum Price Stabilisation Fund (PPSF)</td>
<td>1986</td>
<td>66.4 g/</td>
<td>66.4 g/</td>
<td>Tax on imported petroleum.</td>
<td>Transfer to other funds (mainly PEP).</td>
</tr>
<tr>
<td>Repossessed Utilisation Support Fund (RUSF)</td>
<td>1986</td>
<td>112.3</td>
<td>172.5</td>
<td>Tax on bank loans.</td>
<td>Export and Investment subsidy.</td>
</tr>
<tr>
<td>Selective Credit Fund (SCF)</td>
<td>1987</td>
<td>26.8 g/</td>
<td>6.0</td>
<td>Control government consolidated budget.</td>
<td>Export and Investment subsidy (mainly through transfer to NAP).</td>
</tr>
<tr>
<td>Support and Price Stabilisation Fund (SPSF)</td>
<td>1986</td>
<td>207.7</td>
<td>206.0</td>
<td>Tax on imports and agricultural exports.</td>
<td>Fertilizer subsidy.</td>
</tr>
<tr>
<td>Tax Administration Development Fund (TAF)</td>
<td>1986</td>
<td>g/</td>
<td>56.0</td>
<td>Control Government consolidated budget.</td>
<td>Improvement in tax administration.</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>1134.0</td>
<td>1051.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL (net of inter-fund transfers)</strong></td>
<td></td>
<td>248.0 g/</td>
<td>1751.2</td>
<td></td>
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</tr>
</tbody>
</table>

/ means no import from the EC were skipped in any given year.
/g means some income based on an increase of 10% over 1985.
/ shows that the percentage of July 1986 data had been corrected for transfer.
/ indicates that the 1985 data includes in the totals.
/ indicates the 1985 data includes in the totals.
/ may result from some discrepancies between inter-fund transfer receipts and expenditures in the fund reports.
/ figures in billions of Swiss francs.
increase revenues and reduce the budgetary deficit. In addition, the fact that some EBFs have the authority to borrow is a worrisome sign. Second, with the lack of effective overall organization, it is clear that the policies of some EBFs run counter to those of other EBFs or to those of the Government. For example, reliance on export taxes and import duties is contrary to government objectives of a more open export-oriented strategy. While the Government encourages private initiatives and gives investment incentives, one fund relies on taxes on bank loans to the private sector in order to subsidize exports and investments. At times in the past (it apparently has stopped), one fund was taxing agricultural exports while another was subsidizing them at the same rate. Thirdly, the practice of EBFs in Turkey strays quite far from the benefit principle, representing instead the arbitrary assignment of certain tax revenues for the finance of supposedly desirable government programs. Under these circumstances, revenues provide no guidelines about desirable levels of the service to be provided. Lastly, and relatedly, it is not at all clear what project evaluation criteria the EBFs must meet and how rigorous these are compared to those for regular budget expenditures. In sum, given the size of the EBFs and the lack of coordination and control, there is a potential for a major misallocation of resources.

PART III: CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER WORK

While it is early in this work for definitive conclusions, there are a number of observations which will probably stand the test of further scrutiny:

• There is no general case against earmarking, however much the Bank and Fund have protested the practice in the past. On the theoretical side, earmarking can, by matching revenues and expenditures, allow additional revenues to be raised in cases where different interest groups cannot reach a consensus on expenditure or revenue programs separately; can -- in certain instances -- provide a method for protecting government programs from administrative inefficiency and corruption; and forms a part of the argument for decentralized government activities. In addition, earmarking carries some of the same virtues as benefit taxation or user charges. In practice, there are numerous cases of successful earmarking (as well as numerous failures); the successes seem to be centered in social insurance schemes, special assessments (betterment charges or valorization taxes) and special districts (for schools, water and sewerage, and irrigation), and some highway funds.

• Earmarking works best where benefit principles of pricing and taxing can be applied. The link between beneficiaries and payees seems to enforce better compliance and greater discipline in the use of funds and also provides guides as to appropriate levels of the service.

• Conversely, earmarking is poorest where benefit links are weakest. Hence it is probably not appropriate when pure public goods are involved (as beneficiaries do not have an incentive to express their
preferences)\textsuperscript{36} or in programs which involve strong elements of income distribution or social welfare objectives.

- Earmarking cannot make up for institutional weaknesses in ability to plan, evaluate and implement projects. In fact, the presence of these capabilities should be prerequisites to earmarking.

- There are limitations to the extent of earmarking. These limits stem from the limited cases where the benefit principle applies, the costs of fractionalization of decision-making, and possible tradeoffs with revenue mobilization for the general budget. In those countries where earmarking has become extensive (e.g., Turkey, Colombia), there appear to be numerous cases where it is not justified and ought to be abolished.

Thus earmarking can be justified by the fact that it is fulfilling voter preferences or by failures in the general budgeting processes (e.g., rigid and time-consuming procedures, corruption). However, past experience has shown that earmarking carries with it its own set of potential problems, in addition to sheltering a particular type of government expenditures from having to compete for funding with other types of expenditures. The problems include possible inadequacy of resources to meet sectoral needs, lack of control or scrutiny over expenditure priorities or administrative outlays, competition with the government's ability to raise resources for the general budget, and possible conflict with other government policies. This suggests that each earmarking scheme be called upon to meet a series of tests to ensure that it does in fact represent an improvement. These tests are formidable enough that the scope of earmarking would likely be quite narrow in practice.

- Is there a link between beneficiaries and tax/price payers?

- Will the price or tax (and other financing arrangements) for the earmarked expenditure lead to levels of resources appropriate to present and expected levels of demand?

- Will the price or tax arrangements have (significant) distortionary effects on the allocation of resources (e.g., deadweight losses, inflationary impacts)?

- Is there an appropriate investment program and a clear set of rules for decisions regarding investment, regarding the mix of capital, maintenance and rehabilitation expenditures, and regarding administrative overheads?

- Is there a set of accounting and auditing controls guarding against the misuse or diversion of funds?

\textsuperscript{36} The exception to this statement would be local public goods where the absence of large number creates a greater incentive for voter/taxpayers to express their preferences and to finance the expenditures through betterment levies or property taxes.
• Are the expenditure program and its financing consistent with the government's overall macroeconomic and resource allocation policies? (or, better, is there a government committee or agency which oversees extra-budgetary funds and assures that their activities are consistent with government policies?)

• Is there an agency with the demonstrated capacity to plan, evaluate, and carry out the program (or confidence that one can be created)?

• Is there a cutoff date for deciding whether the earmarking arrangements should be continued?

In closing, it would be useful to point up possible further lines of inquiry. It seems to me that there are three lines. First, in the section "Toward Some Principles for Earmarking", some rules regarding the relations of price, output, and capacity under conditions regarding returns to scale, indivisibilities, externalities, and price/taxation were sketched out. It would be useful to formalize them and explore their implications for relationships between the earmarked budget and the general budget. Second, a study of earmarking in a key sector across several countries would be worthwhile to get at the factors behind its success or failure and make recommendations for its improvement. An important objective here would be to explore the practicality of implementing pricing and taxing rules which come closer to meeting economic efficiency criteria. The sectors that come to mind are highway, power, telecommunication, water and sewerage, and irrigation. The first two seem particularly attractive because of long Bank experience and more advanced development (and measurement) of notions about the relations of price, output, and capacity. The third line of inquiry would be the study of one or more countries where earmarking has reached a significant proportion of the public sector to determine what effects it has had and what the limits to earmarking are. Turkey, Colombia, and perhaps one of the Central American countries are potential candidates here.
An IMF Perspective on Earmarking

Peter Heller

I am going to try to give a Fund perspective on the potential role for earmarking, with an examination of the pros and cons of earmarking in the context of the macroeconomic disequilibria faced by many developing countries. This raises a number of issues which do not normally arise when earmarking is considered for the case of the more developed economies.

Earmarking has generally been viewed negatively in the Fund's Fiscal Affairs Department, primarily because we accept the conventional public finance view that earmarking unnecessarily poses restrictions on a government's use of funds. If earmarking leads to too much money going to a sector, this is certainly undesirable; if it leads to too little, then it hasn't added much to the budget process. One must then still consider the need to allocate more, bringing one back to the marginal budgetary decision across sectors. A recent exception to this view has been set forth in a recent paper by Teja (1987), which was more supportive of earmarking in situations where there is a linkage between the user charge and the benefit derived from use of the funds.

However, the Fund remains generally unsupportive of earmarking. In the context of a deteriorating macroeconomic environment, where the urgent priority is to cut the government deficit, expand private sector credit, reduce overall absorption, and restore fiscal sustainability, earmarking arbitrarily limits the flexibility of budget managers. It makes little sense to have a significant amount of revenues going to a sector, insulated, in effect, from the general budgetary stringency applicable to the rest of the public sector. This is particularly an issue when one considers the kind of stringency generally applied to other sectors.

Let me give you my own views on these issues, continuing to assume a difficult macroeconomic environment. Three arguments can be made in favor of earmarking. First, if fiscal management is poor and there is generally a misallocation of resources in the public sector, one may have doubts on the capacity of fiscal decision-makers to allocate resources efficiently. When cutbacks are to be made, it is not clear that they will be based on a rational, loss-minimizing strategy. In effect, one may find that the unproductive outlays get spared and valuable outlays get cut. Earmarking may be a way of limiting the degree of leakage to nonessential or unproductive outlays.

Second, earmarking to such purposes as road funds may have a high rate of return. Roads play a vital role in the functioning of an economy. In fact, in a period of adjustment, their importance may be particularly great, given the need to stimulate the supply-side of an economy. A road fund may be a mechanism for insulating outlays to a very high productivity sector.

Third, stability in the allocation of resources to a sector may be vital to its functioning. It may allow and facilitate the development of a core
of trained capable personnel, enable contractors to function effectively, and maintain adequate incentives for skilled personnel.

Six arguments can be made against earmarking. First, I have already noted the traditional view, and this seems particularly relevant in the context of adjustment. It is difficult to ensure correct budget decision when a significant portion of the budget is off-limits. The situation is further exacerbated by the fact that earmarking is not the only constraint on a decision-maker’s ability to rationalize the budget. A significant share of the government budget is very difficult to prune. Government employment may be difficult to adjust in the short run. Interest payments are largely nondiscretionary. If one begins to earmark, any budget cutbacks necessarily are further concentrated on the very limited residual outlays on other goods and services. Earmarking may only be an appropriate policy option in an expansionary and healthy macroeconomic environment.

Second, for several reasons, it may be difficult to shield a sector from fiscal stress. A general budgetary squeeze may affect an earmarked fund, even when in principle, the fund is insulated by earmarking. For example, the Government of Zaire, in response to a shortage of revenues, stopped paying its bills to the petroleum company; the latter stopped meeting its obligation for payments into the road fund. Alternatively there may be direct pilferage of earmarked funds. There are obvious examples of corruption, where government officials have illegally taken funds from an earmarked fund and used it for other purposes. Another example is derived from the current budgetary situation of the United States, which has an earmarked tax for airport maintenance. While this tax has generated significant revenues, the funds are presently not being fully spent, primarily as a means of limiting the overall budgetary deficit. In this case, the general budgetary squeeze affects the use of earmarked revenues.

Third, earmarking addresses only the lack of availability of domestic currency -- it doesn’t address a shortage of foreign exchange. While earmarking may be successful in getting the domestic currency to a sector, the money may not be used effectively if there are shortages of important raw materials and equipment critical to the operations or maintenance of a sector.

Fourth, earmarking doesn’t address some of the fundamental factors that determine whether budgetary resources are used effectively. It doesn’t improve the quality of implementation, doesn’t deal with an absence of standards or norms in a sector, and doesn’t deal with any institutional deficiencies in the supervisory, audit, or management functions. The fact that resources are earmarked to a sector doesn’t necessarily suggest they are effectively utilized.

Fifth, broad sectoral earmarking does not ensure that funds are allocated appropriately within a sector. For example, in the roads sector, earmarked funds may end up being used for new road construction. In some countries, public works staff have an incentive to develop new roads or rehabilitate old ones, rather than to engage in routine or periodic maintenance.
Finally, part of the stimulus for earmarking comes from the legitimate desire of sectoral experts and donor institutions to ensure that their sectors or projects are operated and maintained effectively and are not subject to the effects of general budgetary stress. However, one of the key lessons learned by the Bank over the last decade is that one cannot concentrate excessively on the narrow sectoral or project-level issues. Achieving high growth requires a more systemic view of economic policy issues in a country. A well-functioning road system in an environment of macroeconomic stress, controls, and poorly functioning markets may not prove very helpful. In some respects, earmarking may be construed as almost a beggar-thy-neighbor policy for individual sectors. If every donor attempted to pursue such a strategy for its projects, it is not clear that one would obtain a rational allocation of government resources.

When is earmarking appropriate? The closer a public good approximates a private good, the stronger the case that can be made, particularly if the revenues being earmarked are user-related charges or taxes. There may also be an argument for having earmarking which provides a certain core funding to an infrastructural sector -- far less than is desirable for a sector as a whole, in terms of its priorities, but enough to assure some stability and certainty in funding. This may be necessary in terms of relationships with private sector suppliers to a sector.

On balance, and from the discussion of the Zaire, Ghana and Colombia road funds, I must confess that I come away fairly unsympathetic to earmarking in the context of the macroeconomic environment confronting most developing countries today.


THE POTENTIAL ADVANTAGES

What attracts economists to the tolling option for the governance of roads, and what has made them investigate it since at least 1776 is that toll roads could offer the various advantages of decentralization. Considering first the efficiency with which the community uses the resources available to it at a given point in time, tolling could in principle assure a better fit between what is demanded by the public and what is supplied. This follows because tolling permits, in principle, a much more accurate method of pricing than other systems of road user charges. The cost of using the road could thus be charged to the user, according to the use he makes of a particular stretch of infrastructure, whether by car or truck, laden or empty, at night or in day time, peak or off-peak. If fine tuning is ruled out because of its high costs, even coarse tuning should be able to do much better than location-unspecific pricing. (If tolling were suitable for urban roads -- doubtful, with currently available techniques -- a major problem of the urban environment would be solved.) Next, in terms of the efficiency of management and control of roads, tolling may offer the alternative of private, profit-motivated control and perhaps even ownership of roads, and with it an alternative source of financing road schemes. Those who risk their own capital may also require more intensive efforts at traffic forecasting, and construct more economical roads, than is always the case with roads planned and built by the state. Further, in terms of the effectiveness of public choice in individualistic societies, tolling may offer the citizen a firmer control over the use of public resources than typical budget voting. This would be trivially obvious if it were agreed to toll all roads, or all roads costing more than x dollars to construct. The tolled roads would disappear from the troublesome set of public goods and thus from contention between those who expect to pay more in taxes than they receive back in benefits from public expenditure (and should therefore vote for tolling) and the others who hold the contrary expectation (and should therefore prefer roads to be financed from general taxation). The case as stated is not very plausible, if only because it is not clear how such a constitution could ever get adopted or, if inherited from the past, why it should be maintained? But

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2/ Road user charge systems that lack the power to discriminate between the location of road use and can only imperfectly distinguish between different vehicles and forms of road use, can never achieve more than 'average' efficiency of road use. Some vehicles, in some places, at some times, employed on certain operations, will be overcharged relative to the cost they inflict on roads and on other users; others will be undercharged. See Newbery, Hughes, Paterson and Bennathan, Road Transport Taxation in Developing Countries. World Bank Discussion Paper 26, 1982.
in all except the tiniest countries or political territories, some roads will yield most of their benefits to particular regions. In a territory consisting of several regions (say, more than two), each about equal in number of voters, with individual road projects being put to the vote and decided by majority, one would expect tolling to be most readily supported for roads of primarily regional interest. The majority then avoids paying for benefits that go chiefly to a minority. A faint reflection of this principle at work may be seen -- after some transposition to allow for the jurisdictional details of the federal constitutions -- in the incidence of toll roads in the United States3/ and, generally, in the relative frequency of tolling on international transit roads.

Potential advantages of these types may materialize in particular toll road schemes; or they may not, or not all of them. The discussion of toll roads in economics is therefore meant to state the conditions for those advantages, or some of them, to be realized in actual cases, and thus to nudge actual schemes in desirable directions.

The economic argumentation proceeds by the application of standard principles, but it starts by noting some of the interesting characteristics of roads:

a) Investment in roads tends to be lumpy. Till the road fills up, the average cost of road use (damage, interference with other users, interest on capital plus depreciation) will therefore decline. Some decreasing average costs maintenance operations are similarly lumpy. It follows that short-run marginal cost of road use over a range of traffic will be less than average cost. Roads are also subject to economies of scale and decreasing cost in the 'long run': expanding from 2 lanes to 4 raises capacity by perhaps 200 percent and this physical relation is reinforced by the behavior of construction cost per km: 4 lanes may cost only some 70 percent more than 2 lanes.

b) Next, road service is a location-tied good. One cannot supplement available road space by importing from other places. The potential for competitive discipline on the suppliers of road service is accordingly limited.

c) Roads are a congestible facility, generating negative externalities or excesses of social cost of road use over private cost. Congestion is primarily an urban phenomenon but not exclusively so. It occurs on suburban or conurbation roads, and also on some interurban links in developing countries, specifically in industrializing regions where marginal cost of road use is seen to rise above average -- private -- cost.

3/ Federal funds (grants) cannot be used for the construction of toll roads. Toll roads are therefore state roads and casual observation suggests that states adopt the toll system primarily for roads that are most likely to carry out-of-state traffic into the state, and transit traffic. That is the business of the great turnpikes.
d) Last, for our purposes, countries that have tolled roads also have free roads, and sometimes (in developed countries, frequently) these are substitutes in the sense of connecting the same places without more than, say, 20 percent difference in mileage.

**SOME TOLLED, SOME FREE**

The coexistence of tolled roads with free roads (or with rail) connecting the same points is not uncommon in developed countries with developed transport networks. As in the parallel cases of free and priced (private) education or medicine, it is sustained by quality differences between the free and the tolled facility. Users of the toll road pay the toll in addition to all the other taxes that rank administratively as road user charges, but only so long as the difference in quality warrants the expense. This variety, and the competitive limits placed by the presence of an option, are welcome and wholly in the spirit of decentralization. But just as in the case of education or medicine, the quality difference between the free and the priced service tends not to remain static. The usual tendency is for the free service to deteriorate whether in consequence of a real shortage of resources combined with increased traffic or even by design (including in this case the withdrawal of political pressure by those who use the toll road and may think that for the time being they have only to lose from higher expenditure on the free facility). If the free roads are allowed to rot away, the market power of the toll road is raised and those who would prefer to use the free road at the initial quality difference, or who must use it, are harmed.

The effect of coexisting free and priced roads is different where a new road is to connect regions that have hitherto been effectively incomunicado. Tolling the new road while the region's internal roads are free amounts to the imposition of a tax on inter-regional trade. The advantage given to internal trade may be desired (in the interest of regional development) but should be seen for what it is and enter into the decision on the toll level.

The coexistence of priced and free roads thus leads to several conclusions. The first relates to project evaluation and also to the contents of the contract between state and private or semi-private tolling agency. Where an existing road or bridge are to be tolled, perhaps after improvements and, in the case of roads, after construction of access limitation, but where substitutes are left unpriced, one has to expect traffic diversion. This will occur also in consequence of changes in prices or general economic conditions and will affect not just toll revenues but also wear and tear on the free roads or bridges. Failing to account for this will falsify the social cost-benefit analysis of the toll scheme; failing to maintain the free roads in good condition will strengthen the market position of the toll road.\(^4\) Where the free road is neglected, or where there are no free substitutes for the toll road, there is a monopolistic potential which argues for regulation or restrictions on the freedom of decisions of the toll road.

\(^4\) For casual observation: Eastern and Southern France.

agency. Further, the imposition of tolls in addition to standard road user charges necessarily contains an element of 'double taxation'. When road user charges are optimal (every user paying exactly the cost -- marginal road use cost -- occasioned by his actions) and optimally spent, the erection of tolls on some roads, old or new, is obviously tantamount to additional general revenue taxation on transport. Less academic but equally obvious, if the imposition of tolls, unaccompanied by any reduction in the real value of other road user charges, leaves unchanged the percentage of aggregate road revenue (taxes plus tolls) that is spent on the roads, transport taxation for general (non-transport) purposes has been raised. More definite statements require information about the relation between Equivalent Axle-Kms travelled and road damage, and between ESALs travelled and tax revenue. In terms of economics, however, such possible back-door increases in general revenue taxation on transport are no more important, and very possibly less important, than the implicit taxation of transport that occurs through charging above marginal cost for the use of the uncongested road.

THE TOLL: PRICING

According to the standard argument in economics, maximum social welfare, from given resources, is approached by competitive pricing, by pricing goods and services at the marginal cost of producing them from currently available capacities: short-run marginal cost. Since there are certain weighty counter-arguments, it will be as well to get less searching objections out of the way first: all more or less in the style 'why insist on marginal cost-pricing for transport and other utilities when so many other outputs and services are priced above marginal cost? (or: there are lots of monopolies about)'. It should then be enough of an answer that transport tends to be complementary with the production of traded goods which, in its turn, is a substitute for the production of non-traded goods (such as for household or village consumption). The latter tend to be valued or 'traded' unavoidably at marginal cost. If there is indeed monopolistic or monopsonistic pricing, it will be among the traded goods (e.g., marketing boards buying from farmers below border prices). Selling infrastructure service at marginal cost without any markup should therefore help to correct for monopolistic distortions elsewhere.

A substantial argument arises, however, from the decreasing (average cost phase of interurban roads that lasts till the road fills up to the point

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7/ For a somewhat more technical argument - considering inputs as well as outputs -- see Esra Bennathan and A.A. Walters, *Port Pricing and Investment Policies for Developing Countries*. (Oxford University Press for World Bank, 1979.) Chapter 2.
where one experiences some congestion, as say, the New Jersey turnpike, or the Bangkok-Samut Prakan-Chon Buri road). Marginal cost is then below average cost and toll rates tied to the former entail a loss to the supplier: a standard reason for organizing roads (and other utilities) as public or social industries. If all roads are run as a public industry and if marginal cost is defined socially, to include the cost of maintenance as well as the congestion externality (i.e., congestion is priced), then the entire enterprise can break even or make a profit. There is then an argument against decentralization, advanced by economists who do not advocate subsidies for decreasing cost industries: centralization removes the need for subsidies to (and cross-subsidies by) decentralized suppliers, without sacrificing the principles of social pricing. A.A. Walters, considering the cost of wear and tear to be minor compared with the average cost of roads, thus saw no case for tolling interurban roads in developing countries.8/

But it may still be decided to institute tolls or to consider tolling schemes: because resources cannot be redistributed between departments and there is resistance to additional taxation or tax administrative capacity is weak; or as justification for supplying a high-quality road to one region while others want money spent on other things or on rural roads (a Malaysian case?); or because the state cannot borrow more while private finance is on offer; or because private control promises a more efficient management of a new road. (There are also worse reasons: administrative tradition, or political or intellectual inertia, or the pressure of contractor interests.) The room for economic argument has then narrowed but one should still make marginal cost the anchor of the toll rate so as to minimize the waste of resources if one cannot avoid it altogether. It might indeed be avoided 'altogether' by a rate that exceeds the marginal cost of road use by a margin which reflects the marginal cost of raising public funds which are the immediate substitute for toll revenue. Recent work suggests that the social cost per dollar of additional tax revenue in the United States is of the order of $1.40 when raised from labor income; somewhat less if raised from retail sales, and higher if the dollar is spent on transfer payments rather than on government consumption.91 For developing countries one should be able to make rough calculations of orders of magnitude and they are indeed implicit in some recent work on tax reform in India or in Pakistan. One might then take account of such estimates in setting toll rates (initially,


relative rates for different uses of the road) on the lines of Vickrey's formula:

\[
\frac{Toll\ Rate - Marginal\ Cost\ of\ Road\ Use}{Marginal\ Cost\ of\ Road\ Use} = \frac{Marginal\ Cost\ of\ Public\ Funds}{Elasticity\ of\ Demand\ for\ Using\ the\ Road}
\]

or, in symbols:

\[
\frac{P - MC_{\text{road, use } i}}{MC_{\text{road, use } i}} = \frac{MC_{\text{taxes}}}{E_{\text{road, use } i}}
\]

The formula is clearly reminiscent of a particular version of Ramsey's rule for optimal taxation. The results of applying the two are nevertheless different. Vickrey's formula (and the simple version of Ramsey, in the footnote) only holds when demands for different roads and different uses of a given road are independent. And even after correcting for this, the version of Ramsey that is currently popular in utility pricing discussions will only satisfy the social optimality claim made for it if one is willing to swallow a heroic assumption on which all students of consumer demand would choke. But being rooted in marginal cost, and conveying clearly that any excess of price over Marginal Cost is not a price but a tax and needs to be treated on that footing, along with other taxes, such rules can serve as a skeleton for pricing decisions. One notes then that neither formula refers to Average Cost. The system is simply closed by reference to the marginal cost of alternative finance. If roads are to be self-financing, road by road, whether private or public, this may not be enough and may not even in all cases cover the cost of collection. If the command is still, toll road or no road, one has to face the question of the appropriate toll rate in further ways, and with it the question of monopoly, subsidies and regulation. That is done in the next section.

Before proceeding, however, we can state two propositions. In one or the other case they may provide a sufficient compromise between the objectives of self-financing roads and socially optimal allocation of resources (which means: maximizing the national income). The first is that in project evaluation one should not worry about the first-year return (or 3-year payback periods, or the like) but compute cost and benefits over the entire prospective life of the road and, parallel with this, the expected discounted cash flow at toll rates that rise as the road fills up. Linked to this is the warning against the folly of proposing to charge tolls until the road has paid for itself and then abolish tolls. The likely result will be that road


investment (space) is wasted in the early years of relatively light traffic when the toll is set at Average Cost (including a heavy component of amortization) and that the value of the road is dissipated in later years when the road is full and the toll goes to zero: a curious case of imposing a positive sacrifice on one generation to make a negative bequest to the next. 12/ If one cannot borrow for the road and set tolls that merely cover the interest cost, repaying the loan as the road fills up and rates are raised, one should at least not throw away the opportunity of congestion pricing that tolling offers.

TOLL RATE, SUBSIDIES AND MONOPOLY

The most effective control over resource use and prices is competition. If it is decided that expanding traffic and high-value traffic should be catered for by a self-financing, high-quality toll road, with substitutes of 'fair' condition 13/ being available, though possibly of antiquated design, geometry and alignment making for relatively slow transits, possibly slowed further by a mix of motorized and other traffic, then one may allow the toll agency and the tolls charged to look after themselves. The statement is vague but the meaning is not. What is required for such neutrality is that the substitutes are maintained at their initial 'fair' quality. If the expected tolls on the toll road are high, there will be more traffic on the substitutes and higher costs; but some traffic will move on the high-quality alternative. One doubts whether the case is common in developing countries and whether the policy will commend itself widely. For reasons, see last paragraph under "Some Tolled, Some Free".

Failing road competition, neutrality vis-a-vis the comportment of the toll agency, private or public, is not to be expected, nor tolerable, at least not in countries with a modern concept of the public interest and in the case of major roads (rather than project roads). The level of tolls, the question of subsidies, of the organization of the toll agency and its regulation become matters of transport policy and of economic policy. Where privatization is being contemplated, they have to be settled before the contract is written.

Ramsey's celebrated analysis started from an exogenously dictated revenue requirement: so much is to be raised, and what is the socially optimal way of raising it? When transported into the area of pricing by a multi-product firm, the target could be set at 'break-even', a normal rate of profit, or better. In the case at hand, however, one cannot avoid answering the question, what the financial target is to be, and why? Social welfare dictates staying with Marginal Cost, raised by the marginal cost of public funds. But this principle is arrived at in abstraction from institutional complexities and differences in efficiency associated with different organi-

12/ A.A. Walters (op. cit.) said as much in 1968. Judging by toll proposals made in some developing countries in recent years, he was speaking into the wind.

13/ World Bank, 1988, op. cit.
zational forms. Taking account of such factors, social welfare may dictate pricing above Marginal Cost but it is the job of the analyst to work out, however roughly, by how much: to quantify the gain against the loss. If a further tax is to be imposed on transport, one has to prove the case, and seek to prove it quantitatively. What then results may still lead to prices that fall short of Average Cost as derived from a Present Value computation over the life of the investment. At that stage one would be right to consider the total tax revenue from transport, toll plus all the user charges, and the possibility of making do with less than average cost (in a state-owned toll road) or subsidize an independent agency. A possible form of subsidy is to make loans to the agency on terms that will lengthen the horizon to which the independent (or private) agency will compute present value (i.e., lower the discount rate).

The alternative would be to let a monopoly operate monopolistically. The outcome, with simplification, is traditionally demonstrated on the example of Dupuit's bridge.\[14\]

Assume the bridge (road) capacity to be unambiguously given by OB transits per day. With YY' as the demand curve, 'Marginal Cost' equals t₀ Francs. To maximize profits, the monopoly rations transits to the quantity for which Marginal Cost equals Marginal Revenue (YZ), selling the output for what it will fetch: t₁ being the monopoly price. There will be OA transits, (B - A) being wasted. (With a straight-line demand curve, OA = 1/2 OB.) Assuming a prospective revenue of OACT₁ to be just enough to call the enterprise into being, a subsidy of up to t₀DCT₁ from general taxation would add up to t₀ECT₁ in consumer surplus, at a cost to the taxpayer of (up to) t₀DCT₁. Assume, per contra, that the maximum prospective monopoly revenue is not enough to attract the (private) capital to the venture. So long as the monopolist can only charge uniform prices -- as assumed in the case so far -- the only alternative to scrapping the project would be to enlarge the subsidy, the limit to the addition being CDE + Y₁C, at which limit the entire consumer surplus has been transferred. But if the monopolist is technically able and

\[14\] Jules Dupuit, De la Mesure d'Utilite des Travaux Publics. Annales des Ponts et Chaussees, 1844.
contractually free to price-discriminate, he can appropriate some of the con-
sumer surplus directly. It follows that in the case we discussed first --
OACt being the prospective revenue that would bring the enterprise to life -
price discrimination by the supplier would allow a larger output to be
produced, at a lower price than t1. Price discrimination thus allows output
to be maximized subject to a budget constraint (or revenue requirement), but
there is no guarantee that a monopolist, left on his own, would settle for
a target less than maximum profits. Hence a case for regulation or restric-
tions imposed on an independent toll agency. We shall refer to this as 'the
contract'.

We confine ourselves to the most obvious points for consideration in
making the contract, and those to be avoided. Where a monopoly arises and
demand is expected to be strong it will be difficult to avoid some restric-
tion on toll levels. That will be the case whether or not the toll road is
congested: monopolistic profit-maximizing tolling on the privately owned
congested road will charge too high for socially optimal congestion.15 As
explained in the preceding paragraph, however, it would be a mistake to focus
the regulation on anything other than the average toll. Provisions that
demand uniform pricing of any kind would not merely interfere with efficient
management of the toll road but may also result in a lower level of use than
could be achieved under price discrimination.

If future demand and its elasticity are so uncertain that it would be
counterproductive to set too firm a limit on toll rates, control may be
moved in part to taxation of the toll agency. The tax should preferably be
on its profits, not on its gross revenue. The reason is similar to that on
the efficiency of share-cropping: if revenues have to be shared but costs
are not, there arises a disincentive to investments.

Last, one comes to Adam Smith's case against private toll roads. Since
roads, unlike rivers, never become totally impassable when maintenance is
neglected (so argued Adam Smith), the private owner of the road may seek to
raise his profits by cutting back on maintenance.16 The contract would
obviously have to provide for maintenance to approved standards, and for
monitoring. But even if we do not regard our fellow men with the suspicious
eye of Adam Smith, the terms of the contract itself may militate against the
road being maintained well throughout the life of the franchise. The taxation
of gross revenue is such a counterincentive and another, well-known, can be
provided by the terminal conditions of contracts, including the length of the
franchise and provisions for termination. The longer the contract period.
and the firmer the property rights of the contractor, the better the incen-
tive to invest and maintain. Ideally, the franchise-holder should be its

15 Optimum congestion is reached when the toll is equal to Marginal Social
Cost which includes the cost of the externality. On the inefficiency of
private monopoly on congestible facilities, see David E. Mills, Ownership
Arrangements and Congestion-Prone Facilities. American Economic Review,
June 1981. Also, William H. Oakland, Congestion, Public Goods and

owner, with the right to sell, during a specified period, to one of a set of pre-qualified bidders or else to renew his lease by bidding in an open market. If competition for such leases or franchise is weak, the risk of privatization rises. The strategic problem is important, for all that is well known, and deserves research and the study of precedents.
The use of tolls as a means of financing highway investment is hardly new, and the World Bank has been concerned with the economic and financial implications of toll financing over many years. Since the mid 1970s, developing countries have shown an increasing interest in tolls as a means of paying for the high-standard multi-lane highways needed, and a broad range of schemes have emerged, including private financing and operation of toll facilities. It is not the intention of this paper to consider all the pros and cons of each of these schemes, although some comments will be made on issues raised by private operations. The major purpose of this paper is to bring together a number of concepts, options and guidelines that have emerged over the last 15 years and with which the author has some direct working familiarity. The purpose is not to support a particular viewpoint but rather to summarize the key issues that have to be considered and to illustrate that the issues are more complex than indicated by those ardently in favor of toll roads or those equally ardently opposed.1

A. TOLL ROAD PRICING

The application of a toll system to a highway is essentially a pricing rather than an investment decision. But, it can affect the amount of net benefits that are realized by the investment. Once an investment has been approved on economic grounds, public policy should avoid any actions that would reduce the benefits that justified the original decision to invest. Among such actions is the use of toll collection as a means for recovering the construction cost.

Economics indicate that road pricing should be directed toward maximizing the use of the road. To do so, the price (user charge) should be related to two aspects of cost:

a. The avoidable road maintenance costs and the additional construction cost incurred for heavy vehicles; and

b. Any costs imposed on other users if the additional trips generate congestion due to capacity constraints.

For toll highways, the first element of pricing cited above is reflected by setting user charges at a level equal to variable maintenance cost (price = marginal cost). However, on a more pragmatic basis, a rate (toll) based

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1/ The material for this paper has been drawn from a Toll Road Management Training Study sponsored by the World Bank in Indonesia. Particular use was made of Technical Report No. 7: Toll Road Economics - Volumes I and II, prepared by Joseph S. Revis and Hugh Wynn.
on all maintenance cost is sometimes used. As long as the road is not congested, it is argued that the price (user charge) need not and indeed should not be set to recover the full cost of the investment. This principle is based on the assumption that a good part of the benefits of the road accrue to the public at large in the form of the development benefits, and hence the costs of the investment (other than that recovered from marginal cost pricing) should be recouped out of general revenues. This concept, of course, would make it impossible on uncongested intercity roads to recover the government's initial capital outlay through tolls only—the conventional objective of toll financing. Furthermore, the use of tolls to capture some specified share of the benefits which a new highway provides can also be shown to have no basis from a purely economic viewpoint.

Traffic growth may in time lead to congestion of highway facilities. Eventually, additional vehicles entering the traffic system will increase the marginal cost of operation of all users due to added time delays and other types of traffic friction associated with increasing congestion. In this situation, congestion pricing becomes justified in order to allocate scarce capacity and to maintain a desired service level. The loss of benefits from pricing some users off the facility is less than the savings in congestion costs to those who remain on the facility.

Congestion and congestion pricing is typically associated with urban roads. Congestion can, of course, occur on intercity highways, and tolls may be used as a means of "rationing" space on these roads as well. However, the more typical case for intercity roads is to consider adding capacity when congestion reduces service below a desirable level. This reduction in service level serves as an indicator that the need for additional capacity should be evaluated.

Practical considerations and frequently held views that the toll road should pay its own way from funds provided by users make it quite difficult to implement a marginal cost road pricing policy. The quantum change in service level usually associated with new toll roads, and domestic scarcity of resources are considered to justify cost recovery; though these arguments carry no economic weight they carry considerable political force. Thus, toll pricing policy calls for balancing economic and financial objectives. A range of experience has emerged, from a modified marginal cost approach to full-cost recovery or even in excess of full-cost recovery.

A key criterion in setting toll rates above marginal costs, is the traffic responsiveness to the toll (or a toll increase) and diversion to a free alternative. Where traffic diversion levels are relatively low (5-10 percent on open toll collection systems and 10-15 percent on closed systems), a modified marginal cost approach has sometimes been used to recover full costs. It must, however, be accompanied by concerted efforts to keep diversion impacts as low as possible and to use toll collection designs and techniques that minimize costs. More is said on these toll collection and design issues in Section C.

There are a number of additional pricing criteria that contribute to efficient operations from both an economic and financial viewpoint. Each is
based on unhappy results generated by their non-application. They include the following:

a. Toll rates should be adjusted periodically based on an accepted price index -- where inflation and its impact are substantial, a policy is needed in terms of the frequency with which toll rates are changed; for the purpose of keeping the cost and inconvenience of changes at reasonable levels, changes should not be too often.

b. Toll rates should be set specific to each toll facility and linked to the specific traffic and operating conditions and construction costs. This implies: different toll rates should be applied on urban and interurban facilities; on urban toll facilities differential rates should be applied (e.g. peak and off-peak rates) based on the peaking characteristics of each facility, as a means of encouraging better utilization of the road and maximizing economic benefits.

c. It is suggested that when traffic service levels are between "C" and "D" for 50 or more hours per year, tolls be increased for congestion management until the feasibility of added capacity has been established.

B. TOLL ROAD FINANCING

The decision to impose tolls on a road is not a commitment to a particular way of financing its construction. A variety of financing options are available, each with advantages and disadvantages in terms of public finance, economic objectives, and administrative efficiency, as well as differences in political feasibility. The three most commonly used are general revenue financing, earmarked toll financing, and concessions involving the private sector. There is no one best approach; the choice must be based on analysis of specific objectives and circumstances, and it may conceivably call for a mixture of techniques. The discussion below is intended to raise the key issues that need to be considered by such an analysis.

In making comments on the financing options, a number of assumptions were made that need to be clearly stated:

a. Investment funds for development are relatively constrained, and available public funds for investment in infrastructure are accordingly limited.

b. Costs in foreign exchange represent an important financing problem. To the extent that one form of financing results in lower foreign exchange needs, it may be preferable to others (other things being equal) at least in the short run.

c. Government policy (and practice) of applying economic criteria to test the feasibility of investments is in place, and that this policy also applies to any investments financed with specific, earmarked revenue surpluses.
d. Toll road pricing policy is directed to not only full-cost recovery of investment costs but also towards generating revenue surpluses.

General Revenue Financing

General revenue financing may be defined as the use of broad-based taxes for public investment and delivery of public services. Most countries have developed a range of general taxes such as income tax, sales, excise, etc. They also levy road user charges through taxes on fuel, oil, tires, and other consumables as well as vehicle licensing and import duties. Sometimes such user charges are earmarked for roads and related uses, but in many countries they revert to general funds available for general public use. Earmarking user charges raises questions of how investment decisions and pricing are determined, but their impact on the use of the road is different than that of tolling. To simplify, in this discussion general revenue has been assumed to include user charges even if earmarked for highway uses.

A summary of the advantages and disadvantages of general revenue financing follows:

Advantages

a. Where additional revenues are needed to finance expansions or improvements to the road network, a marginal increase in broad-based taxes and user charges provides a lower incremental revenue cost than tolls whose collection costs may run from 10 to 30 percent of revenues collected.

b. In general, subject to uncongested conditions, the use of general revenue financing can minimize the conflict between economic objectives of road investment, and financial objectives of cost recovery. This approach permits passengers and/or freight shippers to choose among the various modes and routes on the basis of a combination of service quality and undistorted prices, thus maximizing economic efficiency. Where a less-than-full-cost-recovery pricing policy is followed, general revenue financing provides greater administrative and policy flexibility of allocating the residual costs of the road.

Disadvantages

a. Because toll road improvements and/or additions typically involve a quantum change in the quality and cost of road service, they are difficult to finance from general revenues. It is politically difficult to argue that costs should be borne by the public at large; the "pay-as-you-go" approach (implied by tolls and concession financing) is considerably more appealing. This is especially true where public investment budgets are seriously limited.

b. Where public investments are already hard pressed and general tax levels high, tax rate increases may be unacceptable. Alternative revenue sources seem necessary, especially if existing roads are seriously congested.
Toll Financing

Many of the advantages and disadvantages of toll financing are simply the reciprocal of general revenue financing. Typically (although not always) toll financing is associated with some form of separate toll collection authority. The structure and nature of that organization is often a problem in and of itself due to its impact on investment decisions, pricing, and use of surpluses. However, these aspects are not inherent to toll financing and the adverse impacts can be limited by appropriate policy.

Advantages

a. One of the major advantages claimed for toll road financing is that users pay as they use the road. It is argued that this is equitable since those that benefit, pay. These "pay-as-you-go" and "equity" aspects make toll road financing politically popular (the weakness of this position has already been discussed).

b. It is contended that tolls permit not only the recovery of all road costs, including financial costs, but can also generate a revenue surplus that can be used for future additions and/or improvements to the network. However, the extent to which that is true depends on the volume of traffic and on demand elasticity, in turn affected by availability of alternative roads (or modes). If the traffic diversion due to the toll is low; surplus toll revenues revert to general revenues and their investment is subject to rigorous feasibility tests; and subject to tests of equity, efficiency, and yield as compared to other taxes; then tolls may be a reasonable revenue source.

c. Where domestic savings are low, tolls could, although not necessarily, result in a higher level of private and public savings than general revenue financing.

d. Serious fiscal and political constraints on increasing revenues from non-toll sources may warrant toll road financing as the lesser of two undesirable conditions: (1) a reduced economic growth attributable to inadequate expansion of the road network, or (2) a less than optimal level of economic road user benefits because of the toll.

e. Some of the adverse impacts of a toll can be minimized. To the extent that economic criteria used to test toll road investments are reasonably rigorous, the probability of implementing a low priority road project is low. To the extent that toll diversions are low -- below 10 or 15 percent -- reduction of benefits due to the toll may be acceptable (e.g. economic rates of return remain within acceptable ranges).

Disadvantages

a. Highway tolls are a supplementary tax or user charge on only specific sections of the network. Since vehicles using toll roads also pay general road taxes while using the toll roads, the total highway taxes
they pay are higher. This may be partly offset by savings in the use of fuel, lubrications, and parts if the toll road provides a higher service level than the alternative roads.

b. As already noted, highway tolling as a revenue collection method (from a public finance point of view) may be costlier than general taxes or user charges.

c. The application of tolls to highways results in cost increases (as listed in Section C).

d. To the extent that the toll collection processes are carried out by an autonomous toll authority which may provide a variety of services, there is a potential for cross-subsidization. Toll authorities have used revenues from road and bridge tolls to finance activities not subject to economic testing and/or with adverse public finance impact.

Concession Financing

Concession financing has been used throughout the world for a variety of purposes, including the financing and operation of highways. One of the primary objectives has been to use the private sector as a source of financing and managerial skills -- often on the grounds that both are more readily available from that sector. Another is to raise foreign investment resources when domestic resources are constrained. A mix of public and private participation (including contractors, bankers, financing companies and government development banks) could form the basis for putting together a concessionary agreement. Domestic and foreign participation could be a requirement. Functional responsibilities could be limited to specific activities or could cover all phases of toll road operations. The scope of the concession agreement will depend, to a considerable extent, on the ultimate objectives of the government. For this discussion, some private participation is assumed.

Advantages

a. A major advantage often cited for the use of private concession agreements for toll road financing is that substantial amounts of private capital can be raised, along with the needed skills for constructing, operating, and maintaining the toll road. However, in many countries where toll road concessions are used, there is no clear evidence that operations are more efficient than in the public sector. In some instances, there are even indications that costs in the private sector are higher.

b. Some argue that, at least in the short run, private concessionary agreements with foreign participation may result in larger aggregate investment in transportation (or roads) than would otherwise be possible using domestic resources only. The amount of the increase will depend, to a considerable extent, on the degree to which foreign financial sources not typically available for government projects are used (e.g. private financiers and consortia at costs competitive with international development banks). It is difficult, however, to determine whether the investment involved would be otherwise included in
the regular program of investment or, whether by the inclusion of this project, some other project would have to be eliminated for lack of alternative financing. In a macro-economic sense, in the short run, there is a given level of investment funds available and private concessions simply shift funds from one investment to another. An investment may be possible through an increase in income/debt. In the long run, the question of whether public investment will be increased through private concessions is not clear. Much will depend on the overall demand for transportation and the general pattern of domestic and international public financing in the country. In any case, private financing needs to be carefully evaluated.

Disadvantages

a. Concessionary agreements using private financing are often cited to be more expensive in view of the returns expected by private bankers operating in the international sphere. In the short run (two to three years) this might be true, but for long term investment (10 years or more) the foreign investor's anticipations may not be so different. In addition, if equity financing is used, investment may be possible at cost levels that reflect different operational criteria and financial techniques not typically available to the public sector.

b. Concessionary financing is sometimes used as a means to avoid the application of economic efficiency criteria to investment and pricing policies. Unless strong specific requirements are built into the agreement, the concession process can be used to bypass the normal public budget process. Despite what is often considered to be a cumbersome procedure, this budget process is often important in preventing misallocation of funds into low priority projects.

c. Typically, concessionary agreements require government guarantees to protect the concessionaire against risks involved in the construction, maintenance and operation of a toll road system. These risks include:

- Traffic volumes less than forecast, leading to revenue shortfalls by the concessionaire unless compensated for by the government;

- Government intervention to promote public goals or to respond to changed priorities in ways that would reduce revenues or increase costs;

- Exchange rate fluctuations and devaluation, which could increase costs to the concessionaire;

- Inflation, which typically increases costs faster than revenues.

Without guarantees for the risks entailed, interest costs are likely to be high in order to attract private financing. It is likely that the government will be asked to provide guarantees against the risks, whereby it would assume the risks itself and lessen the private nature of the concession.
d. The concessionaire will try to maximize his financial return, rather than meet social economic objectives. The government will have to establish clear regulations (in the contract) and may have to compensate the concessionaire for ensuing loss of revenue.

The risks and conflicting objectives described above must be addressed in complex agreements, and often guarantees of revenue. Incentive agreements are also typically required to ensure that the operator will provide efficient services. Most toll concessions involve a complex set of contractual obligations that are difficult to administer and even more difficult to monitor. There is no evidence, based on experience, that concession agreements are easier, more flexible, or more efficient than the public sector; the complexities in some respects are substantially greater. At least, one study of privatization indicated that the "... elaborate scheme of standards and penalties indicated that the government will depend heavily on regulation rather than the market to provide desired service."

C. TOLL ROAD INVESTMENT AND DESIGN CRITERIA

The Investment Decision

The dominant objective of investing scarce resources into the construction of public works, such as a new highway, is to produce benefits to society. The major benefits from a highway, either urban or intercity, are:

a. Savings in vehicle operating costs and in travel time; and

b. Accelerated economic development of the area served by the highway, induced by the reduction of costs of transporting both inputs and final products.

Only projects that are expected to yield more than a certain minimum economic rate of return (or benefit-cost ratio, or net present value) in terms of such benefits should be considered for investment. This criterion should be applied quite independently of the issue of whether to collect tolls or to operate a free road. In addition:

- All projects should be subject to first year benefit analysis to assure that the construction start-up timing is appropriate.

- Every feasibility study conducted for toll road facility investment, expansion or improvement, should be subjected to tests of sensitivity and risks as regards the estimated impact of the toll rate (or changes in the toll rates) on the diversion of traffic from the toll road to alternative routes (or modes). These tests should include alternative toll collection designs (open or closed or a mix). The impact of diversion on these alternatives should be tested.

The major economic losses associated with the imposition of tolls on intercity (and uncongested urban) highways consist of the following:
a. The incremental investment cost for the road reflected in added lanes for toll booths, toll booths and collection equipment, and interchange costs (especially if a closed toll system is used).

b. The extra cost of toll collection and administration, especially when compared to the extra cost of raising revenue through the on-going user charge tax structure.

c. The extra cost imposed on users as a result of stops to pay the tolls (incremental cost of speed change cycles) and time delays in paying the toll and/or in queuing at toll stations.

d. The costs imposed on potential users of a toll-free facility who are diverted to alternative routes because of the toll and encounter higher economic costs of vehicle operation and time delays.

e. The costs imposed on users of the non-toll facility who would not have been diverted to the toll road in any event but who now experience an increase in congestion costs due to the diversions of potential toll road users on to non-toll facilities as described in (d) above.

f. Potentially higher financing costs, depending on the financing basis, or constraints on government economic objectives or implementing changes in these objectives or policies because of legal obligations on revenue to bondholders (i.e., for revenue bonds).2

The extent of these impacts depends on the toll system itself, its operating conditions and prices. These impacts are not independent. Pricing and diversion issues related to toll rates cannot be easily separated from design, anticipated traffic, operating conditions management of the toll system. An understanding of the demand elasticity of traffic is essential to set a toll pricing policy that is consistent with maximizing the net benefits on which the road improvement was justified. Because items (a), (b) and (c) can be more closely controlled and are better understood than the diversion impacts, their adverse effects can be more easily dealt with. The interactions may be illustrated as follows:

<table>
<thead>
<tr>
<th>System Elements</th>
<th>Affected Costs</th>
<th>Design and Management Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Toll System and Design</td>
<td>(1) Investment</td>
<td>(1) Minimize Investment</td>
</tr>
<tr>
<td></td>
<td>(2) Toll Collection</td>
<td>(2) Minimize Collection Costs; Use Open System</td>
</tr>
<tr>
<td></td>
<td>(3) User Operating Costs</td>
<td>(3) Control Use of Staffing &amp; Lower Operating Costs</td>
</tr>
<tr>
<td>2. Operating</td>
<td>(2) Toll Collection</td>
<td></td>
</tr>
</tbody>
</table>

2/ For example, in 1983, financing of toll roads in Indonesia by Government Guaranteed Bonds with short term maturities of 5 years with a bridge financing to payoff using a balloon payment method.
It is within the framework of the economic losses described above that economists generally argue that a free road is "better" than a toll road. A toll road always has a lower economic rate of return than the same road as a free road (except under congestion conditions).

When surplus funds occur, major investment policy issues arise as to how they are to be used, especially if the toll authority is free to make the decisions. Financial objectives could conflict with the economic objectives of development at two levels: (1) potential reduction of economic benefits to road users, and (2) misallocation of investment resources. For example, investment of surpluses into agricultural projects or other transport modes might better serve development needs than a proliferation of toll roads -- even if the latter appear to be self-financing. This argues strongly for separation of toll financing, operations, and management from the investment decision process.

Strategies for minimizing negative impacts, if a toll system is chosen, are discussed below.

Toll Road Design Criteria: Open vs. Closed System

There are three broad collection choices available. A fully closed toll collection system in which tolls are paid on the basis (typically) of trip length and a card or ticket is obtained at the entrance gate and a toll is paid at the exit gate. A second approach involves the use of an open system in which toll collection barriers are placed at strategic points along the main-line sections of the highway and road users pay their toll as they pass through the barriers. A third approach involves a mixed system of partially open and closed elements based on a variety of factors such as terrain, traffic peaking and specific congestion conditions, use of ramp barriers.

The type of toll collection system used affects two attributes that impact on the economic return: (1) the cost of the toll operation and (2) the extent to which the road can be accessed by users. Both of these raise important design considerations such as types of gate (to facilitate vehicle handling), and frequency of interchanges (that determines "access"). Closed and open toll collection systems have considerably different design and operating characteristics. The type of toll collection system selected also has a bearing on traffic.

The closed system requires all users to pay a toll and restricts entry and exit to a relatively few locations because of the need to collect tolls at each access. The accesses usually have costly grade separated intersections. The closed system diverts almost all short distance trips (under 15
or 20 kilometers) to local roads, as well as large numbers of medium distance trips (say, 20 to 30 kilometers), because the limited number of access points are not always convenient to the origins and destinations of trips. The number and distance between access points (interchanges) will strongly determine the extent to which the road will be used and by whom. The longer the distances between access points, the fewer short trips. In general, this will result in less local urban use.

With the open toll collection system, because tolls are collected at barriers across the main roadway, the number and design of accesses or interchanges can be the same as those for a free highway of similar standard. It allows many short trips and some medium distance trips to be made on the toll highway free of charge. Toll barriers can be located on the section of road near the central area of each major city or urbanized area through which the road passes. No exits or entrances should be provided at the barriers. Access ramps in this case should only be provided between cities or urbanized areas. This design approach tends to protect service levels for a longer period against traffic encroachment from urban areas. It is, of course, more restrictive in terms of access to the road. Alternatively, an open road toll collection system can be designed with toll collection barriers located between city boundaries. Again, no on or off ramps are provided at the barriers. In this instance, the exit and entrance ramps would be provided within the city boundaries. This design encourages local traffic use between barriers, but as traffic grows and impinges on the level of service of the toll road, toll gates will have to be added as a means for protecting the level of service.

In a properly planned open toll system, the toll collection stations are located at points where the largest proportion of vehicles are traveling long distances. Since they receive the greatest benefits from the toll expressway, there is the least amount of diversion to other roads. Since the open system diverts far fewer trips to local roads, it has a less depressing effect on economic benefits. Experience has demonstrated that closed toll collection systems have a more depressing effect on traffic than do open systems when measured against the forecast of traffic on the same road operated without tolls.

Toll collection costs. Studies indicate that toll collection costs are strongly affected by the type of system in use. Collection costs on closed toll systems run as high as 15 to 20 percent of gross revenues, whereas on open toll systems they run substantially lower -- in some cases under 5 percent. These collection cost percentages vary from facility to facility, but open toll systems have lower collection costs.

There are a variety of reasons why the operating costs of one open or closed system are higher than another. It is essential to institute a monitoring system at the outset. When collection cost/revenue ratios exceed the expected limits, evaluation of collection policies, procedure, and practices is clearly needed. Toll agencies have used a number of management methods to reduce toll collection costs; the following are illustrations:

- Reduced staffing by using collection machines and a flat rate.
- One way collection on bridges.
- No collection after a specified evening hour to next morning.
- Use of special plates, stickers or licenses.
- More efficient staffing.

In the context of the above, the following design criteria emerge:

- Because the open toll collection system costs less and puts no special limits on the number or design of intersections, it is recommended that open systems be used to the maximum extent possible consistent with traffic management and capacity utilization.

- For each facility, origin-destination patterns should be identified, including a distribution of trip lengths. Where 20 to 25 percent of the trips are under 25 km, only open barrier systems should be used. A study should also be initiated to identify at what trip length traffic is heavily diverted off the toll facility.

- In order to preserve access to the road, it is recommended that the closed system be used only when significant congestion levels are reached, that require access restriction to improve the level of service.

- Where price elasticity is found to be above 0.5 - 0.75, open toll or no toll solutions should be used. Where diversion of over 15 percent is identified as the result of toll rate increases, open toll systems should be used, along with changes in collection procedures (e.g. no toll during off-peak or evenings, use of flat rates as a basis of conversion to open toll operation).

- Design standards should be developed to provide:
  * Adequate rest stops and laybys for trucks.
  * Abutting loading, storage, and transfer areas where agricultural and other products can be processed and collected for distribution through a direct interface between the local area and the expressway.
  * Bus and public transport access to and from the toll facility.
  * Special access for industrial estates and similar development centers along the road.

Whether a road should use an open or closed toll collection system should be decided as part of the feasibility study. It is traffic volume that basically should set the choice of open or closed system. Ordinarily, capacity is set to be adequate for at least 5 to 10 years. A road expected to experience no congestion for 5 to 10 years could be operated as a fully open system while allowing free access to the road for short local trips near urban areas. On the other hand, if traffic is expected to grow very quickly, then it is important to preserve the level of service on the road and it might make sense to simply restrict access from the outset by using a closed system. If a road experiences more traffic growth than anticipated, it may
become necessary to restrict access and use tolls as the basis for congestion control. If so, toll gates may have to be added to some of the exit and entrance ramps. Because of this possibility, it may be wise to design exit and entrance ramps and their location to facilitate eventual conversion to a closed toll operation. This can save capital costs later.

There are other ways that toll collection techniques can be used -- including mixing them with each other. The key point is that in the design stage, one should consider the collection design in terms of minimizing the costs of collection and restriction of access -- always in the context of traffic growth and expected congestion. In addition, because revenue yields are linked to traffic volume, a minimum "break-even" traffic level needs to be estimated as a criterion indicating when tolls will cover both collection and total operating costs. If traffic projections indicate that the break-even flow will not be reached within, say, the first two years of operation, consideration will need to be given whether to open it as a free facility until traffic increases to an appropriate level. In some cases it may be necessary to build toll collection facilities as part of initial road construction, but they need not be activated until break-even traffic levels have been realized. If this level cannot be achieved, collection points would be operating at a net revenue collection loss. It may also be possible to lower operating costs using the methods just listed, or raise the toll rate -- if demand elasticity does not generate an actual fall in revenues.

Urban Toll Roads

The operating and policy issues for urban toll roads are considerably different than for interurban facilities. Urban operations are characterized by extensive network repercussions and the pricing, design, and operating criteria that typically apply to uncongested interurban systems must be modified for urban systems. On uncongested systems, the primary objective is to maximize their use in order to generate the potential economic benefits. When congestion occurs, the use of the road may have to be restricted in order to preserve an efficient level of service.

In designing urban facilities, it is essential to take network repercussions into account lest alleviation of congestion at one point only generates it at another. It is also important to design the facility so that its operation does not in itself create problems.

Whether at-grade or elevated, urban expressways are designed to provide a considerable degree of access to urban activity centers, central areas, commercial activity and entertainment and convention centers. This requires an extensive ramp (off and on) system designed to provide reasonably smooth flow. During peak periods, it is not unusual, at particularly busy locations, for ramps to be so fully loaded that queues form -- often well into the city streets.

In urban contexts the use of closed toll collection methods generates high costs of collection and contributes significantly to the congestion the expressway proposes to alleviate. The decision of whether to collect tolls at the entrance or exit point of an expressway, essentially involves a decision of whether to store vehicles on the city streets or on the expressway.
During peaks, queues are probably inevitable. Obviously, queuing on the city streets will spread repercussions to other streets in the network. There is the option of collecting on the expressway using a flat toll rate. This, however, puts the queues right on the expressway and adversely affects the level of service. For these reasons very few cities in the world have used a closed toll collection system as part of their urban expressway network. Perhaps the most extensive example of such a closed system is to be found in Tokyo and other large Japanese cities. Where tolls are collected the systems have been designed to be more peripheral to the city, with a limited number of accesses. Toll collection is usually conducted as an open system at barriers across the road and well away from any of the entrance/exit ramps. However, even with the open collection system, delays and congestion at peak periods at the collection barriers are substantial although they are of course, to a greater extent confined to traffic on the expressway.

Thus, operating tolled facilities in an urban environment realistically involves operating facilities with relatively frequent periods of congestion that would be unacceptable on interurban facilities. In that context, there are both economic development and traffic objectives that sometimes conflict. It is therefore essential to identify the objectives so that they can at least serve as yardsticks against which "trade-off" decisions can be evaluated. They include:

**Economic Objectives**

a. Preservation of access to activity centers;

b. Development of high volume of unrestricted traffic flows.

c. Stimulation and encouragement of commercial activity and vehicles.

d. For equity objectives, provision of low-cost transport for low income population.

e. Selection of a toll collection system that provides the lowest collection cost consistent with the other criteria listed above.

**Traffic Management Objectives**

a. Provide traffic service characterized by free flow and a minimum of congestion (with minimum of disruption and delay on the toll road and on the network at large).

b. Stimulate and encourage the use of high occupancy vehicles (HOVs).

c. Minimize delays associated with toll collection.

In general terms the two sets of objectives are in accord with each other. Conflict arises over priorities assigned to particular vehicle classes in terms of access to space. For example, some cities restrict access to expressways by commercial vehicles during certain periods as a means of alleviating congestion and spreading demand for highway use over time. In some cases, truck traffic is restricted to certain arterials.
Whatever the approach, restriction of commercial vehicles has important impacts on development. It is essential that these impacts be identified and taken into account.

The other major point of conflict enters in the design of the expressway. As noted, the more frequent (and hence closer) the number of interchanges, the more traffic is attracted to the system — especially short trips. In the design, the frequency of interchanges is in effect a strategy for determining the mix between long and short movements. The strategy needs to be evaluated as part of the design and feasibility effort to insure that it is in accord with development and traffic management objectives, keeping in mind that toll collection compounds the problems. The feasibility effort to insure that it is in accord with development and traffic management objectives, keeping in mind that toll collection compounds the problems. There are a number of approaches and technologies that are designed to minimize collection delays and costs. They include licensing schemes, chemically-timed tickets, special plates or stickers, or an optical scanner system perhaps combined with ramp metering.

In urban environments, congestion is often a "way of life", even on the best designed roads. In many large and medium size communities, peak period demands are so high that commensurate capacity could only be provided at extraordinarily high costs of investment and disturbance to the community (dislocation, pollution, noise, aesthetics, etc.) It is for these reasons that many communities have embarked on major programs of public transportation improvement and expansion. It is essential that there be a clear understanding of the nature of the urban environment in which urban expressways operate.
Earmarking for Transportation
A View of the U.S. Experience

Jenifer Wishart

Earmarking, or assigning tax revenues to specific purposes, is broadly popular in the US because it tends to reinforce broad notions of fairness, and concepts that taxpayers at large should not be asked to pay for special benefits to certain groups. Early highly visible success in constructing the national highway network with earmarked taxes paid into the Highway Trust Fund encouraged planners to set up trust funds for aviation, inland waterways, transit, and harbor maintenance. But earmarking taxes has not clearly increased spending or protected transportation programs from budget pressures. To the extent that additional spending for interstate highways has occurred it may have been over-investment, while disinvestment in minor intercity road systems may reflect a rationalization of past over-building, rather than a less favorable access to (earmarked) funding sources.

Earmarking is common, and in some measures increasing, in government budgets in the United States, and debate on its effects continues. Two recent studies (from which much of the information on state and local practices is drawn) failed to find any conclusive case favoring or condemning the practice. The National Conference of State Legislatures found only mixed evidence that earmarking increases expenditures on favored functions. The National Council on Public Works Improvement found a long term decline in the earmarking of broadly based taxes, but an increase in user fee financing, with earmarking often associated with benefit taxes.

THE EXTENT OF EARMARKING

However measured, earmarking is widespread. Of the 83,000 governments in the United States, some 30,000 are "special districts"—special government units set up for specific functions, usually with their own taxing or revenue raising powers. Around 44 percent of federal tax revenue (and half of all payments to the federal sector) are earmarked. About one-fifth of the general budgets of the states are dedicated to earmarked purposes—primarily highways, education, or intergovernmental aid. The most extensively earmarked state tax sources are motor fuels, motor registrations, general sales, tobacco products, alcoholic beverages and licence fees, with lottery

1/ This paper does not represent the views of the Congressional Budget Office.


proceeds (where they exist) also commonly dedicated to certain uses. But there is considerable variance among states on the extent to which sources are dedicated and the extent to which earmarked sources finance programs. Highway taxes and highway programs rank consistently high in the extent of earmarking. NCSL data on state practices are shown in Table 1.

**TABLE 1. Earmarking in State Budgets during 1984.**

<table>
<thead>
<tr>
<th>The Most-Earmarked Tax Sources</th>
<th>Number of States that</th>
<th>Percent of Tax Revenue Earmarked (%)</th>
<th>Percent of All State Tax Revenue from Tax that is Earmarked (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Source</td>
<td>States</td>
<td>States</td>
<td></td>
</tr>
<tr>
<td>Motor Fuels</td>
<td>48</td>
<td>95</td>
<td>92</td>
</tr>
<tr>
<td>Motor Registrations</td>
<td>42</td>
<td>97</td>
<td>79</td>
</tr>
<tr>
<td>General Sales</td>
<td>29</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Tobacco Products</td>
<td>27</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>Alcoholic Beverages</td>
<td>33</td>
<td>35</td>
<td>23</td>
</tr>
<tr>
<td>Licence Fees</td>
<td>43</td>
<td>92</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Most Favored Programs</th>
<th>Number of States using</th>
<th>Percent of Program Budget Earmarked (%)</th>
<th>Percent of all Earmarking in States (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program</td>
<td>States</td>
<td>from Dedicated Sources</td>
<td></td>
</tr>
<tr>
<td>Local Government</td>
<td>45</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Education</td>
<td>27</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Highways</td>
<td>47</td>
<td>68</td>
<td>41</td>
</tr>
</tbody>
</table>

Source: NCSL, Earmarking State Taxes.

NCSL data show a long term decline in earmarking at the state level. In the mid-1950s, over half of state tax revenues were dedicated to specific purposes; by the late 1970s this had dropped to a little under one-quarter, and by 1984 the share stood at only 21 percent. The decline seems to have been fairly steady over the 30 years. But according to NCSL, the current falling share of set-asides reflects rising non-dedicated income and masks a renewed interest in earmarking, evident in numerous small tax reservations that have been enacted since 1979. Some of these affect transportation
budgets--notably the growth in tax revenues allocated to cover transit
deficits--and many pay for environmental clean-up programs.

Earmarking at the federal level has increased broadly in the last 40 years. Excise and social insurance tax revenue paid to trust funds--the largest category of earmarked tax revenues--was around 11 percent of federal receipts in 1950, 19 percent in 1960 and 26 percent in 1970, compared with 34 percent now. Excise taxes are now paid into eight trust funds, all but one of them created since the beginning of 1970. Some $320 billion in social insurance and excise receipts were paid into trust funds in 1987, the largest earmarkings being social insurance ($303 billion), highways ($13 billion), and aviation ($3 billion). In addition, $52 billion was paid from general revenue into civil and military retirement trust funds.

BUDGET TREATMENT OF EARMARKED PROGRAMS

The treatment of the earmarked programs in budgets varies widely. In federal budgets, treatment depends on whether programs provide entitlements or discretionary assistance. All the transportation earmarks are for discretionary aid, and monies paid to trust funds and special funds are subject to the same budget controls and appropriation processes used for programs funded from the general fund. There is no automatic matching of outlays with revenues. Some states tend to insulate earmarked programs from their general budgets, but NCSL found that this sometimes resulted in under-funding when tax set-asides were too low.

Treatment of earmarked programs in state budgets varies greatly. Many special districts are more-or-less autonomous with varying degrees of freedom to set rates and tax levels and allocate revenues to different agency purposes. As a general rule commercial airports, ports, utilities and similar enterprise-like agencies tend to be fairly independent of parent governments. Activities that are only partly financed from earmarked sources are budgeted along with programs financed from general revenue.

Federal earmarking takes two forms:

* revolving funds in which proprietary receipts of enterprises are netted from their overall program costs before determining appropriations; and

* special and trust funds set up to keep track of taxes assigned to certain programs, and that are subject to ordinary budget scrutiny and appropriation procedures.

Programs from which offsetting receipts are netted before budget appropriations are made are generally the business-like activities of the government--power marketing administrations, insurance funds, commodity credit, and so forth. Federal government enterprises provide both economic goods or services (electric power, farmers' credit and so on) and subsidies that serve federal policies such as regional development. Netting the receipts from sales of economic goods or services exposes the costs of pursuing the govern-

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\(^{2}\) A billion is one thousand million.
Earmarking for Transportation

Earmarking policies financed from general tax portions of the activity. This preserves the rule that federal budget totals show the receipts and outlays of the government in its sovereign capacity.

Special and trust funds typically cover other programs for which special taxes or payment schedules have been earmarked. They can be set up as special funds, trust funds, or trust revolving funds:

- **Special funds:** Revenues from certain sources—typically licence fees, royalties, or charges for use of facilities, but also in some cases, excise taxes—are deposited to a special fund and spent on named programs. Special funds are credited with unspent balances of taxes, which adds to resources available for appropriations in future years. The largest special funds are the Land and Water Conservation Fund that receives payments mostly from leases of the Outer Continental Shelf and disburses for land acquisition for outdoor recreation, and the Reclamation Fund(s) that collects water service payments and capital reimbursements for irrigation, power, water supply and other natural resources projects and makes disbursements to finance ongoing and new water resources projects.

- **Trust funds:** Trust funds are typically financed with taxes on the groups that will benefit from the fund’s spending program. Revolving trust funds also receive offsetting repayments from loans or advances. Laws setting up trust funds usually provide that unspent income is to be invested in federal securities, so that investment income adds to the future resources of the fund. The main transportation trust funds—the Highway Trust Funds and the Airport and Airway Trust Fund—are the largest trust funds after the social insurance funds.

Figure 1 Shows Federal Earmarking in 1987

![Federal Earmarking, 1987](image-url)

Source: Congressional Budget Office
Federal trust funds are not counterparts to private trust funds in which trustees hold and administer property owned by others (the trusters?). Trust funds simply keep account of the taxes designated by law as dedicated to specific purposes, so that it can be demonstrated that the taxes have been spent on those programs. Taxes are deposited to receipts accounts and spending is debited to outlay accounts just as for all other taxes and spending activity. Spending from special funds and trust funds is subject to the same appropriations process as other federal spending, and the earmarking thus does not create special problems regarding scrutiny or controllability of spending. Earmarking, for example, is not sufficient to exempt programs from automatic spending cuts that would be required should a sequester be triggered under the Balanced Budget Reaffirmation Act of 1987. In some cases NCSL indicate that earmarking has protected state programs from across-the-board budget cuts.

Many special funds finance small programs from fees and fines and other regular sources from which there might not usually be expected to be a shortfall or a surplus. The Land and Water Conservation Fund, however, has built up a large balance of about $5 billion.

Trust funds are typically used to indicate a continuity in commitment. The transportation trust funds mostly confirm federal pledges to assist in financing multi-year construction projects in the sector. Interest paid on unspent income recognizes the lag between committing funds and disbursing them under construction contracts.

ORIGINS OF THE TRANSPORTATION TRUST FUNDS

The first of the transportation trust funds was the Highway Trust Fund set up in 1956 (with its first year of operations in 1957) as part of a national plan to construct the Interstate highway system (and its complementary network of primary and secondary highways) by 1972. The trust fund set up a financing mechanism for an agreed construction program, with a half-way target set for Interstate segments by 1964. In the first 10 years, the program was highly successful. Monitoring the trust fund gave early warning of impending financing difficulties in 1959 and 1960 when cost estimates proved too low. Tax increases were voted. Construction targets were also tightly monitored and by early 1966 work was complete or underway on 94 percent of the network.

The same level of success was sought in 1970 when the Congress set up the Airport and Airway Trust Fund to finance expansions that would overcome airport congestion. The trust fund collects revenue from excise taxes on air travellers and light aircraft use, and finances capital grants for airport development and investment and operations of the air traffic control system. Some aim of boosting investment can be attributed to setting up the fund, but no definite plan for construction or investment was adopted until the

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3/ A bigger issue for budget control in federal budgets is posed by the so-called entitlements programs that entitle applicants to levels of aid that can only be amended by amending the authorizing legislation.
National Airspace System Plan was adopted in 1982. Almost from the beginning, the fund began to accumulate a balance of unspent taxes.

The Inland Waterways Trust Fund was set up in 1978 to track spending from barge fuel tax revenues on new waterways construction projects. Half of all new construction was to come from the earmarked revenues. Imposing the barge fuel tax followed a change in policies dating to the early 1800s that waterways should be free. In 1982, a Transit Account was established in the Highway Trust Fund to receive revenue from one penny of the federal gas tax. The account disburses mainly against costs for special large transit projects. The Harbor Maintenance Trust Fund was set up in 1986 to collect revenue from an .04 percent ad valorem charge on cargo loaded or unloaded at U.S. Ports, and tolls on cargo in the St Lawrence Seaway. Funds are to pay for 40 percent of the maintenance of channels and fixed facilities (like breakwaters) by the U.S. Army Corps of Engineers, and all of the U.S. share of the Seaway. Each of these trust funds attached earmarked taxes to on-going expenditure programs.

FINANCING ARRANGEMENTS AND FINANCIAL CONTROLS

The financial arrangements for the highway and aviation funds differ and reflect different ways of operating dedicated funding sources.

Since 1972, the Highway Trust Fund has been rolled over each 5 years or so to continue matching spending on certain highway programs with dedicated excise revenues. The fund liquidates contract authority granted in the 5-year spending programs authorized with each highway bill over a revenue collection of 7 years. Thus the current highway Trust Fund, re-authorized in 1987 inherited the balance of obligations and cash from past authorizations and added new spending programs lasting through 1991, and taxes payable through 1993.

Program authorizations for highways carry contract authority, which means that amounts authorized can be obligated without appropriations. Budget controls are exercised through obligation ceilings that limit the new contracts that can be let in any year, and thus the rate at which authorizations are spent. If obligation ceilings slow the rate at which authorized projects spend-out so that unpaid authorizations exceed the next two years' income, funds available to the states are automatically reduced to the two-year level. Currently, unpaid authorizations are around 1.5 years' income. In other words, although the fund has around $10 billion in cash, it has outstanding "promises to pay" that will consume all of that cash plus all of its income for the next 1.5 years.

The Airport and Airway Trust Fund has less obvious intentions to fund all aviation programs. The trust fund finances investment spending and research by the FAA based on annual budget authority, and a program of grants to the states for airport development, based on contract authority for multi-year programs. These are typically much less than the income of the fund could support. The balance of the fund's resources is meant to pay for some of the operations of the air traffic control system, which is budgeted annually. But the portion of operations paid from the trust fund has been the subject of continuing disputes with the result that significant general funding of
the system has occurred in most years that the trust fund has operated and the fund has at the same time been accumulating large unobligated balance. Whereas the Highway trust fund has $10 billion in cash but has claims of $31 billion against it, the Airport and Airway Trust Fund has $11 billion in cash and is nearly $6 billion in the clear.

Activities financed from the trust funds for inland waterways and harbor maintenance do not have contract authority but are instead budgeted annually like other spending. The inland waterways fund, financing new construction projects, has been a slow spender and has already built up a balance of around $300 million or about 6 years' revenue. The Harbor Maintenance Trust Fund pays only portion of the program costs and has just-about broken-even in its first two years.

RELATIONSHIP OF THE TRUST FUNDS TO THE BUDGET

Trust fund income includes both tax revenues and income from invested balances. This interest income is paid from general tax revenues through other budget accounts (see Table 2). Thus trust fund surpluses and deficits do not indicate the overall budget effects of the earmarked program. Like all government spending, overall budget effects are shown in the simple comparison of tax receipts from the public and outlays. Trust fund income includes both tax revenues and income from invested balances. The interest income is paid from general tax revenues through other budget accounts. Thus trust fund surpluses and deficits do not indicate the overall budget effects of the earmarked program. Like all government spending, overall budget effects are shown in the simple comparison of tax receipts from the public with outlays. Table 2 shows these comparisons for the transportation funds. The highway account surplus of $834 million in 1987, for example, reflects trust fund outlays of $13,476 million and fund receipts of $14,310 million. But $1,278 million of those receipts are for interest on federal securities, and are also recorded as an outlay from Treasury. This interagency transaction thus cancels in calculating the overall effect of highway fund programs, and the net $444 million deficit from trust fund programs reflects the difference between excise tax receipts and outlays.

Trust fund programs also spend significant amounts of federal funds outside interest on trust fund balances. For highways in 1987, again, Federal fund outlays other than interest were $200 million. Thus the overall effect of highway programs on the federal budget was a deficit of $644 for the year. Figure 2 (reproduced from a recent CBO report) shows arrangements for financing federal aviation activity in 1986. Almost half the spending in that year came from non-earmarked sources. Cumulative federal funds spending for aviation over the years of the Airport and Airway Trust Fund has covered 46 percent of all FAA outlays, and 37 percent of spending for commercial and private air transportation. This high level of support is common. Trust fund spending covers only a little more than one-fifth of inland waterways

5/ Congressional Budget Office, New Directions for the Nation's Public Works (September 1988).
Table 2. Transportation Trust Funds and the Budget
(data for 1987, in millions of dollars).

<table>
<thead>
<tr>
<th>TRUST FUND</th>
<th>Highways</th>
<th>Aviation</th>
<th>Inland Waterways</th>
<th>Harbor Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receipts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excise Taxes</td>
<td>13032</td>
<td>3060</td>
<td>48</td>
<td>58</td>
</tr>
<tr>
<td>Interest on Federal Securities</td>
<td>1278</td>
<td>880</td>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>14310</td>
<td>3940</td>
<td>79</td>
<td>58</td>
</tr>
<tr>
<td>Outlays</td>
<td>-13476</td>
<td>-2631</td>
<td>-34</td>
<td>-35</td>
</tr>
<tr>
<td>Surplus</td>
<td>834</td>
<td>1309</td>
<td>45</td>
<td>23</td>
</tr>
</tbody>
</table>

FEDERAL FUNDS

| Interest Paid to Trust Funds | -1278 | -880 | -31 | -1   |
| Federal Funds Outlays       | -200  | -2283| -440| -490 |

NET EFFECTS ON FEDERAL BUDGET

| Trust Fund | -444 | 429 | 14 | 22   |
| Overall    | -644 | -1854| -426| -468 |

Source: Congressional Budget Office, budget data.

2. Airport and Airway Trust Fund.
3. Inland Waterways Trust Fund.
investment, and none of the operation and maintenance for the locks and dams; the harbor maintenance trust fund pays only $35 million out of $440 million spent on maintaining harbor channels. The Transit Account provides only about $1 billion of the annual $3.5 billion federal budget for mass transportation. During the 1980s $2.3 billion has been spent on highway programs not financed from the Highway Trust Fund.
Thus the trust funds have not assured that users pay their way, and nor do trust fund surpluses and balances indicate that transportation users are overtaxed. In all cases this spending outside the trust funds has been such that, if all federal support from these programs were to be paid from the trust funds, taxes would have to be raised significantly. Had all past spending been charged against the trust funds, only the highway trust fund would still have a positive balance, and even that would be used up sometime in 1989 (see Tables 3 and 4).

### TABLE 3. ALTERNATIVE ESTIMATES OF FEDERAL HIGHWAY TAXES AND SPENDING (In billions of dollars)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Actual</th>
<th>Trust Fund</th>
<th>Federal Highway Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>User</td>
<td>Trust Fund</td>
<td>Federal Fund</td>
</tr>
<tr>
<td></td>
<td>Taxes</td>
<td>(Actual)</td>
<td>(Actual)</td>
</tr>
<tr>
<td></td>
<td>1957-1959</td>
<td>5.6</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>1960-1969</td>
<td>36.1</td>
<td>35.3</td>
</tr>
<tr>
<td></td>
<td>1970-1979</td>
<td>62.2</td>
<td>55.6</td>
</tr>
<tr>
<td></td>
<td>1980</td>
<td>6.6</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>1981</td>
<td>6.3</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>1982</td>
<td>6.7</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>1983</td>
<td>7.8</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>1984</td>
<td>10.5</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>1985</td>
<td>11.6</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>1986</td>
<td>12.3</td>
<td>14.2</td>
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<tr>
<td></td>
<td>1987</td>
<td>11.8</td>
<td>12.9</td>
</tr>
<tr>
<td></td>
<td>1988(est.)</td>
<td>13.0</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>1989-1988</td>
<td>86.6</td>
<td>98.9</td>
</tr>
<tr>
<td></td>
<td>1987-1988</td>
<td>190.6</td>
<td>194.9</td>
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<table>
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<tr>
<th>Fiscal Year</th>
<th>Projected</th>
<th>Actual</th>
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<tbody>
<tr>
<td></td>
<td>User</td>
<td>Trust Fund</td>
</tr>
<tr>
<td></td>
<td>Taxes</td>
<td>(Actual)</td>
</tr>
<tr>
<td></td>
<td>1989</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>1990</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>1991</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>1992</td>
<td>13.8</td>
</tr>
<tr>
<td></td>
<td>1993</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>1989-1993</td>
<td>67.9</td>
</tr>
</tbody>
</table>

**SOURCE:** Congressional Budget Office, based on budget data and data from the Federal Highway Administration.

a. Balances in parentheses are negative. In practice, trust fund accounting would require additional revenue (from taxes or transfers of federal funds) or spending cuts to avoid negative balances.

b. Less than $50 million.
TABLE 4. ALTERNATIVE ESTIMATES OF AVIATION TAXES AND SPENDING, 1971-1987 (In billions of dollars)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Actual Trust Fund</th>
<th>Alternative Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>User Cash</td>
<td>Outlays</td>
</tr>
<tr>
<td>1971</td>
<td>0.6 c</td>
<td>0.3</td>
</tr>
<tr>
<td>1972</td>
<td>0.6 c</td>
<td>1.4</td>
</tr>
<tr>
<td>1973</td>
<td>0.8 c</td>
<td>0.7</td>
</tr>
<tr>
<td>1974</td>
<td>0.8</td>
<td>0.5</td>
</tr>
<tr>
<td>1975</td>
<td>1.0</td>
<td>0.6</td>
</tr>
<tr>
<td>1976</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>1977</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>1978</td>
<td>1.2</td>
<td>0.9</td>
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<tr>
<td>1979</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>1980</td>
<td>1.5</td>
<td>1.1</td>
</tr>
<tr>
<td>1981</td>
<td>1.9</td>
<td>1.2</td>
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<tr>
<td>1982</td>
<td>1.2 f</td>
<td>1.3</td>
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<tr>
<td>1983</td>
<td>1.2 f</td>
<td>1.5</td>
</tr>
<tr>
<td>1984</td>
<td>2.2</td>
<td>1.8</td>
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<tr>
<td>1985</td>
<td>2.5</td>
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<td>1986</td>
<td>2.9</td>
<td>2.6</td>
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<tr>
<td>1987</td>
<td>2.7</td>
<td>2.4</td>
</tr>
<tr>
<td>Total</td>
<td>3.1</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>Total 26.6</td>
<td>22.0</td>
</tr>
</tbody>
</table>

SOURCE: Congressional Budget Office, based on budget data.


b. Total FAA outlays are the sum of expenditures from the Airport and Airway Trust Fund and from federal funds, as shown in Table 10.

c. Data do not include transfers to the trust fund of unexpended appropriations of $621 million in 1971 and $255 million in 1972, or supplementary payments from general revenue of $647 million in 1972 and $73 million in 1973.

d. Data include spending for the Aviation Advisory Commission during the 1971-1975 period.

e. Transition quarter between fiscal year ending June 30, 1976, and fiscal year running from October 1, 1976, to September 30, 1977.

f. Data do not include aviation tax receipts of $1.2 billion in 1981 and $1 billion in 1982 that were not credited to the trust fund.

g. Data include trust fund transfers to the National Oceanic and Atmospheric Administration for the aviation weather service, beginning in 1984.
Effects on Levels of Spending

According to NCSL, earmarking makes relatively little difference to the amounts in states' budgets for activities for which the set-asides are a small proportion of all spending; where earmarking makes programs independent of state budgets, programs may suffer from periodic shortfalls because of erosion in the value of the earmarked taxes. The NCSL survey also indicates, however, that earmarking may be effective in preserving interest in some small programs.

There is a general flavor in both the NCSL and National Council surveys that earmarking may help to raise the overall level of resources for states when the reserved programs provide benefits that recipients are willing to pay for, but that were previously provided from general taxes. Whether earmarking of such an expanded tax bases is needed to capture this effect is unclear.

Evidence tends to suggest that federal trust funds, except in one case, have had little effect on raising spending.

Beginning the Interstate construction program marked a major change in the federal role in highway development, but that role seems to have mostly substituted for what the states were already doing. The Highway Act of 1956 set up federal grants to pay for 90 percent of Interstate construction, and 75 percent matching grants for primary and secondary highway networks that would feed traffic to the Interstates. (These grants were also channelled through the Highway Trust Fund). In one year, federal aid for highways jumped from around one-tenth of national highway budgets to about one-quarter, a share that's been roughly maintained since (see Figure 3).

Thus the interesting question is, if earmarking increases federal aid, for highways, does that increase lead to an increase in national highway spending? In principle, federal aid tied to (earmarked for) highway development aims to lower the price of highway programs to the states. If the cost share is 80% federal/20% state for example, each $1 of state resources devoted to highways can buy 5-times the extent of highway development it could before the offer of federal aid. Thus the tied aid aims to encourage states to spend more on highways than they would otherwise, and less on all other programs. This strategy, however, assumes that states have unmet highway needs. If states can finance all the highways they want at the pre-aid "price," then federal highway grants simply finance the states' programs and states switch resources they would have spent on highways to other programs. Federal aid then acts as untied general income assistance, and the earmarking is ineffective. These cases are compared with unaided state budget choices in Figure 4.

The consensus of studies testing empirically whether states' budget choices are consistent with their receiving tied or untied aid is that the states substitute aid for their own funds.2/ Apart from an increase in

2/ These studies are reviewed in Congressional Budget Office, Federal Policies for Infrastructure Management (June 1986).
Figure 3. Highway Revenue by Source
(in billions of dollars)

Federal Aid
State Budgets
Rural Local Govts
Municipalities

Source: Federal Highway Administration

Figure 4. NET INVESTMENT IN HIGHWAYS BY SOURCE
(In billions of dollars at 1982 prices)

Net Federal
Capital Grants
Net State/Local Match
Net Other State/Local Spending

Source: Congressional Budget Office, based on data from the Bureau of Economic Analysis and the Federal Highway Administration.

Note: Net investment in this figure is based on deducting equal annual amounts for depreciation. Net other spending includes net state/local investment on non-federal-aid projects and other major improvements not counted as investment by the Bureau of Economic Analysis.
highway construction during the early and mid-1960s that can be attributed to the early impetus of the interstate highway program, federal aid has not had the desired price effect and has increased highway spending only through general income effects. The studies show that on average, states substitute about 60 cents to 70 cents of each extra federal dollar for their own funds, with no price effects at the margin. In other words, of each extra $1 in federal grants for highways, 60 to 70 cents is spent on non-highway programs, and only 30 cents, because of generally larger budgets, is spent on highways (Figure 5).

**FIGURE 5. EFFECT OF TIED AND UNTIED AID**

Case A: State Budgets Without Federal Aid

Case B: State Budgets With Federal Aid for Highways

Case C: State Budgets With Untied Federal Aid
Moreover, the only ex-post study of interstate highway construction suggests that the additional spending induced by the federal program was over-investment. Such additional spending as did occur was in rural highways crossing thinly populated western states. Ann Friedlaender's 1968 review of the nearly completed Interstate system concluded that if freight were rationally allocated between truck and rail, trucking traffic would be reduced "to such an extent that the construction of the highway with standards adequate to carry commodity shipments would not be justified." Even without diversions, the present value of the rural Interstate system and its feeder roads was estimated to be negative at all reasonable discount rates. Twenty years after that assessment the ratio of traffic volume to capacity on the rural Interstate system is still only 33 percent, with 57 percent of the mileage used at less than 30 percent of capacity and only 9 percent used at more than 70 percent. Estimates put the rate of return to major rehabilitation work on the rural interstates during 1983 and 1984 at -4 percent.

Federal aid may have helped focus highway improvements on the federal-aid sector. During the 1970s disinvestment may have occurred in the U.S. highway system. If so, this seems to have been mainly on the non-federal-aid portion of the system—the 3 million-or-so miles of local roads and streets. Measuring disinvestment is tricky because of difficulties in valuing and depreciating public facilities. But taking investment as equal to the face value of construction, and depreciation as somewhere between a straight-line measure and a measure based on assets withdrawn from service would put net investment from federal highway grants at between $5 billion and $10 billion during the 1970s rising to $8 billion to $15 billion now. Though starting from a somewhat similar level, however, net investment from states' own resources slipped steeply, and on the straight-line depreciation measure, net state and local investment not associated with the federal grants was negative during 1977 through 1981 (see Figure 4).

It's not clear whether such disinvestment is a cause for alarm. As well as the over-investment in rural interstates, other rural routes are also overextended. The traffic volume-to-road-capacity ratio for all other segments is lower than the already low 33 percent of the rural Interstates: on the collector systems that feed the main roads, only 10 percent to 12 percent of capacity is used. Thus declining investment on these road sectors may signal merely a rationalization of the overall highway network quite consistent with long-term transportation requirements.

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10/ See Congressional Budget Office, New Directions.
On balance, therefore, it seems that federal earmarking for transportation does not mirror the text-book arguments:

- It hasn't assured that users pay—a large share of spending on all programs comes from unearmarked funds;

- It hasn't created especially difficult budget control problems—trust funds are subject to the same appropriations procedures as other spending; and

- It hasn't necessarily increased national spending on the favored programs—states simply substitute federal funds for their own tax sources, or the trust fund share of programs is too small to raise national levels of activity.
One of the most exciting aspects of working in the toll industry over the past few decades has been the rapid changes which have occurred, every one presenting new challenges. Each project is unique, bringing its own measure of excitement to the analysis and in many instances, implementation of the facility. The thrust of this paper is the setting of toll rates and financial analysis for toll roads, in the United States.

**Toll Rates**

The setting of toll rates is based on many considerations, including the level of competition from tax-supported roadways in the travel corridor, cost of the project, nature of the patrons served, and financial requirements. Present toll rates vary greatly from project to project in the United States. As can be seen in tables 1 and 2, there are significant differences between rates assessed on intercity toll roads, on urban toll roads, and on different types of vehicle. The rates presented in the tables are for end-to-end, full-length trips for only passenger cars and five-axle trucks. Toll rates for intermediate trips vary, generally keying on the through-trip rate, and rate structures are in place for other size vehicles as well.

Toll rates for passenger cars generally are a fraction of the rates charged for larger, commercial vehicles on the basis that the larger, commercial vehicles cause more damage to roadway surfaces and bridge decks. Some toll agencies simply charge tolls on a straight per-axle basis. Others charge lower per-axle rates for passenger cars than for heavy vehicles.

The toll industry includes many older projects with rates well below those of new projects on which the rates have been set to meet increased costs of construction. The relative success of the current generation of U.S. toll roads has created this interesting situation. Since traffic and toll revenues have, in practice, generally exceeded the original financing forecasts, and because of the financing margins required by the investment banking community for issuance of revenue bonds, there has been relatively little pressure for toll agencies to raise toll rates in proportion to the historical inflation index. However, the disparity is gradually diminishing as the older projects begin to reach the end of their theoretical design lives and major rehabilitation programs are initiated.

Sometimes, toll rates reflect a desire by the project sponsor to generate funds for other purposes. For example, a toll bridge in Venice, Illinois, has, in the trust agreement, a provision whereby if net revenues reach a certain level, part of the surplus is contributed to the city's operating fund. In New Jersey, the toll agencies are required to contribute funds to the state Department of Transport (DOT) to be used for non-toll road purposes.
<table>
<thead>
<tr>
<th>FACILITY</th>
<th>LENGTH (miles)</th>
<th>PASSENGER CAR TOLL RATES</th>
<th>FIVE-AXLE TRUCK TOLL RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PER MILE TOLL RATE</td>
<td>PER MILE RATE</td>
</tr>
<tr>
<td><strong>Barrier Systems</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.E. Bailey Turnpike - Oklahoma</td>
<td>86.4</td>
<td>$6.00</td>
<td>$0.0694</td>
</tr>
<tr>
<td>Cimarron Turnpike - Oklahoma</td>
<td>59.7</td>
<td>4.00</td>
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<tr>
<td>Indian Nation Turnpike - Oklahoma</td>
<td>105.2</td>
<td>7.00</td>
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<td>Muskogee Turnpike - Oklahoma</td>
<td>53.1</td>
<td>3.75</td>
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<tr>
<td>Northwest Tollway - Illinois</td>
<td>76.3</td>
<td>6.25</td>
<td>0.0819</td>
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<td>Tri-State Tollway - Illinois</td>
<td>77.1</td>
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<td>East-West Tollway - Illinois</td>
<td>96.3</td>
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<td>0.0883</td>
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<tr>
<td>Central Turnpike - New Hampshire</td>
<td>40.9</td>
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<td>31.6</td>
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<td>Blue Star Turnpike - New Hampshire</td>
<td>17.8</td>
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<td>0.0843</td>
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<td>Atlantic City Expressway - New Jersey</td>
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<td>Pennsylvania Turnpike - Northeastern Section (3)</td>
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<td>265.0</td>
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</table>

(1) Full-length trip on the facility.
(2) Includes the barrier system portion.
(3) Five-axle vehicle toll rates represent charges for vehicles in the 45,000 to 65,000 pound classification.
(4) In the 55,000 to 65,000 pound classification.

Table 2

COMPARISON OF PER MILE RATES FOR SELECTED INTERCITY TOLL ROADS

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>LENGTH (miles)</th>
<th>TOLL (1)</th>
<th>PER MILE RATE</th>
<th>TOLL (1)</th>
<th>PER MILE RATE</th>
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<td><strong>Toll Rates</strong></td>
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<td><strong>Five-Axle Truck</strong></td>
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<tr>
<td><strong>Toll Rates</strong></td>
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<td><strong>Barrier Systems</strong></td>
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<tr>
<td>Airport Expressway - Florida</td>
<td>8.8(2)</td>
<td>$1.50(2)</td>
<td>$0.1705</td>
<td>$0.50(2)</td>
<td>$0.0568</td>
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<td>Dallas North Tollway</td>
<td>14.4</td>
<td>2.40</td>
<td>0.1667</td>
<td>1.00</td>
<td>0.0694</td>
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<tr>
<td>Holland East West Expressway - Florida</td>
<td>13.0</td>
<td>2.50</td>
<td>0.1812</td>
<td>1.00</td>
<td>0.0725</td>
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<tr>
<td>Sam Houston Tollway - Texas (3)</td>
<td>27.5</td>
<td>7.50</td>
<td>0.2727</td>
<td>2.25</td>
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<td>Hardy Toll Road - Texas</td>
<td>21.7</td>
<td>7.50</td>
<td>0.3456</td>
<td>2.00</td>
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<td>Massachusetts Turnpike - Boston Extension</td>
<td>12.0</td>
<td>1.15</td>
<td>0.0958</td>
<td>0.40</td>
<td>0.0333</td>
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<tr>
<td>Tampa South Crosstown Expressway - Florida</td>
<td>17.5</td>
<td>3.25</td>
<td>0.1857</td>
<td>1.25</td>
<td>0.0714</td>
</tr>
<tr>
<td>New York State Thruway - Barrier System</td>
<td>79.9</td>
<td>11.50</td>
<td>0.1439</td>
<td>3.10</td>
<td>0.0388</td>
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<tr>
<td>Richmond Expressway - Virginia</td>
<td>6.3</td>
<td>1.30</td>
<td>0.2063</td>
<td>0.70</td>
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<tr>
<td>Richmond-Petersburg Turnpike - Virginia</td>
<td>34.7</td>
<td>1.50</td>
<td>0.0432</td>
<td>0.90</td>
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<td>Norfolk-Virginia Beach Toll Road</td>
<td>12.1</td>
<td>0.50</td>
<td>0.0413</td>
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<td>Dulles Toll Road - Virginia</td>
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<td>0.85</td>
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<td>J.T. Butler Expressway - Florida</td>
<td>12.2</td>
<td>2.50</td>
<td>0.2049</td>
<td>0.50</td>
<td>0.0410</td>
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<td>Sawgrass Expressway - Florida</td>
<td>22.8</td>
<td>2.50</td>
<td>0.1096</td>
<td>1.50</td>
<td>0.0658</td>
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<td><strong>Ticket Systems</strong></td>
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<tr>
<td>New Jersey Turnpike - Int. 9-18</td>
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<td>0.1543</td>
<td>1.50</td>
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<td>47.0</td>
<td>7.55</td>
<td>0.1606</td>
<td>2.10</td>
<td>0.0447</td>
</tr>
</tbody>
</table>

(1) Full-length trip on the facility.
(2) Round-trip toll and distance (one-way toll system).
(3) Facility presently only partially open.

NOTE: Updated as of November 20, 1968.
In Maine, the turnpike authority pays $0.8 million annually to the Maine DOT to be used to help meet off-turnpike, highway needs. In some urban areas, including New York City, Philadelphia, and San Francisco, surplus toll revenues help support local mass transit systems.

Toll rates are normally established after extensive toll sensitivity tests are conducted with a traffic model. These require the making of a series of traffic assignments to the proposed toll facility, each assuming a different toll rate. At least three such assignments are required to describe or plot the toll sensitivity curve, that is, arraying the aggregate toll revenues at each toll rate tested against relative traffic services provided, by alternate toll rates. Usually, the result is a "bell-shaped" curve.

The traffic assignments are made using a model not much different than the urban area transportation models evolved in the late 1950s. A key departure from those earlier models, which were based on travel time savings and an "all-or-nothing" assignment process, is conversion of the model to a cost diversion technique and use of a family of asymptotic traffic diversion curves. Inputs to the model include trip origin, destination, purpose, and frequency, collected from motorist interview surveys on existing routes in the travel corridor. Vehicle class and time of day are also recognized. For the traffic assignments, two travel paths are identified between each pair of traffic zones, one path following the toll facility and the other using the best alternate route. The proportion of trips assigned to the toll facility is a function of the relative trip costs via the two routings. Those costs recognize both travel time values and vehicle operating costs estimated specifically for the project travel corridor. Toll rates are of course included in toll facility routings.

The value of travel time is usually estimated separately for peak and off-peak travel periods, keyed specifically to the project travel corridor and the annual median household income of its residents. The resulting estimates are then weighted by the trip purpose distributions found during the motorist interview survey. They then are further weighted by a "motorist perception" factor that attempts to recognize, within each trip purpose category, the importance drivers place on the payment of a toll. The two weighting exercises serve to decrease the unadjusted initial values per minute, introducing a measure of conservatism to the toll road assignments.

Usually, the value-of-time estimates are not expanded to reflect the vehicle occupancy measured by trip purpose in the travel corridor. This is particularly true in studies of urban toll road projects with high commuter use, since most commuters travel alone. In multi-occupant vehicles, route choice decisions are rarely made by consensus, except perhaps in well-organized carpools. In most cases, the decision whether to pay a toll is based primarily on the driver's perceived value of time and cost. This position is also conservative, since factoring to reflect multiple occupants would result in a higher value of time per vehicle, that in turn, would result in a higher diversion of traffic to the toll facility.

A further refinement relates to the mix of local and longer distance trips in the travel corridor. Local motorists are presumed to have a better
knowledge of the alternate travel paths available, particularly during peak hours. Conversely, longer distance travelers usually do not have such a degree of familiarity. Therefore, two drivers reaching a point of choice in their routing at the same time of day could well exercise different decisions. The weighting factors used in this instance would adjust time costs to make them less sensitive to the cost of the toll payment on longer distance trips.

The toll sensitivity/traffic assignment process is continually being refined through studies conducted prior to and subsequent to the opening of new toll facilities. The reaction to toll increases on operating projects provides further indications of driver choice of alternative routes. Years ago, the old "transit formula" usually was reasonably close to predicting how toll road patrons would respond. According to that formula, additional revenue is equal to two-thirds of the projected increase in fare (for example, if fares rise by $0.75, the farebox would actually collect only $0.50, due to loss of some patronage). Today, patron sensitivity is much less. While some decrease in traffic still accompanies introduction of a toll increase, there have been examples where only the rate of traffic growth was diminished, and then on an interim basis.

Working with the toll sensitivity curve developed from the traffic assignments at alternative toll rates, the optimum toll rate is selected. This is the rate that strikes the best balance between traffic service and aggregate toll revenues. This differs from and is lower than the toll rate for maximum revenue. There are many reasons for selecting a rate lower than that for maximum revenue, including financial community "comfort," political considerations, and economic disincentives.

Toll Road Financing

There is great flexibility in the nature of toll road financing. It is project related and dependent on the terms and conditions of enabling legislation, bond covenants, contractual relationships, availability of alternate funding sources, and/or fund pledges and local and federal law and policy. This tends to make each toll project unique.

The basic means of financing toll roads today include general obligation bonds, revenue bonds, revenue bonds supplemented by income other than that paid by users, private financing, and combinations thereof. Of the cases presented in table 3, there are no major toll roads currently in private ownership, and the New Hampshire Turnpike is the only one that was financed purely through general obligation bonds. Interestingly, New Hampshire, in late 1987, decided to reduce the magnitude of general obligation bonds outstanding in an effort to maintain or improve the state's credit rating. It turned to the creation of a new turnpike authority, which then issued revenue bonds for improvements to the turnpike system.

Examples of facilities financed through issuance of revenue bonds, supported solely by income derived from the toll facility, include the Dallas North Tollway, New Jersey Turnpike, Illinois Tollway, Indiana Toll Road, Florida's Turnpike, and the Massachusetts Turnpike. The final category, which involves a co-mingling of toll income with tax receipts, revenue
## Table 3
FINANCING METHODS USED BY SELECTED AGENCIES

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<thead>
<tr>
<th>TOLL FACILITY</th>
<th>GENERAL OBLIGATION</th>
<th>REVENUE LEASE ARRANGEMENTS</th>
<th>GASOLINE TAX PLEDGE AID</th>
<th>FEDERAL FINANCED</th>
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<td>Connecticut</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Delaware Turnpike</td>
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<tr>
<td>Florida</td>
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<td>Sawgrass Expressway</td>
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<td>X</td>
<td></td>
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<tr>
<td>Florida's Turnpike</td>
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<tr>
<td>Sunshine Skyway</td>
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<td>Hardy and Sam Houston toll roads</td>
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<td>Chesapeake Bay Bridge-Tunnel</td>
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<tr>
<td>West Virginia Turnpike</td>
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</table>

(1) Tolls removed in 1985.
pledges, and/or federal funds, includes projects in Connecticut, Delaware, West Virginia, Virginia, Florida, Kentucky, Texas, and Oklahoma.

Recent financings of major new toll roads include a $547.5 million issue by Harris County, Texas, in 1985. The county, which encompasses Houston, approved by referendum in 1983 a program to issue up to $900 million in general obligation and revenue bonds for design and construction of the Hardy Toll Road and Sam Houston Tollway. The urban tollway system will be supported not only by the toll revenues it generates but also, if necessary, by a supplementary dedicated county tax, also approved in the referendum.

The voters of Chesterfield County, Virginia, approved a proposal for the issuance of $22 million in general obligation bonds as that county's share of financing a 13-mile, $100 million extension of the Powhite Parkway in the Richmond metropolitan area. The major portion of the remaining funding came from revenue bonds backed by the state of Virginia.

The economics of toll road financing have changed greatly over the past few decades. The last major new toll road successfully financed with revenue bonds alone was in 1965, the Dallas North Tollway.

In a study completed in late 1984, the following comparisons were presented as to toll road cost and financial relationships between the 1950s and 1984:

- Initial cost per mile, up six times;
- Annual debt service, up 13 times;
- Average annual maintenance and operating costs, up eight times; and
- Total annual revenue requirements, up 12 times.

A comparison of actual per-mile costs generally supports these findings; the ten-mile Dallas North Tollway was constructed in 1968 at a cost of less than $3 million per mile; the approximate five-mile northerly extension to the Tollway was recently completed at an estimated cost of about $32 million per mile. The Indiana Toll Road opened in late 1956 and cost an average of $1.5 million per mile; in 1973, the 14-mile urban Holland East-West Expressway in Orlando was completed at a per mile cost of $4.2 million; the recently opened Sawgrass Expressway in Broward County (a 22-mile facility serving as a partial circumferential to Fort Lauderdale through a developing corridor) cost about $6.5 million per mile for construction and right-of-way.

The costs of operating a toll road have also increased dramatically. Recognizing the expense of toll collection, highway patrol, routine maintenance, insurance, and administration, the 1985 per-mile cost on the Indiana Toll Road amounted to $104,000; on the Ohio Turnpike, $154,000; and the Pennsylvania Turnpike, $191,000. On the Dallas North Tollway, total operating expenses computed to $324,000 per mile in 1985.

In 1987, the cost of operating the Illinois Tollway was 182 percent of the cost of normal maintenance of the project, exclusive of major rehabilitation or upgrading. On the Indiana Toll road, the percentage was 213.
In determining the financial feasibility of a proposed toll road, assuming use of revenue bond financing, the estimated capital cost must be escalated to a bond issue amount, with the escalator representing capitalized interest costs for the design and construction period, funding of debt service reserve accounts, costs of issuance, etc. The income from reinvested funds serves to help reduce the escalator, but even so, it normally ranges between 1.2 and 1.5 times the project cost. A comparison of project cost estimates with bond issue size for the Dallas North Tollway Extension, Houston Ship Channel Bridge and Mountain Creek Lake Bridge finds ratios of 1.36, 1.40 and 1.33, respectively. The refinancing in 1985 of the Dallas North Tollway and the proposed extension resulted in a 1.28 ratio.

Successful revenue bond financing is also dependent on current bond interest rates and the bond term, both of which have significant leverage on debt service requirements. For example, the initial $415 million Illinois Tollway bond issue in 1955 had a term of 40 years and a coupon or interest rate of 3.75 percent. Today, the term would likely be no longer than 30 years and the interest rate between 8.5 and 9 percent. A year ago, the interest rate was about one point higher.

Annual net revenues, or toll plus other income minus maintenance and operating expenses, are generally required to provide at least a 1.25 coverage of annual debt service in the first year of operation for successful financing. Depending upon the nature of the toll road, the operating entity, and other circumstances, this coverage requirement could be higher. The purpose of this margin is to provide some level of comfort to the investor in the event that toll and other income does not measure up to forecasts or if maintenance and operating expenses exceed the estimates.

While each project is unique, it is possible to develop an indication of the current conditions required to successfully market revenue bonds for a new toll road. Since project costs, toll rates, and operating expenses differ widely between rural and urban toll roads, separate scenarios were developed for each type. All of the conditions given in table 4 are assumptions, with the "required average daily traffic" as a result.

If operating expenses can be reduced, this enhances the chances for successful financing. Presently, the cost of toll collection varies greatly by facility and is heavily driven by personnel costs. Automatic Vehicle Identification (AVI) would be a means of reducing these costs. Currently, automatic toll machines are in use on many mainline/ramp barrier system toll roads, collecting fares from passenger car motorists. AVI would take this a step further through use of a vehicle-mounted transponder, a stationary interrogator and a computer-based recording and billing system. The required electronic devices are in various stages of development and will soon become cost-effective.
Table 4

ESTIMATED CONDITIONS FOR SUCCESSFUL REVENUE BOND FINANCING

<table>
<thead>
<tr>
<th>Item</th>
<th>Type of Toll Road</th>
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<tbody>
<tr>
<td></td>
<td>Rural</td>
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<tr>
<td>Bond Term:</td>
<td>30 years</td>
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<tr>
<td>Earning Period:</td>
<td>27 years</td>
</tr>
<tr>
<td>Interest Rate:</td>
<td>8.50 percent</td>
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<td>Project Cost to Bond Issue Escalator:</td>
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<tr>
<td>First Year Coverage of Debt Service:</td>
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<tr>
<td>Per Mile Project Cost:</td>
<td>$5 million</td>
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<tr>
<td>Average Per Mile Toll Rate:</td>
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<tr>
<td>Average Per Mile Maintenance-Operating Expenses:</td>
<td>$150,000</td>
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<tr>
<td>Required Average Daily Traffic:</td>
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</tbody>
</table>

Varying an assumption can have considerable leverage; for example, if a 10 rather than 8.5 percent bond interest was assumed, the required traffic level under the urban toll road condition would change to 110,000 from 98,200. It should be noted that if general obligation bonds are used instead of revenue bonds, the escalator from project cost to bond issue would be significantly less. The first year coverage requirement would decrease to 1.0 and the bond interest rate could be as much as a point less. Assuming an escalator of 1.10, no extra coverage requirement, and an interest rate of 7.5 percent for an urban project, the required traffic would decrease to 64,100. If the earning period could be extended, the traffic required would decrease further.

The current economics of revenue bond financing indicate there may be very few opportunities to successfully implement new toll roads without some support from the public sector. A possible solution would be an extension of the present federal toll road demonstration project to encompass all new projects. This would enable more of the marginally feasible toll roads to be implemented.
Combination of private and public sector funding of highways are accelerating and will continue. This can include tolling of selected portions of the present highway system, probably mostly urban, where viable alternate toll-free routes exist. The challenge is to achieve a proper and workable blending of public and private sector funds.

The idea that toll facilities must always be self-liquidating must be put aside and public agencies encouraged to pledge other revenues as a guarantee of debt service. The practice has been followed for many years in some states, and very sizable revenues have been added to the pool of highway funds through this leveraging technique. The Harris County financing took this concept a step further with its combination of bonds and a dedicated county tax.

REFERENCES


ENO Foundation for Transportation, Transportation Quarterly, October 1981.


Federal Highway Administration, Toll Facilities in the United States.

General Assembly of the State of Indiana, Senate Bill No. 397 - A Bill for an Act to Amend the Indiana Code Concerning the Toll Finance Authority, January 1986.


Witt, Oliver. *California City Sells Bonds, Constructs Own Toll Bridge*, Roads and Bridges, June 1986.


The Dulles Toll Road
Conception, Operations, and the Future

Edward J. DeLozier

This presentation covers six major topics related to the Dulles Toll Road: its beginning, traffic, financing, the proposed FASTOLL system, the planned road extension, and the organization; some background notes are included in an annex.

THE ROAD

The Dulles Toll Road is located in Northern Virginia, in the suburbs of Washington, D.C. This 13 mile, 4 lane, east-west toll road intersects Interstates 66 and 495 (the Beltway) in the east, and ends near Dulles Airport.

While disagreements between government entities did not permit construction of a local access road in the 1950s and 1960s, by the 1970s the need for the road was apparent. The designers of the original Dulles Airport Access Road were visionaries. Not only did they plan for a mass transit corridor in the median; they also foresaw the need for an outer parallel road. The location of the toll road (on the same right of way as the Dulles Airport Access), of the toll booths, and of the connecting ramps resulted from compromises between federal, state, and county agencies, whose earlier disagreements were overcome by political pressure, in turn due to heavy traffic on alternative roads. Thus, after long initial delays, the toll road was rushed to completion and was opened in October 1984 with temporary wooden toll booths, an administration office in a trailer, and the construction inspector in charge of operations.

There are presently 20 toll booths staffed on a regular basis, and 20 unattended automatic lanes. The total of 40 toll lanes are spread over 14 different locations, the bifurcated barrier and 12 ramp sites. The ramp sites are attended 16 hours per day, every day. The main toll plaza has eight toll booths, of which at least five are staffed 24 hours per day, every day. The toll "collectors" do not collect tolls. They give coins for bills. All deposits are made directly to the coin machine to get a green "go" signal. In this way, each attended lane can process up to 700 cars per peak hour, while the automatic lanes handle 800 per hour.

TRAFFIC

The original planners conceived of the road as a commuter road connecting the suburbs and the District of Columbia. The toll road is the third corridor connecting this area of the county with the District of Columbia. Leesburg

1/ Views expressed in this paper are those of the author and do not necessarily represent those of the Virginia Department of Transportation.
Pike (Route 7) to the north and Interstate 66 to the south are both free roads, and both operate at level of service F during rush hours.

Five year projections for the Dulles Toll Road anticipated 60,000 vehicles per day and $6,000,000 revenues per year by 1990. The planners were accused of being overly optimistic at the time, but they were not. Even as the finishing touches were completed, including roadway striping, canopies over the lanes, real toll booths (and to the relief of the employees, real toilets!), traffic was important. As of October 1988, four years after opening, traffic exceeded 125,000 vehicles per day, and annual revenues were in excess of $16,000,000. Peak hour average for the two lane ramp plaza was 1,500 vehicles. Peak hour average for the seven lane main plaza was just over 5,000 vehicles.

Traffic growth, at an almost steady rate of 18 percent per year, is expected to continue, because the opening of the road has facilitated the commercial and residential development of western Fairfax County in what has become known as the Dulles Corridor. Commercial development in this zone, either completed, under way, or planned, will exceed eighty to one hundred million square feet of office space. This commercial development has created a bi-directional rush hour, with most growth now being experienced in the "reverse" travel direction.

The in-bound District of Columbia and beltway traffic has already reached capacity (level of service F). Every rush period, major segments of the toll road reach and stay at the level of service F for hours. Traffic at ramps backs up onto the main line or adjacent streets.

To meet continually increasing traffic demand, numerous responses were introduced or are under way. The main toll plaza has been expanded from 10 to 14 lanes under an expedited contract. The "Flashpass" was tried - Flashpass was a metal license plate attachment, and was intended to eliminate stops at the main toll plaza - but the program was discontinued at the end of September due to lack of sales. Widening of the toll road was accelerated, with construction to begin next spring, years ahead of the original schedule. Just as importantly, in the spring of 1987, an interdisciplinary working group was created to procure an Automatic Vehicle Identification system. Finally, the development of the Dulles Toll Road extension, originally projected for the year 2010, was moved into the present time frame.

FINANCING

A lack of funds and political considerations prevented the road from being financed conventionally; i.e. by the use of state highway funds. Under the notion "If they want it, let them pay for it", a toll project was jointly developed by the State and Fairfax County, with approximately 10 percent of the total $56,000,000 bonding of the road supported or underwritten by Fairfax County. The original bond issue was sold at a 12 percent interest rate for a 20 year term. As market interest rates dropped, the bonds were refinanced in 1986 at a lower interest rate and for a 25 year term. The state and the county are guarantors of the payment of the bonds in case tolls were insufficient to pay them. (This is an important guaranty, as will be discussed later.) Conceptually, the bonds are to be paid off by tolls
collected, and the Commonwealth of Virginia has a statutory requirement that when the bonds are paid off the road will become free.

The Dulles Toll Road broke even after two years, and after 4 years, doubled the revenue required for debt servicing and operations. Realistically, however, continuous refinancing of improvements makes any near future bond payoff unlikely.

Several alternative funding schemes have been resorted to to finance improvements required by traffic growth since the opening of the toll road:

- Due to development in the Tysons Corner area, four interchanges at Spring Hill Road have since received additional lanes (6 in all) to facilitate access to the developments. A major portion of the construction costs was paid for by the developers of the area. Such contributions, known as conditioned proffers, are requested of developers at the time of zoning review of their plans, as a sort of quid-pro-quo for approval. Obviously, easy access is a valuable consideration in real estate development.

- On the west end of the toll road an interchange is being reconfigured as part of the widening of the intersecting road (Sully Road, Route 28). This construction is being paid for by developers through a special voluntary taxing district.

- A new interchange is to be constructed at the intersection of the cross-county Springfield Bypass. It will be paid for by a transportation bond floated by the county itself.

- The entire toll road is to be widened to at least three lanes in each direction, beginning in the spring of 1989. This $31 million dollar reconstruction will be paid for entirely from existing receipts and the $10 million annual surplus.

FASTOLL

In the spring of 1987 it was decided to procure an automatic vehicle identification system. A working group was assembled representing most of the disciplines within the Virginia Department of Transportation (VDOT), including audit, legal, purchasing, planning, information systems, construction, and operations. The group, known as the Automatic Vehicle Identification/Electronic Toll Collection task force, or AVI/ETC for short, was headed by a scientist from VDOT's Research Council. The use of the task force approach permitted critical decisions to be made at meetings, instead of obtaining serial approvals for each step of the ongoing project.

A preliminary notice to dozens of consultants outlined the needs of the new system. There are three major objectives:

* increased throughput, reducing delays at all toll plazas whence the name FASTOLL);

* tight audit control; and
• voluntary participation, that required retention of and compatibility
  with conventional toll collection methods;

other goals include:

maximal cost effectiveness;
extremely high reliability and accuracy;
flexibility and expandability;
extension and transfer to other toll facilities; and
easy accounting and auditing.

After presentations by more than half a dozen consultants and short
listing, Castle Rock Consultants, of Nottingham, England, were chosen. This

group had the most "hands-on" experience including the HELP project in the
U.S. and the Hong Kong auto pricing venture. Their experience, personnel,
and response to the department's needs made them the stand-out choice. Within
two years from contract signing, the consultant is to provide a fully opera-
tional system within the parameters designated by the AVI/ETC task force.
In order to meet this demanding timetable, the project is divided into eight
overlapping phases, each phase consisting of numerous tasks, 50 in all. Fur-
thermore, in order to assist the task force in its decision-making role, in
addition to regular meetings numerous reports are prepared and circulated by
the consultants on a monthly and as-needed basis.

The feasibility phase, begun December 1, 1987, was completed within six
months. This phase included a review of available technologies, determina-
tion of system requirements including a traffic analysis, and a technical
assessment of alternative designs. An economic feasibility evaluation was
completed -- especially important in light of the lack of Flashpass sales.
Selection of the preferred option and delineation of characteristics of the
desired system completed this phase.

Phase 2, the concept development stage, began during the spring of 1988.
The three major tasks within this phase included the plaza designs, the
control of traffic and operating speeds, and layout of the control center.
Other tasks were the determination of computer and communication needs. Also
addressed were security and privacy issues, enforcement, maintenance, staff-
ing, accountability, and preliminary cost estimates. The completion of phase
two (on schedule) was a major milestone, as many of the decisions that will
determine the future direction of the FASTOLL project were made.

The next six phases, detailed design, plans and specifications, equipment
procurement, acceptance, installation, and evaluation, will occupy 1989.
From design to delivery of scanners and transponders, to purchase and
programming of the computer equipment, the coming year represents the basics
of the FASTOLL/AVI program.

In conjunction with the FASTOLL project, the consultants have also been
contracted to procure a new conventional (i.e. cash) system. After review
by the Internal Audit division, the present toll system was found to be
grossly inadequate in its performance.
While procuring the FASTOLL and the new toll system separately would have cost in excess of $5 million each, the two systems in combination, along with major security improvements are expected to cost only $8 million.

THE DULLES TOLL ROAD EXTENSION

The Dulles Toll Road Extension will be a 15 to 17 mile addition to the west end of the present facility. The area the toll road is to traverse is expected to develop as intensely as the original Dulles Toll Road corridor. Toward this end, major parcels of land have been aggregated by large developers. Developers are seeking to gain better access to their individual parcels; transportation is key to their zoning approvals, and each is willing to trade land for potential density credits.

The owner of the toll road project will be the Virginia Toll Road Corporation. One of the implementation procedures developed by the corporation is that the right-of-way will be donated by land owners; this greatly decreases the initial cost of the facility and makes the venture attractive. Therefore, the corporation, through a politically influential law firm, sponsored the enabling special legislation. This legislation reversed the earlier trend of state takeovers of private toll facilities. Extensive negotiations between the corporation and the governmental agencies in Virginia responsible for oversight are still under way, but the project is moving forward. Alternative alignments through a designated corridor have been delineated.

Revenue and financial provisions were still in preliminary stages and not available for disclosure. Based on experience, however, it can be said that "Toll highways normally do not pay for themselves in early years of operation, and then more than pay for themselves in later years. Studies ... indicate that it takes about 8 years for a new suburban toll highway to break even, but that in 15 years the highway can be collecting twice as much money as it needs for operation and debt service." That is, an equity infusion will be necessary, since early revenue will be insufficient to meet the debt service requirements. It is this front-end problem of debt service financing that makes a government pledge of funds important. A general obligation, or general revenue source pledge, which can be used to offset the start-up shortfall in toll revenues reduces the debt service. Supporting start-up costs for toll facilities is a way government can get its biggest return on investment. If additional support is needed, the government can act as underwriter of toll revenue bonds, but should avoid, if at all possible, direct financing of toll roads. The public funds not expended on road construction can be allocated to more socially or economically desirable projects.

CURRENT ORGANIZATION

The system of direct deposit/non-collection of tolls permits a tighter financial control, as well as expedited traffic handling. Leaving lanes unattended, as was tried on Sundays, tripled the violation (non-payment) rate. Seventeen supervisors, working around the clock, perform the necessary support functions. They have a variety of functions from road patrols to cash collection, training, maintenance, etc. An important point to remember
when planning staff requirements for a toll facility is that 24-hour op- erations require four times the normal number of employees; i.e., a 168 hour work week requires four 40-hour/week employees, and furthermore, extra collectors are needed to provide meal and rest breaks, as well as "reserves" for absences.

A half-dozen employees, including the manager, provide the necessary on-side administrative and managerial services. The four-person fiscal/ clerical staff is responsible for internal auditing, accounts payable, and accounts receivable. Maintenance, construction, personnel, and other similar supporting functions are subsumed under other sections of the Department of Transportation. Equipment and facilities maintenance, as well as the personnel function, will soon be brought in-house in order to be more responsive to the toll road needs. Roadway maintenance will continue to be done by VDOT, its cost paid from the toll road revenues; it amounts to approximately $350,000 per year.

Numerous other services are contracted for. These include toll equipment maintenance, armored car service, bank coin handling (counting and supply), cleaning, vehicle rental and service, and major repairs. All major services and items are procured under the Virginia Procurement Procedures, and handled through a centralized purchasing section in Richmond.

Of the three possible types of environment in the toll road industry, a turnpike authority, a state agency, and the private sector, the governmentally controlled (i.e., state) agency is the least efficient. Both the authority and the private sector are more efficient. While a toll may be analogous to a user charge, toll organizations are service industries. As such, so-to-speak "customers" require quick responses and efficient meeting of their demands. Bureaucracies cannot do this. Furthermore, tolling authorities, once established and successful, have enormous potential for further funding.

ANNEX: BACKGROUND

The Dulles Toll Road is not the only success story in the U.S. industry. The New Hampshire Turnpike System has averaged an annual growth over the last five years of 11 percent. It also has an outstanding record of continuous net profits. To quote from a recent report: "It is very likely that the 35 year profit performance of the New Hampshire Turnpike System was a major determinant in decisions made in the past year..." to expend $500 million for the creation of two new turnpikes and related improvements. The expansion is expected to increase toll revenue from $23,000,000 (1986) to $80,000,000 in 1995. The New Jersey Turnpike recently floated a $2 billion dollar bond issue for additional construction.

Toll roads have been in use in the United States since the early 18th century. In the northern Virginia area, two main arteries, the Columbia and Little River Turnpikes, had their starts as toll roads. American Indians collected tolls from cattle drivers in Montana. Toll collection is nothing new.
During the depression of the 1930s, many private toll facilities in the U.S. were purchased by governmental authorities either as a result of or to prevent bankruptcy. Also, as an effort toward improving the economic environment, several new facilities were constructed with governmental assistance. This surge was stopped by World War II. Postwar economics prompted the creation of toll authorities and the development of the major toll roads in the U.S. today. These included the New Jersey, Pennsylvania, and Ohio Turnpikes.

Even with the passage of the Federal Interstate Highway Act in 1956, "... the toll road movement prospered, since most states could find no federal, state or local funds for road improvements. For years, many states have been diverting highway receipts, intended for road construction and repair, to education and other public benefit projects". State legislators found it hard to either increase the taxes or re-divert them toward their original intent.

"Thus, the toll financing methods of setting up a state-owned agency, equipping it with bonding authority and specific operating power, then directing it to build and operate a designated highway system, was justified as expedient. There was no other way to meet the growing need of a nation that had fallen in love with its motor cars and the open road.

"... on the day the Interstate and Defense Highway Act was passed, there were already 2,262 miles of toll roads in 14 states. Although the Interstate Act was supposed to stop the toll road boom through the availability of new Federal and state tax dollars, it did not do so. In the next 20 years, toll road mileage..." more than doubled, across 20 states.

And in a final proof that the time for toll roads has arrived, the land that coined the term "freeways," as a shortened version of "toll free highways," the great state of California, is about to begin its first toll roads. "The three transportation corridors that make up the Orange County, California, project will cost an estimated $1 billion to $2 billion". It "will combine developer fees (up to 48 percent), federal highway funds (up to 35 percent), and toll revenue to finance the needed new highways."

In the August 1987, report to the United States Senate, an advisory panel recommended increased private sector participation in "public projects." The Dulles Toll Road extension is one of these projects.

The Transportation Research Board, the Federal Highway Administration, the International Road Federation, and the International Bridge, Tunnel and Turnpike Association are valuable sources of additional information.
Road Fund Experience in Ghana

Thampil Pankaj

Introduction

As the World Bank's Road Deterioration Study has demonstrated, road maintenance has high priority, and high economic returns, often above 25 percent. Under-financing road maintenance is known to lead to several times its cost in higher vehicle operating costs and higher, subsequent, road rehabilitation costs. Any public investment program should give road maintenance a high priority on a continuing basis.

In principle, earmarking for road maintenance can be treated as different from earmarking of general tax revenues, since what is earmarked is essentially a charge on road use, similar to what a railway or utility would collect from its users. The difference is that in the case of roads the most convenient and cost-effective system of collection is taxation of fuel and other inputs.

A road fund, functionally a road maintenance fund, was set up in Ghana in 1985, with the purpose of ensuring better flow of maintenance funds, particularly for financing maintenance contracts. The road fund has after initial delays, contributed to improve road maintenance planning and implementation. This paper reviews its characteristics and impact against the background of a massive program of road stabilization (clearing backlogs and bringing the network to normal conditions) that Ghana has undertaken.

Background: The Road Maintenance Program

Ghana has a road network of about 14,000 km of primary and secondary (trunk) roads under the Ghana Highway Authority, and about 17,000 km of feeder roads under the Department of Feeder Roads. Due to a long period of neglect of maintenance, road conditions have deteriorated and only about 30 percent of the system is in good condition. In many parts of Ghana, the road network has nearly broken down, disrupting goods and passenger transport, with scores of farm areas losing access to markets and ports.

A major effort to rehabilitate the network, by first improving institutions, capacity for contracting, and mechanisms for financing, was started in 1985 under Ghana’s economic recovery program, through an IDA-financed Road Rehabilitation and Maintenance Project. Though direct funding of road works was not substantial under this credit, the project supported a significant shift from force account works to contracting, private contractors through training and loans for equipment, and instituted measures to increase road-user charges, and financed road sector planning. Based on the plan produced

\[1\] The author is indebted to various government agencies of Ghana for data and information.
under the project, it became clear that a massive six to seven year program was necessary to restore the road network to normalcy. This program would require more than doubling the level of annual maintenance, from about US$19 million to about US$40 million equivalent per year for six years, after which annual maintenance needs would decline to a norm of about US$20 million equivalent. Ghana launched this major road stabilization program in 1988. The first phase, covering 1988 and 1989, is currently being implemented under an IDA supported Transport Rehabilitation Project. The size of and financing sources for this program, including the road fund, are presented in table 1.2

The Road Fund Characteristics

**Origin:** The road fund was established in July 1985 by the Provisional National Defense Council, the highest authority in Ghana. This was done in accordance with an agreement with IDA under the Road Rehabilitation and Maintenance Project.

**Purpose:** Its purpose was to increase the contribution of road users towards periodic road maintenance, to finance the core of periodic maintenance needs through the road fund, topped up as needed from regular budgets. (Routine maintenance remains separately funded from recurrent budgets.) In particular, the road fund was to address two problems relating to the budget process, which had adverse impacts on maintenance efficiency: (a) delays in budget approval and in release of budget allocations, that disrupt planning and execution of maintenance works (delay in effective budget approvals up to March or April for the January to December budget year is a common occurrence in Ghana); and (b) lack of synchronization between fund availability and the dry season (September to May), when most maintenance works are done. The payment uncertainty and budget break come precisely in the middle of this work season (in January), making it impossible to commit funds for a season-long contract, while 95 percent of the maintenance jobs are done by private contractors for whom regular payments are critical for survival and efficiency. The road fund was established to insulate road maintenance contracting and payments from these financing uncertainties.

**Funding sources and structure:** The road fund sources are: (a) a special road fund levy, part of the fuel tax, (b) vehicle examination and driver licensing fees, and (c) tolls on 14 bridges, 4 ferries and one road: Accra-Tema. In 1987, 2,140 million cedis (about US$12 million equivalent) was deposited into the road fund, of which 1,927 million cedis (90 percent) was from the road fund levy on fuel, 160 million cedis (8 percent) was from license fees, and 53 million (2 percent) from tolls. Obviously, the fuel levy is the most important source for the road fund.

The road fund levy on fuel was started as an average 5 cedis per gallon, and has later been raised twice to the present level of an average 10 cedis per gallon (US$ 0.043 at the present exchange rate of 230 cedis per dollar). The increases mainly helped maintain the dollar value of the fund intact. All fuels except aviation kerosene and LPG bear the road fund levy. There are

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2/ Tables and graphs are attached to the paper.
no exemptions to the levy; all consumers, including armed forces, police, and
government departments are subject to the tax. Table 2 presents the 1988
level of levies on various products, the structure of fuel prices, and the
product composition of fuel sales in 1987. Total taxation and the road fund
levy as percentage of pump prices for the three road fuels are shown below:

<table>
<thead>
<tr>
<th></th>
<th>Road Fund Levy</th>
<th>All Fuel Taxes</th>
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<tbody>
<tr>
<td>Premium gasoline</td>
<td>3.2</td>
<td>14.8</td>
</tr>
<tr>
<td>Regular gasoline</td>
<td>3.3</td>
<td>23.8</td>
</tr>
<tr>
<td>Diesel oil</td>
<td>5.3</td>
<td>13.7</td>
</tr>
</tbody>
</table>

Part of the road fund levy is paid by non-road fuel uses - by diesel
consumed in fishing and farming, and kerosene consumed mainly in rural areas.
About 30 percent of the road fund revenue may be from these categories. The
government intends to correct this anomaly, to review the structure and level
of the road fund, and institute suitable reforms by the end of 1989.

The share of the road fund in road maintenance financing: The road fund
is designed to contribute annually about 30 percent of the total cost in the
backlog clearance phase, another 15 percent coming as topping-up from regular
budgets, and about 55 percent coming from IDA and other co-financiers. It
is expected that after backlogs are cleared further needs for maintenance
will be less, most of them to be covered by the government's own sources, of
which about 60 percent may be through the road fund, by 1994. (Table 1).

Collection and disbursement procedures: The Ghana National Petroleum
Company (GNPC), the sole importer and wholesale supplier of petroleum fuels
in Ghana, collects the petroleum levy, while the Ministry of Transport is
responsible for license fees, and the Ghana Highway Authority, for tolls.
Collections are deposited into the road fund account in the Bank of Ghana.
GNPC receives payment of the road levy and other fuel taxes from the fuel
distribution companies (Ghana Oil Company, BP, Mobil, and Shell) on the basis
of product supplies, within 30 days of invoicing, and then passes on the
collection to designated recipients, one of which is the road fund account.
The collection of the road fund levy is very efficient and is at minimal
cost. There is considerable evasion in the case of license fees and tolls,
and their collection costs are relatively high.

The road fund deposits are released into road maintenance accounts opened
by the Ghana Highway Authority and the Department of Feeder Roads in the Bank
for Housing and Construction. The releases are authorized by the Accountant
General on joint instructions from the Ministry of Roads and Highways and the
Ministry of Finance and Economic Planning. The releases are initiated by the
former Ministry, but can be delayed if the latter does not clear them.
Usually releases are made monthly depending on need and accrual in the road
fund. Accruals not disbursed in one year are carried over to the next since
the road fund account is in continuous operation.

The accounts are used for road maintenance contracts, except for about
5 percent earmarked for a special mobile maintenance unit which undertakes
periodic maintenance on a semi-contractual basis. The Ministry of Roads and
Highways decides the shares for the Ghana Highway Authority and the Department of Feeder Roads, which have remained at about 80 percent and 20 percent respectively. It is expected that, beginning in 1989, the new Department of Urban Roads will also receive part of the allocation.

**Scrutiny/audit:** The accruals to and disbursements from the road fund are audited annually with reference to GNPC invoices to the distribution companies, statements indicating payments to GNPC, and statements from the Bank of Ghana. Bank of Ghana statements are also regularly furnished to the Ministry of Roads and Highways and its agencies, who scrutinize the fund level. Moreover, the domestic contractors, who are keenly interested, keep an unofficial vigil and make representations when disbursements are delayed or diverted. The use of funds by the Department of Feeder Roads and the Ghana Highway Authority for the specified purpose of contractor financing is checked by the relevant bank statements and internal and external audits. In addition, the Bank for Housing and Construction, where these accounts are kept, also scrutinizes the payments; it has a vested interest in this, since it is allowed to deduct from contractor payments instalments due for equipment loans.

**The Road Fund Funding So Far**

The monthly position of deposits, disbursements, and balance of the road fund is presented in chart 1, and annual totals in table 3. The annual accruals have doubled between 1986 and 1988, reflecting increased fuel consumption and higher fuel levies; the dollar value remained constant at about US$12.5 million equivalent (average 100 cedis per dollar in 1986, and 200 cedis in 1988). Monthly accruals have fluctuated considerably. It should be emphasized that from 1986 to 1988 the road fund had no topping up from the budget, in spite of the core budget concept, with periodic road maintenance as part of the 'super core'. This concept was introduced in 1986 on the basis of a separate public investment review conducted with active World Bank support. This shows that it is hard to insulate any sector completely from an economic crisis.

Releases from the road fund have been rather erratic, particularly in the beginning. This is because an automatic release mechanism was not accepted by the Ministry of Finance; often, in order to conform to obligations with the IMF on level of spending and other financial targets, the Ministry delays release of the road fund balances, which are, though earmarked, still treated as part of budget resources. This is also a reflection of the particularly fragile budgetary situation faced by Ghana in this period, with steep devaluations and resulting inflation constraining the government budget. The road fund releases have been impressively regular and larger from early 1988. Possibly this is due to the ultimate acceptance of the need to release these funds on time, particularly following the crisis in 1987, when contractors were owed large arrears and maintenance output declined.

Judging from output in road maintenance (table 4) the performance in 1985 and 1986 has been only slightly better than in 1984, and in 1987 it was lower. However, the combined 1988-89 (2 year) program, mostly already contracted or tendered to both local and foreign contractors for US$50 million, shows an annual output in periodic maintenance that will be more than double,
particularly in the critical resealing work. This has been the ultimate prize of a number of institutional and other reforms, including the confidence-boosting of contractors by the road fund.

Road Fund Impact: an Assessment

It took two to three years since 1985 to make necessary changes in institutions to overhaul road maintenance operations (reorganizing the Ministry of Roads, strengthening the Ghana Highway Authority and the Department of Feeder Roads planning and supervision, switching to contractors), to reequip and train contractors, and to improve their cash flow through larger and more regular contract payments. The concurrent strain faced by the Ghanaian economy, and currency devaluation from 30 cedis to 220 cedis equal to one dollar during this period, were major factors affecting the process. This slowed down government financing for roads and adversely affected maintenance output for some time. Absence of a prompt monitoring system has also played a part. A monthly monitoring system has been started since. The changes effected in the road sector are now beginning to pay off through a large volume of contracts under implementation.

What has started to go well after three years of road fund operation:

(a) Earmarking has produced commitment of funds, which, in spite of occasional delays, have been carried over and ultimately released. This has helped reduce uncertainties in the budgetary process of GHA/DRF and has enabled them to plan contracting programs in advance.

(b) It has effectively solved the problem of lack of synchronization between the budget year (January to December) and the construction season (September to May).

(c) The greater certainty of funding has enabled effective competitive bidding. This has made a crucial difference. Budget releases were erratic and uncertain, and therefore the road agencies were obliged to give small extensions to old contracts on a unit-cost basis without competition to do one or two kilometers of road maintenance at a time on ad-hoc basis whenever money became available. This approach produced poor quality results. In early 1988, because of the road fund, GHA and DFR could terminate all old maintenance contracts and go for competitive bidding based on bigger lots of contracts. This switch caused start-up delays in 1988, but has brought efficiency into maintenance work.

(d) The Fund has given a significant boost to contractor cash-flow, confidence and capacity. From early 1988, for the first time in many years, all payments owed to contractors have been made, with no arrears due. This is a phenomenal change for Ghana.

(e) Unit costs for maintenance have come down due to the competitive bidding. Contracts awarded show 15-20 percent decline in unit prices, compared to engineers' estimates based on previous non-competitive system.
(f) Reliable domestic funding has produced larger matching funds from international aid enabling the ambitious stabilization program now under way. Producing domestic resources for part of the maintenance needs is an important condition for securing foreign funds, particularly IDA funds.

(g) Over the past three years, the only domestic funding made available for periodic maintenance work has been from the road fund; the topping up from budget did not materialize, though maintenance was in the 'super core' budget.

(h) As an idea, road-user charges earmarked for road maintenance appeal to the general public who are frustrated about the road conditions. This has brought easier acceptance of such charges and taxes.

What the Road Fund has done to Ghana is hard to comprehend from outside since the impact is not fully measurable in figures. Overall, the Ghana Road Fund has worked as a well-defined, clearly targeted operation, with built-in provisions against leakages and misuses of funds. The release of funds is still not automatic, causing occasional delays, and its structure is not ideal, with some non-road uses contributing as well. These problems are expected to be corrected shortly. It is clear, however, that the larger road stabilization program now under way, the wholesale switch to competitive bidding and contracting which has brought in reduced unit costs and greater efficiency through larger contracts, and the resurgence of the domestic contracting industry would not have been possible without the road fund. These add up to a significant impact.
### Table 1

**REPUBLIC OF GHANA**

#### Financing Needs and Sources for the Road Stabilization Program (1988 - 1992)

(Costs in million US$ equivalent in 1988 Prices)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Periodic Maintenance (GHA/DFR) Costs (including payment of arrears)</td>
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<td></td>
<td></td>
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<tr>
<td>2. Routine Maintenance Cost of Materials (US$ m)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Total Costs</td>
<td></td>
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<td></td>
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<tr>
<td>B. Financing Sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Fourth Highway Project (RRMP) IDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cofinanciers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Transport Rehabilitation Project IDA</td>
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<td>Cofinanciers</td>
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<td></td>
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<tr>
<td>3. Future Projects (TRP-II, Others) IDA/Cofinanciers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Government Of which Road Fund (tentative)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total Financing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of which Government contribution (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Notes

1. The Stabilization program aims to clear backlogs in maintenance by 1992; after this, annual maintenance needs will decline to a reduced normal level.

2. Concurrently, Government is undertaking major rehabilitation/reconstruction of trunk roads, of about 150 km per year at a cost of about US$30 m equivalent with about 50% foreign financing support.

3. The figures in the table exclude Government salaries, special cocoa road programs, and special urban road programs.

* After Stabilization.
## GHANA:

**PETROLEUM FUEL PRICES AND TAX STRUCTURE, 1988 (a)**

<table>
<thead>
<tr>
<th>1987 Product Sales (m. gallons)</th>
<th>Government Imposts (cedi/gall)</th>
<th>Margins (cedi/gall)</th>
<th>Final Price (Per Gall) (Per Litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex-Deritory</td>
<td>Dealer’s</td>
<td>Marketer’s</td>
</tr>
<tr>
<td></td>
<td>Price (cedi/gall)</td>
<td>Margin</td>
<td>Margin</td>
</tr>
<tr>
<td></td>
<td>Road</td>
<td>Energy</td>
<td>Expl’n</td>
</tr>
<tr>
<td>52.8</td>
<td>Premium Gasoline</td>
<td>173.39</td>
<td>7.50</td>
</tr>
<tr>
<td>12.7</td>
<td>Regular Gasoline</td>
<td>148.86</td>
<td>7.50</td>
</tr>
<tr>
<td>66.16</td>
<td>Gas Oil (b) Diesel</td>
<td>167.85</td>
<td>12.00</td>
</tr>
<tr>
<td>32.28</td>
<td>Kerosene</td>
<td>132.87</td>
<td>10.00</td>
</tr>
<tr>
<td>5.31</td>
<td>Aviation Kerosene</td>
<td>136.97</td>
<td></td>
</tr>
<tr>
<td>0.12</td>
<td>Unified Gasoline (c)</td>
<td>173.39</td>
<td>5.00</td>
</tr>
<tr>
<td>0.32</td>
<td>Industrial Diesel (d)</td>
<td>145.29</td>
<td>8.00</td>
</tr>
<tr>
<td>3.17</td>
<td>Inland Fuel Oil (d)</td>
<td>120.60</td>
<td>5.50</td>
</tr>
<tr>
<td>6.85</td>
<td>Residual Fuel Oil (c)</td>
<td>115.51</td>
<td>5.00</td>
</tr>
<tr>
<td>10.16</td>
<td>LPG</td>
<td>18.89</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Notes:**

a) From 16 January 1988. Where margins and final prices are shown, these are fixed by the Government. Where margins and final prices are not shown, these are at the discretion of the distributor.

b) Diesel fuel used by road vehicles and other high speed diesel engines used in agriculture, industrial and marine applications.

c) Industrial solvent (close to naphta) not a road vehicle gasoline.

d) Industrial diesel and fuel oils not used by road vehicles.

**Source:** National Energy Board
Chart 1

Republic of Ghana
Road Fund
Cumulative Accruals and Disbursements

CEDIS (Billions)

- Deposits (Cumulative)
- Disbursed (Cumulative)
- Available Balance

MONTHLY DEC 1985 - SEPT 1988

Table

Republic of Ghana
Summary of Road Fund Yearly Totals (Cedis)

<table>
<thead>
<tr>
<th>Year</th>
<th>Deposits</th>
<th>GHA</th>
<th>DFR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985 (Dec)</td>
<td>230,000,000.00</td>
<td>200,000,000.00</td>
<td>30,000,000.00</td>
<td>230,000,000.00</td>
</tr>
<tr>
<td>1986 (Jan-Dec)</td>
<td>1,265,039,786.79</td>
<td>1,236,667,000.00</td>
<td>63,333,000.00</td>
<td>1,500,000,000.00</td>
</tr>
<tr>
<td>1987 (Jan-Dec)</td>
<td>2,145,358,443.45</td>
<td>1,435,333,000.00</td>
<td>305,166,000.00</td>
<td>1,740,500,000.00</td>
</tr>
<tr>
<td>1988 (Jan-Sep)</td>
<td>2,139,298,460.21</td>
<td>1,823,000,000.00</td>
<td>497,500,000.00</td>
<td>2,320,500,000.00</td>
</tr>
<tr>
<td>Actual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988 (Jan-Dec)</td>
<td>2,589,298,460.21</td>
<td>2,303,000,000.00</td>
<td>617,500,000.00</td>
<td>2,920,500,000.00</td>
</tr>
</tbody>
</table>

GHA - Ghana Highway Authority
DFR - Department of Feeder Roads
### Table 4

**REPUBLIC OF GHANA**

**Periodic Road Maintenance Output**
**During 1984-1989**

<table>
<thead>
<tr>
<th>Year</th>
<th>GHA - Trunk Road</th>
<th>DFR - Feeder Roads</th>
<th>Total kms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Paved (km)</td>
<td>Unpaved (km)</td>
<td>Total (km)</td>
</tr>
<tr>
<td>1984</td>
<td>138</td>
<td>674</td>
<td>812</td>
</tr>
<tr>
<td>1985</td>
<td>136</td>
<td>786</td>
<td>922</td>
</tr>
<tr>
<td>1986</td>
<td>132</td>
<td>811</td>
<td>943</td>
</tr>
<tr>
<td>1987</td>
<td>131</td>
<td>418</td>
<td>549</td>
</tr>
<tr>
<td>*1988</td>
<td>271</td>
<td>780</td>
<td>1,051</td>
</tr>
<tr>
<td>*1989</td>
<td>525</td>
<td>684</td>
<td>1,209</td>
</tr>
</tbody>
</table>

*1988-1989 Program is implemented as a combined project under TRP. 1988 figures include work in progress, based on Contracts awarded; 1989 figures are based on Works currently being tendered. All previous Contracts were terminated in early 1988, and fresh tenders invited under new competitive bidding procedures, which caused start-up delays in 1988.*
Earmarking of Transport Funds in Colombia

Malise C. Dick

I. Background

The practice of earmarking funds is widespread in Colombia, and in 1986 over 35 percent of central government tax revenue was earmarked. This paper concentrates on earmarking in the transport sector and in particular, of the funds generated by the tax on gasoline and diesel fuel, which accounted for nearly 7 percent (in the above 35 percent).

Most of the funds thus earmarked are devoted to the highway sector. The national highway network has expanded slowly; in 1986, it was 30 percent greater than in 1970 and 13 percent larger than in 1980. The paved network has grown more rapidly as roads have been upgraded. In 1986 the paved network was twice as long as in 1970 (table 1). In addition to the national network, there are about 78,000 km of departmental and feeder roads, largely unpaved.

Table 1


<table>
<thead>
<tr>
<th>Year</th>
<th>Paved</th>
<th>Unpaved</th>
<th>Total</th>
<th>% Paved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>4,821</td>
<td>15,094</td>
<td>19,915</td>
<td>24</td>
</tr>
<tr>
<td>1971</td>
<td>5,023</td>
<td>14,994</td>
<td>20,017</td>
<td>25</td>
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<tr>
<td>1972</td>
<td>5,957</td>
<td>14,319</td>
<td>20,276</td>
<td>29</td>
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<tr>
<td>1973</td>
<td>6,446</td>
<td>13,962</td>
<td>20,408</td>
<td>32</td>
</tr>
<tr>
<td>1974</td>
<td>6,856</td>
<td>13,987</td>
<td>20,843</td>
<td>33</td>
</tr>
<tr>
<td>1975</td>
<td>7,328</td>
<td>13,936</td>
<td>21,264</td>
<td>34</td>
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<tr>
<td>1976</td>
<td>7,344</td>
<td>14,494</td>
<td>21,838</td>
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<td>1977</td>
<td>7,516</td>
<td>14,752</td>
<td>22,268</td>
<td>34</td>
</tr>
<tr>
<td>1978</td>
<td>7,737</td>
<td>14,815</td>
<td>22,552</td>
<td>34</td>
</tr>
<tr>
<td>1979</td>
<td>7,856</td>
<td>14,901</td>
<td>22,757</td>
<td>36</td>
</tr>
<tr>
<td>1980</td>
<td>8,203</td>
<td>14,714</td>
<td>22,917</td>
<td>36</td>
</tr>
<tr>
<td>1981</td>
<td>8,616</td>
<td>14,757</td>
<td>23,373</td>
<td>37</td>
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<tr>
<td>1982</td>
<td>8,946</td>
<td>14,874</td>
<td>23,820</td>
<td>37</td>
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<tr>
<td>1983</td>
<td>9,168</td>
<td>15,304</td>
<td>24,472</td>
<td>37</td>
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<td>1984</td>
<td>9,448</td>
<td>15,802</td>
<td>25,250</td>
<td>37</td>
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<tr>
<td>1985</td>
<td>9,599</td>
<td>15,983</td>
<td>25,582</td>
<td>37</td>
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<tr>
<td>1986</td>
<td>9,617</td>
<td>16,316</td>
<td>25,933</td>
<td>37</td>
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</tbody>
</table>

1/ Includes departmental roads incorporated each year into the National network.

Source: MOPT, October 1986
During the 1970 to 1985 period, the GDP was estimated to have grown by 53 percent in real terms - i.e., more rapidly than the network. Public sector investment has, in turn, increased from 5.2 percent of GDP in 1975 to 8.3 percent in 1985 (table 2).

**Table 2**

**Macro and Micro Economic Indicators**

*(Col $ billion and Indices 1985=100)*

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP (Nom) 1/</th>
<th>GDP (Real) 2/</th>
<th>Index</th>
<th>Total Govt. 1/</th>
<th>% GDP 1/</th>
<th>Total Govt. (Index)</th>
<th>Govt. Consumption 1/</th>
<th>% GDP 1/</th>
<th>Govt. Investment 1/</th>
<th>% GDP 1/</th>
<th>Road Maintenance</th>
<th>Road Investment</th>
<th>Road Total 3/</th>
<th>Index Road Expenditure (real) per Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>1,189</td>
<td>6,392</td>
<td>87</td>
<td>888</td>
<td>13.9</td>
<td>64</td>
<td>556</td>
<td>8.7</td>
<td>332</td>
<td>5.2</td>
<td>17</td>
<td>43</td>
<td>60</td>
<td>135</td>
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<tr>
<td>1980</td>
<td>1,579</td>
<td>6,634</td>
<td>90</td>
<td>988</td>
<td>14.9</td>
<td>71</td>
<td>617</td>
<td>9.3</td>
<td>371</td>
<td>5.6</td>
<td>15</td>
<td>48</td>
<td>63</td>
<td>141</td>
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<tr>
<td>1981</td>
<td>1,982</td>
<td>6,787</td>
<td>92</td>
<td>1,025</td>
<td>15.1</td>
<td>74</td>
<td>645</td>
<td>9.5</td>
<td>380</td>
<td>5.6</td>
<td>22</td>
<td>50</td>
<td>72</td>
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<td>2,497</td>
<td>6,841</td>
<td>92</td>
<td>1,094</td>
<td>16.0</td>
<td>79</td>
<td>684</td>
<td>10.0</td>
<td>410</td>
<td>6.0</td>
<td>18</td>
<td>41</td>
<td>59</td>
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<td>1983</td>
<td>3,054</td>
<td>6,956</td>
<td>94</td>
<td>1,189</td>
<td>12.1</td>
<td>86</td>
<td>716</td>
<td>10.3</td>
<td>473</td>
<td>6.8</td>
<td>18</td>
<td>31</td>
<td>49</td>
<td>102</td>
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<tr>
<td>1984</td>
<td>3,856</td>
<td>7,180</td>
<td>98</td>
<td>1,255</td>
<td>17.5</td>
<td>91</td>
<td>739</td>
<td>10.3</td>
<td>516</td>
<td>7.2</td>
<td>15</td>
<td>30</td>
<td>45</td>
<td>92</td>
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<tr>
<td>1985</td>
<td>4,865</td>
<td>7,360</td>
<td>100</td>
<td>1,383</td>
<td>18.8</td>
<td>100</td>
<td>773</td>
<td>10.5</td>
<td>610</td>
<td>8.3</td>
<td>14</td>
<td>29</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>1986</td>
<td>6,355</td>
<td>7,759</td>
<td>110</td>
<td>135</td>
<td></td>
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<tr>
<td>1987</td>
<td>8,103</td>
<td>8,103</td>
<td></td>
<td>141</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

2/ 1987 prices.
3/ Source: FVN.

II. Fondo Vial Nacional (National Highway Fund)

Legal Framework

The Fondo Vial Nacional (FVN) was created by Law 64 of 1967 to help plan, construct and maintain the national highways and inland waterways networks. It is established that FVN will assist the Fondo Nacional de Caminos Vecinales (FNCV). In principle, the FVN is to be employed for investment purposes. It operates under the fiscal surveillance and regulation of the Contraloria General de la República. The Ministerio de Obras Públicas y Transportes (MOPT) is the legal representative of FVN.

Under Law 64 of 1967, as modified by Law 30 of 1982, FVN is to make the following transfers from the earmarked taxes on petroleum automotive fuels: 10 percent to FNCV, 10 percent to Ferrocarriles Nacionales de Colombia (FNC...
Earmarking of Transport Funds in Colombia

and five percent to the Corporación Financiera de Transportes (CFT) to fund urban transport operations. It is clear that FNC's financial situation is so bad that in fact the funds are used for debt servicing. The five percent allocation to CFT is basically to provide an operating subsidy. Thus, significant lessons can hardly be expected from FNC's and CFT's fund use, and they are not explored further. Accordingly, the analysis below is confined to FVN and FNCV.

Sources of Funds

The revenues for FVN come from allocations from the national budget, earmarked taxes on fuel sales, tolls, services and sale of equipment and materials not needed for meeting FVN's objectives, domestic and external credits, and other sources:

Table 3

Ministry of Public Works and Transport

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tabla</td>
<td>0.1</td>
<td>0.3</td>
<td>0.5</td>
<td>1.1</td>
<td>1.6</td>
<td>2.4</td>
<td>3.3</td>
<td>5.1</td>
<td>5.8</td>
</tr>
<tr>
<td>Financial Returns</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
<td>0.9</td>
<td>1.3</td>
<td>2.2</td>
<td>2.9</td>
<td>3.6</td>
</tr>
<tr>
<td>External Loans</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Fuel Tax</td>
<td>0.1</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
<td>1.1</td>
<td>1.6</td>
<td>2.1</td>
<td>2.6</td>
<td>2.9</td>
</tr>
<tr>
<td>Government Contributions</td>
<td>4.9</td>
<td>5.0</td>
<td>5.1</td>
<td>5.2</td>
<td>5.3</td>
<td>5.4</td>
<td>5.5</td>
<td>5.6</td>
<td>5.7</td>
</tr>
</tbody>
</table>
| Total Revenues   | 12.8 | 17.1 | 21.8 | 27.2 | 32.8 | 38.4 | 43.9 | 50.0 | 57.3 | 205

FVN and MOPT clearly have undergone a transformation in the 1980s. In 1979, the source of funds was almost entirely the national budget. In 1982, with the institution of a new law governing FVN, MOPT also assumed for financing its activities by loans, in which external loans dominated. Basically, obtaining non-internally generated funds became a responsibility of MOPT rather than of the Ministry of Finance (MOF). Toll revenues, which were insignificant in 1979, became increasingly important, and by 1987 reached one seventh of the total. Even so, during the 1979 to 1987 period, the contribution of the fuel tax was remarkably steady, at about two-thirds of total revenues (figure 1).

The main earmarked source of funds for FVN is the tax on gasoline and diesel fuel. Article 2 of Law 30 of 1982 modified the fuel tax of 5 percent on the retail price created by Law 64 of 1967. This new article established a tax equivalent to Col$13.50 per gallon of regular or extra gasoline or diesel fuel. Gasoline for aircraft and marine diesel were exempted. Every time the price of gasoline is increased the amount of the tax is increased.
either by the percentage increase in the index of costs of heavy industrial activity or by the percentage increase in the prices of gasoline and diesel oil. The level of funds generated from the fuel tax has varied over the years and in 1987 was lower than in the early 1980s, in real terms. The reason appears to be the 1982 change in the basis of the tax.

Figure 1

In addition, MOPT (but not FNV) receives revenue from highway tolls, which are collected at strategically located toll booths on major highways. These highways are not toll roads in the fullest sense of limited access, but in most cases alternative routes do not effectively exist. It can be argued that the proportion of resources effectively earmarked for MOPT use increased substantially over the period. If tolls (the dominant form of "own revenues"), the fuel tax, and domestic loans are all considered earmarked, the earmarking proportion rose from 65 percent to 83 percent between 1979 and 1987. If external loans are included, MOPT becomes a self-sustaining organization, immune from direct influence by the Ministry of Finance. Neverthe-

\[\text{\textsuperscript{11}}\text{ The taxes and charges levied by FVN can thus be classified, in terms of William McCleary's categories, as specific taxes for a specific end use. See "Notes on the Principles and Practice of Earmarking" in this volume.}\]
less, there is de jure vulnerability to factors beyond MOPT control: the level of revenue generated by the fuel tax depends upon the basic price of fuel that is set by the government, and external loans are technically made to the government.

It is of interest to compare the level of funding to some commonly employed concepts such as the growth of GDP, total government expenditures, and the overall level of charges imposed on road users, on the one hand, and the actual needs of the highway system on the other. Since 1983, earmarked funds have grown at roughly the same rate as GDP, but total FVN funds have grown more slowly than government expenditure as a whole, and substantially more slowly than government investment in other sectors (this is particularly true if account is taken of the growing proportion of FVN funds pre-empted for debt service payment). The comparison with earlier years is a little suspect in view of changes in the fuel tax base, but prima facie road funds actually declined while government expenditure and investment grew steadily (see table 2 and figure 2).

Figure 2
It is more difficult to comment on the relationship between funds generated and road user charges, as a time series of the latter was not available. However, data on road user charges were obtained during appraisal of the Second Highway Sector Project in 1986. Only about one third of the fuel tax was at the time considered a road user charge, the remainder being considered equivalent to a general tax. The "user charge" yield was close to expenditure classed as recurrent or highway maintenance. Obviously, if other categories of expenditure, such as paving or purchases of equipment, are included, the coverage becomes less. Conversely, the inclusion of toll revenues as an earmarked source increases the coverage. It appears that the total fuel tax revenue retained by FVN of some Col$46 billion covered over 70 percent of total MOPT expenditure, equivalent to all expenditure excluding new construction and debt service. Toll revenues roughly covered the debt service. Prima facie this does not seem excessive. Rehabilitation and paving are obviously activities that are determined by investment in previous years, unless there is a justification for reducing the size of the network, which seems unlikely in Colombia. Thus the conclusion is that the earmarked tax revenue (in 1986) was not excessive in relation to the needs to maintain road standards. This conclusion generally holds even if the analysis is turned on its head -i.e., the basic expenditure required to maintain the system in good condition at a given level of congestion is considered to be total expenditure (including new construction but excluding debt service).

Use of Funds

The use of funds also varied substantially over the 1980s, and particularly since MOPT took on debt-servicing responsibilities in 1983. Debt servicing accounted for one percent or less of total expenditure before 1983; by 1987, it absorbed 20 percent. Changes also took place within the framework of non-debt servicing expenditure. New construction has increased while paving has decreased, and the proportion devoted to maintenance has remained reasonably stable. There is no obvious reason for these changes, and the fact that, if 1982 and 1983 are compared, the percentage of funds employed for new construction, rehabilitation and paving combined was virtually unchanged suggests that there may have been some redefinition of activities between the two years. Administration has increased; this could reflect the additional responsibilities of MOPT (table 4 and figure 3).

It is difficult to relate either the distribution or overall expenditure to some definition of "needs" in the system; sufficient to say that the proportion does not seem excessive, and the proportion spent on maintenance has been consistently at an acceptable level. Furthermore, the World Bank was sufficiently satisfied with the performance of FVN to appraise a second highway sector project in 1986, when it was noted that the project would, inter alia, support the strengthening of MOPT's highway management capabilities instituted under the first sector project.
### Table 4

#### Distribution of Public Works and Transport

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**Note:**
- (1) Export Price
- (2) 1980 (Plan) Prices (adjusted to 1970 if different)
- (3) US dollars (at 1980 = US$)
FNVC has a somewhat different mixture of funding from MOPT. The 10 percent of the fuel tax allocated to it is the most important single source; furthermore, FNVC obtained a higher than theoretical 10 percent share in each of the years 1983 to 1986. But the direct government contribution is also substantial and in 1987 accounted for one third of the total. What has increased significantly in importance is external loan financing, mainly by the Interamerican Development Bank and the World Bank. In 1980, loans were insignificant; by 1987 they accounted for a quarter of revenues. FNVC also obtains small contributions from: a) a tax on beer, but this tax is at a fixed level and, with inflation, the yield has declined to an insignificant
value; and b) the National Aeronautic Fund, that is, in fact, not separately recorded in FNCV's presentation of revenues (table 5 and figure 4).

Table 5

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(1) = Currents
(2) = Constant (adjusted by GDP deflator to 1987 prices)

Table 6

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(1) = Currents
(2) = Constant (adjusted by GDP deflator to 1987 prices)

Figure 4

FONDO NACIONAL CAMINOS VEICINALES - SOURCES

Source: FNCV, Government of Colombia
The total funds available to FNCV, in real terms, changed in a similar manner to FVN's. In 1987 FNCV revenues were about 18 percent higher than in 1980 and about 45 percent higher than in the low year of 1981.

Use of Funds

FNCV employs different categories of expenditure from MOPT. It is rather difficult to distinguish between maintenance and administrative expenses. Investment in roads is recorded under six categories: Ordinary, Regional Development (DRI), Pico y Pala (literally pick and shovel), Maintenance, Community Aid, and Regional Integration, apart from studies. It is worth noting that what is classed as road investment has absorbed a consistently high proportion of resources (71 to 85 percent). What is classed as functions (which include in particular personal services and transfers) and acquisitions of equipment and spare parts has until 1984 absorbed most of the rest. Expenditure on equipment and spares has fluctuated quite sharply; this reflects deliveries rather than use, and its inclusion in the non-investment category is perhaps deceptive. If equipment spares and "functions" are taken together, and averaged over the period, they represent nearly 19 percent of total expenditure. Together with maintenance, this would rise to about 21 percent, still well below the maintenance and administration component of MOPT expenditures. It may be, however, that this reflects the implementation of a philosophy that with rural roads it is more cost effective to reconstruct roads (that still have adequate traffic levels) every few years, rather than constantly maintain them (table 6, figure 5).

Table 6

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(1) = Current
(2) = Constant (deflated by GDP deflator to 1987 prices)

Source: MOPT, Government of Colombia
IV. Effects of Earmarking

Four types of effect of earmarking are considered below. Three are specific to the transport sector: the effects on administrative ease, expenditure levels, and efficiency. In addition, a more basic question is considered: whether benefits from earmarking in one subsector are not offset by the lack of flexibility imposed upon other sectors. We do not examine the more general theoretical pros and cons of earmarking, which are addressed in other papers, except to note that a basic condition for the continuity of an earmarking regime is general public acceptance of the concept, which seems to obtain in Colombia.

Administrative Ease

MOPT and FNCV administrators are quite clear that the availability of earmarked funds facilitates the administration and even more importantly the continuity of their activities. Although the actual level of funds from the fuel tax, dependent as it is upon a combination of consumption levels, retail prices and relative inflation levels, cannot be predicted with complete accuracy, there is a prima facie case for assuming that the funds needed for
continuation of contracts, and indeed force account activities, are secure from one year to another. This is in stark contrast to the experience of some other countries in the region. It would be very difficult to apply objective criteria to test this conclusion. One would need to compare the experience of sectors (or agencies) which do not receive earmarked funds with the road sub-sector and information of this comparative nature is not to hand. Nevertheless, the fact that other agencies, not currently recipients of earmarked funds, are trying to establish this type of financing suggests that avoidance of the complex procedures for allocation of funds from the central government eases the administrative burden on the agencies. It should be noted that it does not prevent some delay—the funds from the fuel tax flow in the first instance to central government, and Congress does have to approve the agency budgets. The reasonable continuity in the flow of funds has required maintenance of petroleum product prices in Colombia in real terms, and this has generally obtained.

**Funding Levels**

The previous comparisons between the growth of public sector expenditure and that in the roads subsector and the generally static level of real expenditure in the subsector (decreasing if debt servicing is excluded) suggests that earmarking has not generated pressure to spend. The fact that the fuel tax contribution to total revenues has generally been under 50 percent for MOPT and only about one third for FNCV also suggests that it did not constitute a driving force. FNCV certainly does not consider its activities to be financial-supply driven. More problematical is financing from tolls. Toll revenues have increased sharply, and that this is essentially a function of exertion of monopoly power—with the decline of the railways, road transport dominates and has little option to paying tolls except through pressure in Congress. This may be a cause for concern.

Nor does the composition of expenditure suggest pressure to spend. Both the distribution between (e.g.,) high cost construction and lower cost paving and that between investment and recurrent expenditures in MOPT seem reasonable, with changes that are not correlated with the funding source. As noted above, the designations of activities in FNCV make it difficult to associate cause and effect, but FNCV projects are subject to feasibility study, and while the weaknesses of feasibility studies when applied to opening up new regions are well known, there is no reason to suppose they are any weaker, or more susceptible to pressure to invest, than (e.g.,) World Bank-financed activities of a similar nature.

**Efficiency**

The word "efficiency" can have a multitude of meanings. If we assume it to mean the choice of the technique to meet a given objective that maximizes the economic benefit to Colombia, it is difficult to see how earmarking per se could affect efficiency.

The use of the funds in Colombia is not narrowly constrained. The questions could be posed, "Could and should the use of earmarked funds be more circumscribed or should X percent be allocated to new construction, Y percent to paving, and so on?" Immediately problems arise. Only in the
unlikely situation of static equilibrium with a constant rate of replacement of the infrastructure could the desired distribution be unchanging from year to year. More likely, it would be necessary to change the law every year; changing a law is lengthier and more cumbersome than defining a good yearly program in the agency in charge. The technical skills to optimize activities and determine priorities, and the will to apply them, would be the same either way, but it might be argued, prima facie, that one of the main sources of deviation from optimality is political pressure. The availability of funds that are free from such pressures can allow technical criteria to be applied more rigorously, and this supports Colombia's lack of earmarking within earmarking.

Earmarking Everything?

The main danger of earmarking is that it undermines the power of central government, which in a democracy is the representative of the electorate, to make decisions on the use of resources that are, in the final analysis, generated by that electorate. It has an obvious tendency to distort expenditure patterns. If sectors such as transport, where the generation of earmarked revenues is easy both in terms of identifying sources and raising revenues without excessive public protest, are encouraged to be entirely self-sufficient, what happens to those (such as health) where no such easy association exists? Unless one adopts the philosophy that there should be no transfers between different sectors and users (a philosophy which admittedly seems to be gaining support in some developed countries), there has to be a limit to earmarking.

What appears necessary is that an acceptable balance be struck between the objective of minimizing the administrative and political obstacles to continuation of a worthwhile activity and that of ensuring that at the margin the funds are used with the same efficiency in the sectors benefiting from earmarking as in those less fortunate. As marginal funds for activities are provided from the national budget or by international agencies who are in theory prioritizing lending across the total public sector spectrum, it would seem the efficiency criterion can be broadly met.

Conclusions

Generally, the system of earmarking road funds has worked well in Colombia. The form - a specific tax for a specific purpose - is generally accepted by the Government and the electorate as 'fair' and implementation has not led to significant sub-optimization in the use of resources. In particular, the funds have provided a basis for executing a generally sensible set of programs, both of investment and maintenance in the sector, without generating pressures to spend for spending's sake.

The use of earmarked funds has not been very narrowly defined. Thus, their availability has not in itself acted as an efficiency control mechanism; in a developing country with a constantly changing balance of needs between different types of activities (construction, reconstruction, paving, periodic and routine maintenance) combined with an allocation system based upon laws (as compared to administrative discretion) the straight-jacket approach to quality control is not appropriate.
In summary, the combination of a policy which ensures a reasonable flow of funds with continuous vigilance to ensure that their use is within reasons optimized, seems an appropriate path for Colombia to continue to follow.
General

Zaire is the third largest country in Africa and the fifth largest in terms of population. Zaire has a low population density, estimated at 12 persons per square kilometer. About a third of the population of about 30 million lives in urban areas. Mining and mineral processing account for about one third of GDP, two-thirds of overall export earnings and a major share of public sector revenues. Agriculture accounts for another third of GDP, but provides employment and income for more than three-quarters of the population. GNP per capita (about US$170 in 1986) ranks among the lowest in the continent.

Zaire is served by rail, river and road transport. Its road network comprises about 145,000 km classified as national (20,700 km), main regional roads (20,200 km), secondary regional roads (17,100 km) and local roads (57,000 km). Only about 2,400 km are paved. More than 200 ferries are currently operated. On the whole, Zaire’s road network is adequate in length for current needs but is of limited technical standards, and in poor condition, especially the local roads, of which a majority has not received any maintenance for years. The most intensely trafficked interurban road is Kinshasa-Matadi with about 1,000 vpd. Most interurban roads have less than 100 vpd. Urban traffic accounts for over 50 percent of all traffic in the country.

Responsibilities for administration of the road network are allocated to (i) the Office des Routes (OR), a financially autonomous agency supervised by the Ministry of Public Works, for national and regional roads, (ii) the Ministry of Public Works' Directorate of Urban Roads for all roads in urban areas and (iii) the Ministry of Rural Development for local roads.

Dedicated taxes are widespread. In 1987 it was estimated that Zaire had more than 400 fiscal instruments outside the revenue and budgeting control of the Ministry of Finance; the Road Fund is one of them.

I. THE ROAD FUND SYSTEM

Sources of Funds

A road fund was created in 1974 and has been used since then to provide local funds for road operations. It is based on an earmarked tax on fuel, a fixed amount per liter.

Until 1982, the road tax on fuel was relatively low and represented a small portion of resources for roads (6 percent of total road user charges or 15 percent of road recurrent expenditures in 1974). The Office des Routes (OR) relied mostly on Zaire's recurrent budget for the financing of its...
current expenditures. Between 1975 and 1982, OR experienced major difficulties: recurrent and investment related disbursements not only declined in real terms but were also significantly and persistently below approved budgets, and the resources needed were not available in time. The erratic pattern of payments hurt OR's maintenance activities by necessitating frequent changes in the work program and hindering work in progress. Over this period real wages of OR's personnel were substantially reduced.

In 1982, to solve its funding problems, OR proposed that funding through the road tax be increased to substantially cover OR's required expenditures. Considering sales volumes and pump prices, OR estimated that a fuel tax equivalent to 20 percent of the fuel cost would meet its budgetary requirements. The government agreed to revise the mechanism of the road fund and to increase the fuel tax gradually so that by January 1, 1985, it reached a level sufficient, when combined with OR's allocation from the national budget, to finance OR's recurrent expenditures and about 30 percent of its investment requirements. This was supported by the Fifth Highway Project.

In 1985, the government increased the road tax again to 31 percent of the fuel cost and decided that the proceeds would be paid directly to OR by the petroleum companies, to cover OR's recurrent expenditures under its multi-year road program. It was understood that local contributions to externally financed investments would be covered with budgetary allocations additional to the road tax proceeds (this was discontinued in 1986). Under the Sixth Highway Credit Agreement, that became effective by mid-1986, the Borrower pledged to take steps, including increases in road taxes on fuels, as necessary to ensure:

"(a) that OR has available the funds necessary to cover at least the maintenance of roads under its responsibility, repaving activities, bridge and ferry works, technical assistance, studies, training and the purchase of office equipment, included in its five-year rolling program;

(b) that all such funds, other than those from external sources, come from the road tax on gasoline and diesel oil;

(c) that the proceeds of such tax not fall below the equivalent of $50 million per year in mid-1986 terms;

(d) that such proceeds be paid directly to OR."

During the 1987 review of dedicated taxes, the road tax was not questioned. Past experience showed that it had been effective in providing timely resources and also tended to indicate that budgetary allocations for funding road operations were likely to suffer major disruptions. Moreover, the government decided then to create an additional tax on fuel similar to the road tax, to finance an emergency program of maintenance and rehabilitation on the feeder road network. This additional tax brought in about 11 percent of the road fund revenue.

It should be pointed out that only the petroleum products imported through the western route via Matadi are subject to the road tax and most of the other taxes. The imports through the eastern route via Kenya or through the southern route via Zambia (in 1987, 12 percent of the total), which have
a higher CIF price, are not subject to taxation, to avoid raising the retail price. Thus, the fuel taxes have also been used as a tool against geographic price differentials. The structures of fuel prices as of August 1985 and June 1988 are shown in table 1.

Table 1

Zaire

Structure of Fuel Prices

<table>
<thead>
<tr>
<th></th>
<th>(as of August 1985)</th>
<th>(as of June 1988)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gasoline from Matadi</td>
<td>Diesel Oil from Matadi</td>
</tr>
<tr>
<td>Average CIF Price (Z/m^3)</td>
<td>12,916 43</td>
<td>12,419 48</td>
</tr>
<tr>
<td>Distribution Cost (Z/m^3)</td>
<td>4,402 15</td>
<td>6,077 23</td>
</tr>
<tr>
<td>Taxes (1) (Z/m^3)</td>
<td>12,683 42</td>
<td>7,504 29</td>
</tr>
<tr>
<td>of which Road Tax (Z/m^3)</td>
<td>5,377 18</td>
<td>5,377 21</td>
</tr>
<tr>
<td>Total (Z/m^3)</td>
<td>30,001 600</td>
<td>26,000 520</td>
</tr>
<tr>
<td>(US$/m^3)</td>
<td>5780</td>
<td>5780</td>
</tr>
</tbody>
</table>

1-Most taxes other than Road Tax go to the Treasury.

Uses and Procedures

The Board of OR consists of nine members: the general manager and his deputy, the administrative and the technical directors, and delegates of the Prime Minister, the Ministries of Finance, Public Works, Rural Development, and Agriculture.

Budgeting. Every year, in the course of budget preparation, the road maintenance objectives in each of the nine regions of Zaire are discussed in a Regional Road Committee (under the governor's authority) which consists of local representatives of the various administrations and representatives of local businesses. OR submits for government approval a budget proposal for the following year with a detailed forecast of recurrent and investment expenditures and physical output. OR's budget is discussed and approved by the parliament along with the national budget.
Uses. With the road fund, the OR finances salaries and compensation of its staff, procurement of various inputs (fuel, lubricants, materials, supplies, mostly supplied locally), local costs incurred for externally financed supplies, and contracts for works (maintenance, new construction, and/or rehabilitation).

Procurement. The procurement procedures are the same as for all government and public entities and are considered acceptable (by the Bank) for local competitive bidding. Bidding documents, bid evaluation reports and decisions to award contracts are submitted to OR's procurement committee which includes OR staff and representatives from the Ministries of Public Works and Finance. The final decision on awarding is made by OR's general manager or the Minister of Public Works, depending on the proposed contract amount.

Disbursements. Disbursements from the road fund are made by OR's management with two signatures required, but without any external interference. When payments are due in foreign currencies, OR may purchase the needed amounts after obtaining an import license like any other public or private company. Each of OR's regional units has some financial autonomy.

Accounting and Accountability. A modern and satisfactory accounting system was introduced at OR at the beginning of 1984 (consulting assistance is still required to complete the training of accountants and the system for computer processing of financial statements and calculation of unit costs). Accounts are consolidated monthly across regions and types of activities, and controlled by internal audit units in the central departments in Kinshasa. Since 1980, OR's accounts have been audited by independent external auditors. Their reports have noted continuous improvements in OR's accounting procedures, although some improvements of the system must still be achieved. In addition to the annual audit report which is reviewed by the government, OR prepares an annual report of activities which shows a number of activity indicators including physical consumptions, equipment utilization rates, physical output per category and region and the overall condition of the road network by region and category. This report is submitted to (and at times discussed in) the parliament. In spite of this, however, there is a widespread understanding that OR is not subject enough to the government's control and that its accountability should be reinforced to ensure a better use of its resources.

II. EXPERIENCE WITH THE ROAD FUND

Parallel Between the Economy and Road Expenditures

The road fund system functioned satisfactorily from 1984 to 1986 and especially in 1985 and 1986 after the 1985 substantial increase in the road tax. During these years OR achieved overall a far better performance than during the previous years, especially because the road tax proceeds were made available in a smooth and timely manner.

The situation started deteriorating in late 1986 when: (i) the Zaire exchange rate started falling rapidly, eroding the value of this non-ad-valorem road tax despite the credit component, which was not complied with; (ii) the retail price of petroleum products fell below their economic cost.
and (iii) the government and various parastatals retarded payment of their accounts with the petroleum companies. Point (i) meant that OR's nominal resources were too low. Points (ii) and (iii) triggered non-payment by the petroleum companies of the already inadequate taxes due to OR and to the treasury, because of their own liquidity problems. The level of resources made available to OR fell from about US$50 million equivalent in 1985-1986 to about US$38 million in 1987 and supposedly US$20 million in 1988.

A parallel can be drawn between the evolution of the economy (Annex 1) and the evolution of road expenditures since 1975, as explained below:

(i) 1975-1982 was a period of economic crises, with large budget deficits, overvalued exchange rates, and decline in income per capita. The road fund was at a relatively low and largely insufficient level, suffering from shortages and erratic payments; the real wages of OR's staff declined, and the performance of OR was extremely uneven;

(ii) 1983-1986 was a period of economic adjustment with a devaluation of 78 percent, public expenditure control and reduction, reduction of wages in the public sector, major fuel price increases and further decline in income per capita. The road tax was substantially increased in 1982 and 1985 and together with additional sources for road expenditures (national budget) provided OR with a high level of resources; OR's performance was quite satisfactory from 1984 to 1986 due to increased revenues, better motivation of staff (who received adequate training and increased wages), and timely payment of road tax resources to OR.

(iii) 1987-1988. Despite the attempt to resume structural adjustment, inflation soared to 100 percent, the fiscal deficit expanded and the exchange rate declined. Petroleum prices and the road tax were not increased to take account of inflation adequately. Budgetary resources to OR were discontinued in 1986. The road fund is now experiencing a major liquidity crisis, even though an additional fund for feeder roads has been created and represents about 11 percent of the initial road fund.

The best three years of the period in terms of road maintenance local financing have been 1984, 1985, and 1986; OR's recurrent budget peaked in 1985 following a reinforcement of the road fund system (tables 2 and 3). The ratio of road recurrent expenditures to GDP peaked in 1985-86 at 1.2 percent, unlike the ratio of government current expenditures to GDP which was at a historical record low in 1984-86 (table 4 and graph). It is clear that, in the absence of a road fund, expenditures for road maintenance activities would not have increased so dramatically in 1985-1986 when the government current expenditures were being severely reduced. Nevertheless, the level of recurrent local financing in 1987 fell at a level comparable to those of 1977 or 1983.

As a result of the deterioration in local funding of the OR, road maintenance, which used to be contracted out by OR to small entrepreneurs, small businesses, non-government organizations, and/or collectivities had to be discontinued by mid-1987. OR deteriorated as an institution because of the funding crisis and because of major management changes.
Table 2

**Zaire**

**Highway Expenditure 1977-87**

(2 million 1987 value)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Recurrent Expenditure (local)</td>
<td>3,153</td>
<td>1,958</td>
<td>2,741</td>
<td>2,839</td>
<td>2,937</td>
<td>2,957</td>
<td>3,035</td>
<td>3,407</td>
<td>5,169</td>
<td>4,230</td>
<td>3,172</td>
</tr>
<tr>
<td>2- External Funding</td>
<td>803</td>
<td>735</td>
<td>714</td>
<td>906</td>
<td>1,460</td>
<td>1,549</td>
<td>2,223</td>
<td>2,658</td>
<td>3,650</td>
<td>3,840</td>
<td>3,248</td>
</tr>
<tr>
<td>3- Total Maintenance</td>
<td>3,956</td>
<td>2,693</td>
<td>3,483</td>
<td>3,745</td>
<td>4,397</td>
<td>4,506</td>
<td>5,258</td>
<td>6,065</td>
<td>8,819</td>
<td>8,070</td>
<td>6,420</td>
</tr>
<tr>
<td>4- Investment Expenditure</td>
<td>548</td>
<td>940</td>
<td>20</td>
<td>176</td>
<td>255</td>
<td>607</td>
<td>352</td>
<td>529</td>
<td>1,057</td>
<td>1,273</td>
<td>1,057</td>
</tr>
<tr>
<td>5- External Funding</td>
<td>723</td>
<td>613</td>
<td>627</td>
<td>785</td>
<td>1,314</td>
<td>1,267</td>
<td>2,223</td>
<td>2,658</td>
<td>3,650</td>
<td>2,760</td>
<td>1,680</td>
</tr>
<tr>
<td>6- Total Investments</td>
<td>1,271</td>
<td>1,552</td>
<td>647</td>
<td>961</td>
<td>1,569</td>
<td>1,874</td>
<td>2,131</td>
<td>3,054</td>
<td>4,707</td>
<td>4,033</td>
<td>2,737</td>
</tr>
<tr>
<td>7- Total Local Funding (1)</td>
<td>3,701</td>
<td>2,898</td>
<td>2,761</td>
<td>3,016</td>
<td>2,192</td>
<td>2,564</td>
<td>3,288</td>
<td>3,936</td>
<td>6,227</td>
<td>5,502</td>
<td>4,220</td>
</tr>
<tr>
<td>8- Total External Funding</td>
<td>1,526</td>
<td>1,348</td>
<td>1,569</td>
<td>1,690</td>
<td>2,274</td>
<td>2,816</td>
<td>4,003</td>
<td>5,184</td>
<td>7,299</td>
<td>6,500</td>
<td>4,528</td>
</tr>
<tr>
<td>9- Total Road Funding</td>
<td>5,227</td>
<td>4,246</td>
<td>4,120</td>
<td>4,706</td>
<td>5,964</td>
<td>6,380</td>
<td>7,389</td>
<td>9,120</td>
<td>13,526</td>
<td>12,102</td>
<td>9,158</td>
</tr>
</tbody>
</table>

(1)-Of which

10- Road Tax Contrib. | 1,273 | 313 | 411 | 705 | 940 | 940 | 3,288 | 3,525 | 3,483 | 3,502 | 4,230 |
11- Local funding by R.T. | 34 | 11 | 15 | 23 | 15 | 26 | 100 | 90 | 88 | 100 | 100 |
12- National Budget Contrib. | 2,428 | 2,585 | 2,350 | 2,702 | 2,624 | 0 | 411 | 744 | 0 | 0 | 0 |
13- Local Road Funding/ National Gov't Expenditure | 4.1 | 3.5 | 3.5 | 3.9 | 3.2 | 2.3 | 2.9 | 2.5 | 3.9 | 3.3 | 2.3 |

Table 3

**Zaire**

**Highway Expenditure 1977-87**

(US$ million 1987 value)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Recurrent Expenditure (local)</td>
<td>28.1</td>
<td>17.5</td>
<td>24.5</td>
<td>25.4</td>
<td>26.2</td>
<td>26.4</td>
<td>27.1</td>
<td>30.4</td>
<td>46.2</td>
<td>37.8</td>
<td>28.3</td>
</tr>
<tr>
<td>2- External Funding</td>
<td>17.8</td>
<td>18.6</td>
<td>17.8</td>
<td>18.7</td>
<td>24.8</td>
<td>27.7</td>
<td>32.2</td>
<td>26.3</td>
<td>32.5</td>
<td>35.2</td>
<td>29.0</td>
</tr>
<tr>
<td>3- Total Maintenance</td>
<td>45.9</td>
<td>36.1</td>
<td>42.2</td>
<td>44.0</td>
<td>51.0</td>
<td>54.1</td>
<td>59.3</td>
<td>56.7</td>
<td>78.6</td>
<td>72.9</td>
<td>57.3</td>
</tr>
<tr>
<td>4- Investment Expenditure</td>
<td>4.9</td>
<td>8.4</td>
<td>0.2</td>
<td>1.6</td>
<td>2.3</td>
<td>3.4</td>
<td>3.1</td>
<td>4.7</td>
<td>9.4</td>
<td>11.4</td>
<td>9.4</td>
</tr>
<tr>
<td>5- External Funding</td>
<td>16.0</td>
<td>15.5</td>
<td>15.0</td>
<td>16.2</td>
<td>22.3</td>
<td>22.6</td>
<td>25.8</td>
<td>24.9</td>
<td>32.5</td>
<td>25.3</td>
<td>15.0</td>
</tr>
<tr>
<td>6- Total Investments</td>
<td>20.9</td>
<td>23.9</td>
<td>15.2</td>
<td>17.8</td>
<td>24.6</td>
<td>28.1</td>
<td>28.9</td>
<td>29.7</td>
<td>41.9</td>
<td>36.6</td>
<td>24.4</td>
</tr>
<tr>
<td>7- Total Local Funding (1)</td>
<td>32.8</td>
<td>34.1</td>
<td>32.8</td>
<td>34.9</td>
<td>47.1</td>
<td>50.3</td>
<td>58.0</td>
<td>51.2</td>
<td>65.0</td>
<td>60.4</td>
<td>44.0</td>
</tr>
<tr>
<td>8- Total External Funding</td>
<td>68.6</td>
<td>59.8</td>
<td>57.4</td>
<td>61.8</td>
<td>75.6</td>
<td>82.1</td>
<td>88.3</td>
<td>86.3</td>
<td>120.6</td>
<td>109.6</td>
<td>81.8</td>
</tr>
</tbody>
</table>

(1)-Of which

10- Road Tax Contrib. | 11.4 | 2.8 | 3.7 | 6.3 | 4.4 | 8.4 | 30.2 | 31.5 | 49.0 | 49.1 | 37.8 |
11- Local funding by R.T. | 34 | 11 | 15 | 23 | 15 | 26 | 100 | 90 | 88 | 100 | 100 |
12- National Budget Contrib. | 21.7 | 23.1 | 21.0 | 20.6 | 24.1 | 23.4 | 0.0 | 3.7 | 4.6 | 0.0 | 0.0 |
Table 4

Zaire

Road Recurrent Expenditure (Local Contribution)
Relative to GDP and Government Recurrent Budget

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-GDP (2 billion current)</td>
<td>3.9</td>
<td>5.5</td>
<td>11.1</td>
<td>17.2</td>
<td>23.8</td>
<td>31.3</td>
<td>57.9</td>
<td>106.0</td>
<td>144.0</td>
<td>215.0</td>
<td>442.0</td>
</tr>
<tr>
<td>2-Government Recurrent Budget (Z billion current)</td>
<td>732</td>
<td>1,001</td>
<td>2,033</td>
<td>2,923</td>
<td>4,552</td>
<td>6,920</td>
<td>8,465</td>
<td>12,485</td>
<td>17,233</td>
<td>25,337</td>
<td>53,762</td>
</tr>
<tr>
<td>(expend in tab. not included)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Road Recurrent Budget (Z million current) (1)</td>
<td>33.4</td>
<td>29.7</td>
<td>63.0</td>
<td>121</td>
<td>178</td>
<td>233</td>
<td>440</td>
<td>897</td>
<td>1,771</td>
<td>2,115</td>
<td>3,172</td>
</tr>
<tr>
<td>4- I Road Rec. Budg./GDP</td>
<td>0.9</td>
<td>0.5</td>
<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>1.2</td>
<td>1.0</td>
<td>0.7</td>
</tr>
<tr>
<td>5- I Road Rec. Budg./Gov't Rec. Budget</td>
<td>4.6</td>
<td>3.0</td>
<td>4.1</td>
<td>4.5</td>
<td>3.9</td>
<td>3.4</td>
<td>5.2</td>
<td>7.2</td>
<td>10.3</td>
<td>8.3</td>
<td>5.9</td>
</tr>
<tr>
<td>6- I Gov't Rec. Budget/GDP</td>
<td>18.8</td>
<td>18.5</td>
<td>18.3</td>
<td>17.0</td>
<td>19.1</td>
<td>22.1</td>
<td>14.5</td>
<td>11.4</td>
<td>12.0</td>
<td>11.8</td>
<td>12.2</td>
</tr>
</tbody>
</table>

(1)-Equivalent to 1987 values of table 3 - line 1

Legend: Line (1) represents Road Recurrent Expenditures divided by Government recurrent budget times 100. Line (2) represents Road Recurrent Expenditures divided by GNP, times 1000. Line (3) represents Government recurrent Expenditures divided by GNP, times 100. Symbols (4) represent the Road Recurrent Expenditures (in 1987 terms and US$ million eq. on a scale of 1/2)
Earmarking vs. Budget Allocations

The earmarking system failed to insulate road fund allocations from the overall budgetary availability of funds. But, OR's budget is about twice as large as the current country investment budget, which does not include the investments made by parastatals. The likelihood of an alternative solution working better should be considered before advocating another system for financing road maintenance: (i) tolls on roads or specific taxes on vehicles would produce only a very marginal part of the resources needed by OR. Most roads in Zaire have very low traffic, and toll collection costs would be relatively very high. An annual tax on vehicles would need to be high to produce substantial revenues. Moreover, the country has so far failed to collect revenues properly and it is likely that such new systems would also have to face the usual problems of tax exemptions, evasion, and diversions; (ii) relying on direct budgetary allocations does not seem any more promising, as illustrated by the government's increasing arrears to petroleum companies and its expanding fiscal deficit; this is one of the major underlying reasons for the breakdown of the present road fund system. This is a structural question which quite obviously needs to be addressed.

One of the basic criteria for determining OR's resource base must be the availability of a proven public administrative structure to ensure proper mobilization of revenues, and recording and payment of amounts due. Until public administration can be improved, the system of budget allocations does not meet this criterion. The breakdown of the existing system of earmarked funds is more attributable to the poor performance of the government in dealing with revenue mobilization, exchange rate and petroleum pricing issues, and in management of its budget, than to deficiencies in the system itself. It would be difficult to conceive a system totally immune from these shortcomings in the present Zairian environment. For the time being, therefore, and until a properly functioning budgetary system can be established, the existing system of an earmarked tax on fuel at a level compatible with Zaire's fiscal macro-economic situation may be the most practical solution. It should benefit from the relatively efficient management of petroleum companies. To ensure full collection of amounts due to OR would, however, require conferring the recording of amounts of fuel tax due and payment of these amounts to OR to an independent reliable entity capable of monitoring and verifying petroleum company records.

Based on past and recent experience, some measures and commitments from government would be needed to provide the road fund system a minimum of sustainability:

(i) a minimum of political acceptance of OR's role, of the importance of road maintenance, and of the need for raising and subsequently maintaining fuel prices at economic levels, is required;

(ii) the road tax should be an ad-valorem tax instead of a specific tax to protect it against inflation;

(iii) a cleanup of various arrears in the petroleum sector is required.

21 In July 1988, the government created an annual registration tax on vehicles, the proceeds of which will go to the treasury.
ANNEX

COUNTRY ECONOMIC PERFORMANCE AND RECENT ADJUSTMENT ATTEMPTS

The country enjoyed relative stability and economic growth from 1967 until 1974; GDP grew at about seven percent per year in real terms. Between 1975 and 1983, however, the Zairian economy was characterized by a series of crises and short-lived recoveries, severe underutilization and deterioration of productive capacity and infrastructure, the emergence of significant economic and financial imbalances, high inflation, and a decline in per capita income. A number of factors contributed to these difficulties, including: the 1973-74 zairianization and nationalization measures which, though subsequently rescinded, disrupted the distribution network and undermined private sector confidence; the 1970s heavy external borrowing, much of it at unfavorable terms and for projects of low or even negative returns; and continuing deterioration in the terms of trade. By 1983 the balance of payments deficit and the budget deficit reached 12 percent and 11 percent of GDP respectively. Both external and domestic confidence were at a low ebb: a grossly overvalued exchange rate, pervasive price controls, and high inflation were the manifestations of widespread distortions in the economy.

A major turning point for the Zairian economy came in 1983 when the government began introducing, within the context of an IMF stand-by program, a series of far-reaching stabilization and reform measures. These included: (i) an immediate devaluation of the zaire by 78 percent; (ii) the introduction of a transitional dual exchange rate regime, leading to a unification of the two rates in February 1984 and the subsequent maintenance of a market-determined exchange rate; (iii) a substantial liberalization and simplification of the exchange and trade system, including a revision of tariffs; (iv) the decontrol of most prices, including agricultural producer prices and interest rates; (v) tight expenditure controls, including limitations on wage increases and reductions in public sector employment; (vi) a series of actions to reduce the burden of parastatals on the budget, including the sale of some assets; and (vii) major increases in the price of petroleum products to make them more accurately reflect world market prices. Real GDP per capita continued to decline, and private investment remained insufficient due to persistent lack of confidence from the private sector. The adjustment process was disrupted by mid-1986 by strong political pressure to reverse the liberalization trend. In October 1986 decisions were announced for a reversal of some of the Government's major reform measures. The situation resulted in a rapid depreciation of the currency and high inflation rates due to widespread lack of confidence in revised government policy.

A structural adjustment program was set up by mid-1987 with IMF and IDA's assistance after the government reaffirmed its commitment to the process of structural adjustment and reform. One of the objectives of the adjustment program was to eliminate or rationalize, gradually over a 30-month period, the charges whose effects were most harmful on producers or exporters or had no justification for separate administration. In spite of this, there remain major flaws in domestic policies, including lack of coordination of fiscal and monetary policies and increasing interference in key prices (petroleum product prices). The most evident signs of deterioration in the Zairian economy during 1987/88 were inflation above 100 percent, a GDP growth rate of only 2.7 percent, and a decline of 7.5 percent in transport volumes.
Toll Road Experience in Malaysia

Maurice Le Blanc

Introduction

Peninsular Malaysia has a relatively well developed system of toll free federal and state roads. During the 1970s traffic growth was high, 20 percent in some years, and the need to provide additional road capacity became obvious. As a result, the government in 1978 decided that an inter-state expressway (The North-South Expressway, figure 1) should be built along the west coast of the peninsula where most of the country's population and high traffic densities occurred. The Ministry of Public Works was entrusted with the task of designing and building the new expressway, which at the time was planned to be built over a five year period.

Figure 1

NORTH-SOUTH TOLL EXPRESSWAY PROJECTS
The North-South Expressway

The North-South Expressway covers a distance of 785 km between Singapore and the Thai border with an additional 143 km of side links, of which the longest connects Kuala Lumpur with Port Kelang to the west and Karak to the east. The project was split into a dozen packages and design contracts were awarded to consultants. Given the planned five year construction period for the entire project, early construction contracts were let on some packages without consideration of how the completed sections should be linked in the event that the construction schedule could not be met. It became clear early on that the project timetable was slipping and in order to speed up the process, the government created the Malaysian Highway Authority (LLM) in 1980 and gave it the mandate to finish the project without too much consideration to cost. The authority was hastily set up with staff seconded from the Ministry of Public Works and totally lacking in capitalization, since it was not originally planned that LLM would be responsible for financing the project. When the government decided to go to external borrowing for the project, it mandated LLM to get commercial funds with the federal treasury providing guarantees.

The government decided that the only way the project could be completed was through a system of tolls to generate revenues. Initially the toll system was to be open, but the decision evolved quickly to a closed toll system, since the government felt that this would generate higher revenues. In the meantime, costs continued to escalate and the government decided it could no longer afford to finance the project on its own. Furthermore, during the expressway construction, the government forced the authority to undertake a grossly uneconomic project, the construction of the 15 km Penang bridge, a M$1.2 billion investment for which the authority had to continue to borrow heavily, further straining its financial situation. The authority then sought financing of two major packages valued in excess of M$600 million from the Bank, with the Malaysian government providing financial guarantees. Apart from the fact that the authority was virtually bankrupt, the two issues that resulted in the Bank dropping the project were the design standards and the tolling. The design standards called for a uniform four lane expressway on a six lane embankment, irrespective of varying traffic level. On some sections, the incremental fifth and sixth lanes would not be justified economically until 2015. The government then decided to privatize the project in order to complete it.

In July 1987, after considerable debate over the issue, the government signed a contract for M$3.5 billion covering the construction and operation for 30 years of the sections remaining to be built at the time, totalling 504 km. The 'private' firm awarded the contract, United Engineers Malaysia (UEM), has, as major shareholders, the Prime Minister and the Minister of Public Works, the latter also being the executing agency. As part of the contract, UEM was given the entire system (the government had constructed about 424 km at a M$3.1 billion cost) to operate and collect tolls during a 30 year period, but the government continued to assume the debt for the original 424 km it had built. In addition, UEM assumed virtually no risk since the contract provides a "security package" which includes a pre-completion loan of M$750 million to be drawn down during construction and a post-completion loan of M$950 million to be drawn down during the operation
phase of the project; traffic volume guarantees; an external risk undertaking to cover costs from adverse foreign exchange movements; and guarantees to cover adverse interest rate movements, adverse changes in taxation, delays in completion due to factors outside its control and cost overruns due to changes in government policies.

While UEM has begun collecting tolls from the users of the already completed sections, they have yet to line up the necessary financing to start construction. The company has no equity of its own, has an accumulated deficit of MS100 million and has been suspended from the Kuala Lumpur Stock Exchange. It has not yet been able to line up private financing, either local or foreign. Banks have so far considered their financial risk too high or have insisted on guarantees the government is not willing to provide. UEM is trying to raise US$900 million in offshore funds but at the same time is giving preference to local financing. To ease its cash flow, subcontractors, either local or foreign will be paid only up to 87 percent of the value of their contracts in cash, the remaining to be paid in the form of non-voting equity shares in the concession company (UEM). Contractors will have the option of converting their shares into voting shares or selling them off after construction ends.

Toll Levels

Acrimonious debates have taken place over the levels of tolls to be charged. Malaysians already enjoy the distinction of being among the most heavily taxed road users in the world. During the period from 1982 to 1986, the government realized a MS2.3 billion surplus from road users (table 1).

Table 1

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Operating revenue</th>
<th>Expenditure</th>
<th>Surplus or deficit</th>
<th>Government maintenance</th>
<th>Development</th>
<th>Total</th>
<th>Public surplus or deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road transport</td>
<td>10,662,200</td>
<td>-</td>
<td>10,662,200</td>
<td>1,356,442</td>
<td>6,457,132</td>
<td>8,393,574</td>
<td>2,288,626</td>
</tr>
<tr>
<td>Rail transport</td>
<td>766,847</td>
<td>875,655</td>
<td>(108,808)</td>
<td>-</td>
<td>553,228/e</td>
<td>553,228/e (662,036)</td>
<td></td>
</tr>
<tr>
<td>Ports and Marine Services</td>
<td>1,804,810</td>
<td>1,270,965</td>
<td>534,845</td>
<td>-</td>
<td>702,984/4</td>
<td>702,984/4 (444,938)</td>
<td></td>
</tr>
<tr>
<td>Sabah Port Authority</td>
<td>302,965</td>
<td>204,915</td>
<td>98,050</td>
<td>2,953</td>
<td>6,059</td>
<td>9,012/72 (38,030)</td>
<td></td>
</tr>
<tr>
<td>Sarawak Port Authorities</td>
<td>183,881</td>
<td>136,001</td>
<td>47,880</td>
<td>9,735</td>
<td>225,044</td>
<td>264,779 (221,794)</td>
<td></td>
</tr>
<tr>
<td>Marine Departments</td>
<td>56,452</td>
<td>96,366</td>
<td>(40,914)</td>
<td>-</td>
<td>34,264/a</td>
<td>34,264 (94,778)</td>
<td></td>
</tr>
<tr>
<td>Light Dues Board</td>
<td>28,258</td>
<td>21,494</td>
<td>6,764</td>
<td>14,390</td>
<td>14,390 (11,714)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>2,376,411</td>
<td>1,720,341</td>
<td>656,070</td>
<td>12,688</td>
<td>1,013,231</td>
<td>1,026,019 (732,194)</td>
<td></td>
</tr>
<tr>
<td>Air transport</td>
<td>360,385</td>
<td>635,461</td>
<td>(275,076)</td>
<td>-</td>
<td>821,623</td>
<td>821,623 (1,096,499)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14,165,843</td>
<td>3,221,437</td>
<td>10,924,286</td>
<td>1,349,120</td>
<td>9,245,314</td>
<td>10,794,644 (222,303)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 
1/ Excluding results of road users, transport-related institutions, etc. are not included. 
2/ Excluding operating loan and development expenditure for 1981-85 only. 
3/ Excluding tolls of Penang, Johor, Entan tan, and Bintulu: expenditure in the form of grants for 1981-85 only. 
4/ Surplus of MS43.9 million had been taxed at a 48% rate and the amount obtained has been deducted from the total government figure. 
5/ Source: NIS. Include or exclued M51.6 million grant for the Marine Department. Sarawak included under /e, column 5.
When proposals were called for the privatization of the North-South Expressway, UEM had proposed a toll of M$0.075 per km for cars compared to the existing rate of M$0.025. The public and the opposition parties were outraged and managed to delay the project, through the courts and by protracted parliamentary debate, by one year. Negotiations with UEM resulted in reducing the rate to M$0.05 per km but extending the toll collection period from 25 to 30 years. The effect of extending the toll collection period from 25 to 30 years is estimated to increase UEM's revenues by M$20 billion over the five year period. In 1995, the above rates will be increased by 10 percent and thereafter be linked to the country's consumer price index. Taxi rates are set at 50 percent above car rates, buses double the passenger car rates and heavy goods vehicles three times the car rates. Motorcycles pay a flat rate of M$0.30 at each toll plaza. Current collections of tolls amount to about M$4.0 million per month, hardly enough to even begin servicing the debt.

**Impact of Tolls**

While tolls add about 10 percent to the cost of construction, the prospect of toll revenues did not mobilize additional resources for road construction. While a private concessionaire has been selected to build and operate the North-South Expressway, the government was forced to take on all risks associated with the venture and provide substantial guarantees. The generation of tolls is not expected to have any bearing on the cost of capital to the concessionaire since the toll revenues are insignificant when compared to the overall debt service. Neither was the pace of construction affected positively from the toll imposition. While the government's target date for completion is 1992, this is unlikely to be met due to the delays which have occurred as a result of the public debate over the project. It is unlikely to be completed before 1995.

What remains to be seen is the impact the tolls will have on users of the new expressway. No data is available for the most recently opened and tolled sections. However, the impact of tolling the Kuala Lumpur-Seremban (60 km) section of the North-South Expressway was analyzed in 1985 by Frida Johansen who concluded that, despite very low toll rates, as a result of the imposition of tolls on this section, 14 percent of the expressway traffic was diverted from the northern plaza and 12 percent at the southern plaza. This diverted traffic consisted about 95 percent of local traffic, indicating a very high sensitivity to price variations particularly among car users.

The effects of tolls on road users was to add between 30 percent and 100 percent to existing road use taxes, depending on the vehicle type. Table 2 shows the outcome of analyzing the cost and revenues on the Kuala Lumpur-Seremban section. Government increased its net revenues by M$10 million but a cost to the economy of M$5 million in real resources. Collection costs amounted to about M$2.6 million, or 20 percent of gross revenues from tolls. The same tax revenue could have been obtained more efficiently by increasing existing taxes on all road users by about 0.5 percent i.e., the share of current toll revenues in total revenues. Such a measure would also imply payment by those vehicles that pay no toll but benefit indirectly from a good expressway that lowers congestion on alternative roads. The public...
awareness about the cost of infrastructure has increased as intended, but not the willingness to pay. Most people recognize that it is "fair" for those who use a higher design road to pay a premium for reduced travel time. However, the level of diverted traffic indicates some resistance. Only those who perceive that it is worth paying extra to avoid the older, congested facility will pay the premium.

**Table 2**

Malaysia

Cost and Revenues From Tolling
the Kuala-Lumpur-Seremban Expressway, 1983
(Million M$)

<table>
<thead>
<tr>
<th>Costs to Users</th>
<th>Economic</th>
<th>Financial</th>
<th>Taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toll payments</td>
<td>-</td>
<td>12.3</td>
<td>12.3</td>
</tr>
<tr>
<td>Stop-go Cycles at Toll Plazas</td>
<td>0.7</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Increased VOC and Time Costs of Dverted Traffic (equated to avoided tolls)</td>
<td>1.8</td>
<td>2.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>2.5</td>
<td>15.4</td>
<td>12.9</td>
</tr>
</tbody>
</table>

| Costs (-) and Revenues (+) to Government    |
|---------------------------------------------|----------|-----------|--------|
| Toll Installation and Equipment             | -0.6     | -0.7      | -0.1   |
| Depreciation                               |          |           |        |
| Collection Costs                           | -2.0     | -2.0      | -      |
| Extra Road Maintenance Cost                | -0.03    | -0.03     | -      |
| Toll Revenues                              | -        | 12.3      | 12.3   |
| Increased Revenues from Other Taxes        | -        | 0.6       | 0.6    |
| Total                                      | -2.6     | 10.1      | 12.9   |

**Total (Cost)**

-5.1

*Source: Frida Johansen, Malaysia Toll Road Case Study, TRP report, 1985.*

The equity argument - those that benefit should pay - is not supported by the effects of tolling. There is no economic reason that tolls should cover full construction costs, and they do not. There is also no reason for charging users more on a higher standard road than on a lower standard one if the cost of the road use is not any higher. Taxes on road users in Malaysia are very high, covering both road construction and maintenance costs. As such, tolls represent a form of double taxation.

**Lessons Learned**

So far, the experience in Malaysia with toll roads suggests high economic costs. Almost half of every dollar of net revenue from tolling is estimated to be lost in uneconomic uses. One half of this cost is the cost of toll
collection. The remainder is the higher transport cost incurred by those who deviate from the expressway when a toll is levied because the toll exceeds the perceived value of extra operating cost and the extra time associated with traveling on the alternative route. Road users are sensitive to price increases, but indifferent to whether the increase is due to a pure financial transfer (toll) or to a higher use of resources (vehicle operating costs and travel time on poorer alternative roads). They will try to minimize the perceived cost increase but the perception of costs may not be accurate and may lead to choosing costly alternatives. While the new private operator (UEM) has raised toll levels, it is not certain that the increase will improve the ratio of revenue to economic cost. After a year or so of operation, it will be opportune to ascertain what levels of traffic diversion have occurred.

In practical terms, it is evident that tolling has not allowed the government to raise capital or build the road faster than if it had continued the project under the Public Works Department. Given the overall time span, it is questionable why the Public Works Department was not left to complete the project as originally planned. Political interference also has not been lessened under a separate highway authority or private operator. Furthermore, the decision to impose tolls has not benefited any of the parties so far involved in raising the necessary funding to complete the project, as Banks and private investors continue to perceive this as a high risk venture. In the end, it is highly possible that the government will intervene with the economic domestic banks it controls to raise the capital, and the major beneficiary will be UEM, which is guaranteed a profit. Road users will ultimately be paying a premium in the form of high economic and administrative costs.
Toll Roads and Financing of Road Expenditures in Yugoslavia

N. Cengiz Yucel

A. Introduction

The characteristic features of the Yugoslavian toll road system arise from special and, in many ways, unique features of the overall highway administrative system and financing methods used. In addition, the Yugoslavian toll road network, because of its important role in the total highway system of the country, indeed in the European road network, enjoys a highly advantageous position. In the following section the location, extent, and role of the Yugoslavian toll road network, both existing and planned, are described. The administrative structure of toll road authorities is discussed in Section C. The financing arrangements for toll road construction is closely tied to the road financing system existing in Yugoslavia. The salient features of this system and the earmarking arrangements governing road expenditures are presented in Section D.

B. Toll Road Network

Yugoslavia's transport system has been, to a major extent, shaped by its geography, the difficult terrain resulting from the Dinaric Alps which dip abruptly into the Adriatic Sea. The five openings that this formidable barrier allows have been the major determinants of the alignments for most of the transport routes, including the road system. The transport network serves as a unifying element for the eight republics and provinces which make up the Yugoslavian Federation, and provides a vital link in international traffic between western Europe and the Middle East as well as access to the sea for a number of Central European countries. The highway network plays a dominant role. It is now well developed and comprises about 120,000 kilometers of roads, of which about 67,000 kilometers are paved.

The backbone of the network is the Trans-Yugoslav Highway (TYH) running from Austria and Italy on the relatively easy terrain provided by the Sava and Danube Valleys, to the borders with Greece and Bulgaria, and linking the Middle East with Europe (see map 1). Traversing four republics (Slovenia, Croatia, Serbia and Macedonia) and the province of Vojvodina it is also regarded as an unifying element for the federation, hence the label, the Brotherhood and Unity Highway. At present various heavily trafficked sections of TYH with a total length of 520 kilometers have been constructed in four-lane motorway standard. An additional 50 kilometer section in Montenegro has two lanes, with plans for upgrading to a motorway standard when traffic volume warrants it. The TYH enjoys a highly special place in the Yugoslavian road network development plans. When completed it will have a total length of 1,170 kilometers.

All four-lane sections of the TYH are operated as tolls roads. In addition a number of other motorways are tolled. Among these about 49 kilometers linking Zagreb with Karlovac (part of E-65 and E-59), Belgrade-Novisad (E-75), and Maribor-Celije-Ljubljiana-Postojna are important.
In addition the bridge to the island of Krk and the Ucka tunnel are tolled. These various toll road segments add up to only a small portion of Yugoslavia's road network; however, they handle large volumes of traffic. In 1988 annual average TYH traffic ranged from 6,000 vehicles per day (vpd) in Macedonia to about 12,000 in Serbia, Croatia and Slovenia. Around large cities traffic volumes were much higher, reaching about 25,000 vpd around Belgrade in summer time, but only 10,000 vpd during winter months. The fluctuation is due mainly to foreign tourism and traffic: about 900 vpd in February compared to 11,000 in August. A significant part, on average about 25 percent of the traffic on the TYH, consists of foreign vehicles, that generate a considerable toll revenue in foreign exchange for the Yugoslav toll authorities.

Most tolled roads have toll-free alternatives. Often these consist of narrow circuitous roads passing through small towns and villages and therefore do not provide a real alternative. Despite this, imposition of tolls leads to some traffic diversion. Studies based on traffic behavior on the existing system indicate that in a closed toll system toll charges equalling 50 percent of the savings allowed by motorways divert about 10 percent of trucks to alternative roads; when charges represent 70 percent of the savings, diverted truck traffic increases to 20 percent. In the case of cars, tolls equalling 50 percent of travel cost savings lead to 7 percent of traffic choosing the alternative roads. With open-system tolling the diversion rates are somewhat above these figures.

C. Toll Road Administration and Rates

The toll road administration is largely determined by the structure established for administering the road network. The essential features of the highway administration were laid down by the Associated Labor Act of 1976, in which the responsibility for formulation of policies for development and administration of the road network in each republic and province was entrusted to Self-Managing Communities of Interest for Roads (SIZs). These unique entities are made up of delegates representing groups having an interest in roads, such as trucking enterprises, industrial concerns, and urban and local communities. The practice varies by republic and province, but SIZs exist at several levels for different classes of road. In Croatia for example, there is one SIZ for primary roads, eight SIZs for regional roads, and over one hundred for local roads. Regional and local SIZs are coordinated through the Republican Assembly which, guided by federal laws and social compacts, provides policy directives to their secretariat. The secretariat, headed by a secretary who is appointed by the assembly, implements policies. The secretariat, with its design, construction, and maintenance divisions, resembles a public works department. For design and planning work SIZs employ highway institutes; for maintenance, road maintenance enterprises; and for construction, independent contractors. Independent Basic Organizations of Associated Labor (BOALS) carry out various work activities. At the federal level, the Federal Association of Republican and Provincial Road Organizations (FARP) provides coordination in matters of development and overall planning of the highway sector.
Within this arrangement the responsibility for toll road administration, rate setting, and revenue collection is entrusted to the individual republics and provinces. The republican toll road network is operated by the local Autoput companies which are a part of the republican SIZ and which represent separate cost centers within the road administration system. The toll road companies are under the full control of their republican SIZs. They do not own the network. They simply administer tolls on the road network which is entrusted to them on the basis of the toll regime determined by SIZs. The administrative budgets of toll companies are determined by SIZs specifying the number of employees, expenditures for purchase of materials and the toll rates. Annual budgets of toll companies in some republics are specified in annual contracts agreed between the toll company and the SIZ. The toll revenues collected, after meeting costs, are passed on to the SIZs. The coordination among five toll companies is entrusted to FARP; the coordination is rather loose.

The toll authorities appear to be reasonably well operated: based on the information made available by Yugoput, the Serbian toll company that runs the Belgrade-Nis section of the THY, the wage costs represent about six percent of revenues collected with total collection costs estimated to be around 10-12 percent of total revenues. Recorded non-payments were estimated at about 2.5 percent of total vehicle transits. In addition there were losses, due to operator faults, amounting to about 3.5 percent of revenues. A substantial portion of revenues, about 27-30 percent, is allocated to routine maintenance of the system.

Different systems of toll collection have been adopted by each republic and province, even on the TYH that is viewed and planned as a single facility. In Slovenia an open system of toll collection is used, whereas in Croatia and Serbia the system is a closed one. In Macedonia and the province of Vojvodina, an open system is used pending completion of the second stage of construction of TYH, at which time a closed system will be introduced. There are also differences in the method of toll collection in terms of equipment used, classification of vehicles and the toll payment system. Recently in Croatia a magnetic card system has been introduced. In all republics tolls are based on the distance traveled (from the card taken on entrance) and paid at exit points, but in the Vojvodina province payment is made at the entrance point and is a flat rate for the 80 km travel from Belgrade to Novi Sad.

Toll rates also differ among the republics and the province of Vojvodina, although the structure of rates and effective rate levels are, by and large, similar except in Slovenia, where the toll structure is based on vehicle types rather than weight and the rates are appreciably higher (when adjusting for comparability). Average toll rates are shown below:
Table 1

TOLL RATES BY TYPES OF VEHICLES
(As of October, 1988)

<table>
<thead>
<tr>
<th>Vehicle Class</th>
<th>Dinar per km</th>
<th>US Cent per km</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Automobiles</td>
<td>45.0</td>
<td>1.3</td>
</tr>
<tr>
<td>II. Automobiles with trailers</td>
<td>67.5</td>
<td>2.0</td>
</tr>
<tr>
<td>III. Light trucks</td>
<td>135.0</td>
<td>4.0</td>
</tr>
<tr>
<td>IV. Heavy trucks with more than 3 axles</td>
<td>270.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

The structure and level of toll rates are not determined on the basis of costs and revenue requirements. However, as a broad guideline, toll authorities are expected to earn revenues at least to cover the collection and maintenance expenditures and debt servicing charges. It appears that the toll authorities establish the rates in relation to the charges imposed in neighboring countries after allowing for lower income levels in Yugoslavia. Vehicles with foreign registration are charged twice the rate applied to domestic vehicles; tolls, in addition to taxes imposed on foreign registered trucks, provide a mechanism for capturing some of the benefits of the motorway accruing to foreigners. On the Serbian section of the TYH, during the first nine months of 1988, foreign registered vehicles generated about US$ 5.0 million equivalent.

D. Tolls and Financing of Roads

Republic and province road authorities (SIZs) operate, to a large extent, on a self-financing basis for carrying out the road development and maintenance programs within their jurisdictions. Revenues collected from various user charges compose the primary source of funds (in 1988 about 74 percent) used for all types of road works including construction. The principal user charge is the fuel tax. Tolls are a distant second; proceeds from vehicle registration fees, taxes on foreign vehicles, and levies imposed on enterprise surpluses (profits) also contribute. In addition, republic and province governments allocate funds for construction of specific projects and, in severe winters, for snow removal. The federal government contributes to road development only in the lesser developed regions of Macedonia, Kosova, and Montenegro. Some road expenditures are financed from loans -- specially foreign loans. The Bank through its lending operations in the Yugoslavian road transport sector has participated in the construction of some sections of TYH (see table 2 below).

\[1/\text{Approximate exchange rate prevailing in October 1988 Din}\text{ar 3,400 = US}\$1.00.\]
Table 2
Sources of Revenue for Road Expenditures (1988)
(US$ million)

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Various Charges</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Fuel Tax Allocation to Roads</td>
<td>532.4</td>
<td>61.2</td>
</tr>
<tr>
<td>2. Tolls</td>
<td>60.3</td>
<td>6.9</td>
</tr>
<tr>
<td>3. Tax on Foreign Vehicles</td>
<td>15.3</td>
<td>1.8</td>
</tr>
<tr>
<td>4. Vehicle Registration Fees</td>
<td>39.7</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td>647.7</td>
<td>74.5</td>
</tr>
<tr>
<td><strong>B. Budgetary Allocations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Communities</td>
<td>32.5</td>
<td>3.7</td>
</tr>
<tr>
<td>2. Republican</td>
<td>27.2</td>
<td>3.1</td>
</tr>
<tr>
<td>3. Federal</td>
<td>21.2</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td>80.9</td>
<td>9.2</td>
</tr>
<tr>
<td><strong>C. Credits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Local</td>
<td>17.5</td>
<td>2.1</td>
</tr>
<tr>
<td>2. Foreign</td>
<td>124.1</td>
<td>14.2</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td>141.6</td>
<td>16.3</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>870.2</td>
<td>100</td>
</tr>
</tbody>
</table>

Among the levies imposed on road users the tax on fuel is the most interesting in that it yields the most revenue and in that the allocation of revenue collected from this source is governed by complex earmarking arrangements. Gasoline and diesel prices are uniform throughout Yugoslavia, with the Federal Government determining the price of crude oil, ex-refinery prices and final prices and each of the various elements of the tax levied. All distribution companies face the same input and sales price structures and receive the same margin for distribution. The price structure for gasoline for general road use is shown in Table 3.
### Table 3

**Gasoline Price Structure**  
(November 1988)

<table>
<thead>
<tr>
<th></th>
<th>Dinar per liter</th>
<th>US Cents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pump Price</td>
<td>1,730</td>
<td>43.5</td>
<td>100.00</td>
</tr>
<tr>
<td>2. Refinery Costs</td>
<td>804</td>
<td>20.2</td>
<td>46.5</td>
</tr>
<tr>
<td>3. Markup</td>
<td>102</td>
<td>2.5</td>
<td>5.9</td>
</tr>
<tr>
<td>4. Special Levy for Maintenance and Debt</td>
<td>80</td>
<td>2.0</td>
<td>4.6</td>
</tr>
<tr>
<td>5. Total Tax (Federal/Republic)</td>
<td>744</td>
<td>18.7</td>
<td>43.0</td>
</tr>
</tbody>
</table>

About two-thirds of the fuel tax revenue go into general funds. The allocations to roads are specified by law and as shown in Table 4, are further earmarked for separate sub-elements: maintenance, repayment of foreign loans, counterpart funds for construction of main regional roads, and of the Trans Yugoslav Highway.

### Table 4

**Allocation of Fuel Tax Receipts**  
(November 1988)

<table>
<thead>
<tr>
<th></th>
<th>Dinars per liter</th>
<th>US$ per liter</th>
<th>Percent of total fuel tax</th>
<th>Percent of Federal or Rep/Prov portion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Federal Portion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To General Revenue</td>
<td>611</td>
<td>15.3</td>
<td>82</td>
<td>100</td>
</tr>
<tr>
<td>To Roads:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) TYH and Other Primary Rds</td>
<td>149</td>
<td>3.7</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>(ii) 20% discretionary fund for maintenance</td>
<td>37</td>
<td>0.9</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2. Republic/Province Tax Portion</td>
<td>134</td>
<td>3.4</td>
<td>18</td>
<td>100</td>
</tr>
<tr>
<td>To General Revenue</td>
<td>63</td>
<td>1.6</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>To Roads:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) maintenance</td>
<td>32</td>
<td>0.8</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>(ii) debt</td>
<td>25</td>
<td>0.6</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>(iii) construction</td>
<td>14</td>
<td>0.4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>3. Total to Roads</td>
<td>257</td>
<td>6.6</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Total fuel tax</td>
<td>744</td>
<td>18.7</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

---

2/ At the exchange rate of Dinars 3,979 = US$ 1.00.
Recently, as an emergency measure, the federal government introduced an additional earmarked category to increase the level of maintenance funding, item No. 4 in Table 3. Such detailed earmarking arrangements introduce rigidities and therefore inefficiencies in resource allocation. In fact, the recent sharp increase in revenues collected from the fuel tax has raised two potential dangers: (a) misallocation of funds among different types of road works; and (b) excessive resource allocation to the road sub-sector at a time when macro-economic considerations call for a reduction in public spending. This issue is being addressed during the preparation for a Bank highway sector loan to Yugoslavia.

In those republics where toll roads exist, toll revenues account, on the average, about 9 percent of total annual road expenditures including debt repayment and maintenance. In Serbia, for example, in 1988 toll roads are expected to generate about US$ 25.4 million (based on the actual receipts for the first 9 months) representing 8.2 percent of the total expenditures. In Croatia tolls are expected to generate about 10 percent of the total road expenditures in 1989. Similarly in Slovenia, projections made for 1989 indicate that toll revenues will account for 9 percent of the total road expenditures.

With the completion of TYH and other motorway construction tolls will increasingly become an important source of road financing in Yugoslavia. Moreover, with a completed motorway network Yugoslavia's role as a transit country for Europe and particularly for the European Community (EC) will increase. At present about twice as many EC trucks use Yugoslavian roads as Yugoslav truckers use EC roads. This imbalance will likely increase. At the same time the EC intends to verify balances including that of transport by 1992. This move will likely lead to the establishment of sharp barriers between the EC countries and the rest of Europe seriously curtailing the operations of transport enterprises to non-EC countries including the Yugoslavian trucking enterprises. Negotiations between Yugoslavia and the EC have already started to reach an agreement whereby the Yugoslavian truckers can continue to operate relatively freely in the EC market. The present indications are that the EC, in return, will ask Yugoslavia to increase its axle load limit from 10 to 11.5 tons and also adopt the same road user tax structure as the EC countries. Given that a large portion of traffic using the Yugoslavian toll road system is either transit traffic or tourist traffic, it is not likely that the Yugoslavians will abandon their toll road policy for receiving some compensation for their use of its road network. In addition tolls have already become a fairly important source of funds for road development.
LOCATION OF TRANS-YUGOSLAV HIGHWAY
"BRATSTVO-JEDINSTVO" IN RELATION TO
INTERNATIONAL ROADS IN YUGOSLAVIA
TRANS-YUGOSLAV HIGHWAY AND
OTHER MAJOR ROAD NETWORK
The Mexican toll highway system was started with the opening of 61.2 km of highway from Mexico City to Cuernavaca on November 30, 1952. By 1958, 226 km were in place, and over the decade of the 1960s, about 634 km of toll highways were added to the system. Since 1970 only about 80 km of highways have been added, and until recently even the addition of lanes to existing toll highways has been limited. Presently the toll system totals 940 km of which about 60 percent or 572 km have four or more lanes (see table 1).1/ The remaining 40 percent of the toll network are high standard two-lane highways (pavement widths of about 7.5 m and maximum grades of about 5 percent) which have been designed to be upgraded to four lanes as traffic warrants. In addition, the toll system includes 44 bridges.

For the most part the existing toll highway system radiates from Mexico City; the Metropolitan Area, with a population of about 20 million, is the country's main generator of economic activity and traffic (see map). Almost 80 percent of this highway network is within a 180 km radius of Mexico City. In all cases the toll highways have a "free" alternative route, since this is a requirement of the constitution. In contrast to the highways, the toll bridges are spread throughout Mexico and in many cases alternative access is not available.

In addition to the federal toll highway network, the state government of Mexico has built and is operating two toll highways: Toluca - Atlatomuco (40 km) and La Venta - Naucalpan (11 km). The former is interesting in that it stretches the definition of a free alternative to a toll highway. Since the new two lane toll highway runs parallel to the existing two lane highway, the state government consolidated the highways to operate as a four lane highway, but collects a toll in one direction. The latter, La Venta - Naucalpan, has been recently completed as part of an urban bypass to the west of Mexico City and was partly financed by the World Bank under an urban transport project. In addition to the state of Mexico, several other states are in the process of constructing toll highways.

Traffic

In 1988, average traffic volumes on the federal network varied from a low of 1,600 vehicles per day (Compostela - Chapalilla) to a high of about 12,000 - 13,000 on short stretches of two lane highways. For a four lane highway the low appears to be about 2,700 vehicles per day and the high about 27,000 vehicles per day (Mexico - Queretaro). Average annual daily traffic volumes for most sections of the federal toll highway system are presented in table 2. On most of the toll highways cars and light trucks account for the majority of the traffic. However, on the industrialized corridors (such as Mexico - Queretaro and Apaseo - Irapuato and Puebla - Orizaba) trucks amount

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1/ Tables and graphs are attached to the paper.
to about 35 to 45 percent of the traffic. Bus traffic varies, but usually averages about 5 to 10 percent of the traffic.

The most notable feature concerning traffic is that it declined about 20 percent after a high in 1982 and only recovered to the previous 1980 levels in 1987. During the 1970s traffic on the toll roads had grown at an average annual rate of about 10 percent. This growth pattern abruptly changed after 1982 when the economy experienced a forceful external shock, the steep drop in oil prices. Presently the country is experiencing another severe drop in oil prices which could again affect economic and traffic growth. However, the government has been undertaking a major restructuring of the economy in order to be more competitive in international markets, and modest growth is expected to resume. In most of its traffic projections the Secretariat of Communications and Transport (SCT) is now using growth rates of 3 to 4 percent.

Objectives of Tolling

Since the early 1950s Mexico realized the need to upgrade its interurban highway network in order to promote the efficient exchange of goods and services. With the rapid growth of Mexico City, most of the need for high standard highways tended to concentrate around Mexico City where traffic volumes were the highest. Since the government considered it inequitable and undesirable to finance these works by a general tax increase on fuels or through the general budget when some regions still lacked even basic road access, it was decided to impose tolls on the new highways where free alternative highways were available. No doubt the requirement that a free alternative route be available has played an important part in promoting the public's acceptance of paying a toll for the use of the highway. Usually road markings clearly indicate the free alternative routing before entering the toll highway.

Over the years the government's objective of partially financing high standard highways through tolls has often wavered. For long periods, particularly when the economy was rapidly growing, tolls were not raised and it appeared that the government had little interest in cost recovery. Equity considerations appeared to have had less importance when resources were fairly abundant with expanding oil revenues. The new administration which took office in December 1982 made a fundamental change in CyPF's operations. Faced with a severe economic crisis, the new administration had to find revenue sources to reduce the public sector deficit. Highway and bridge tolls were seen as an underutilized source of income. Tolls were redefined as a general revenue tax to be collected on behalf of the Secretariat of Finance (SHCP) and then deposited with SHCP.

The Toll Highway Authority

In 1963, Mexico established Caminos y Puentes Federales de Ingresos y Servicios Conexos (CyPF), the Mexican toll highway authority, to operate and maintain toll highways and bridges and other related services. The design, contracting, and construction supervision of the toll highways and bridges is the responsibility of the Federal highway department of the SCT. CyPF is a quasi-public agency also attached to SCT. The board of directors and
management are appointed by the government, and the president of the Board is the Secretary of SCT. CyPF's organization is shown in chart 1. The organization is divided into two main departments: technical, which includes maintenance and operations (toll collection), and administrative. In addition there are six field superintendencies.

The original concept was that CyPF should be self-financing. Revenues were to be sufficient to cover operating, maintenance, and administration costs and generate a surplus to cover some investment needs. The government provided most of the initial investment capital through the roads constructed by SCT and in addition capital was provided through local and foreign loans. The World Bank provided financing for CyPF through two loans in 1962 and 1965 and further highway improvements are being financed under the second sector loan. Operating, maintenance, and administrative budgets were handled internally, but highway and bridge investments were subject to government approval.

Until 1981, revenues from CyPF's highway and bridge operations were sufficient to cover operating, maintenance, and administrative costs, including depreciation and debt service, and to generate annual net incomes. In 1981 and 1982, however, CyPF reported net losses for its highways of US$ 15 million and US$ 17 million, respectively. Tolls were not raised sufficiently to cover costs during a period of rapid inflation and local currency devaluations sharply raised the cost of foreign debt service. With few exceptions, toll rates were not increased in Mexico during the period 1952 to 1975 while traffic was rapidly growing and inflation was low. Between 1975 and 1982 toll rates were raised, but not enough to halt the decline in CyPF ability to finance all operating, maintenance, and financial costs. In addition, during this period CyPF was burdened with other money losing operations such as ferry and gasoline operations.

CyPF lost its financial autonomy in 1982 and was put under the direct financial and budgetary control of the Secretariat of Finance. CyPF receives funds from the general public sector budget, which are not necessarily related to tolls collected, although some provisions have been made so that funds need not physically pass to SHCP before being spent for budgeted items.

With the change of government policy and increased tolls, CyPF's net income, which went into general revenues, rose to nearly US$ 40 million in 1984. As can be seen from table 3, the financial position of CyPF continues to improve. Net income reached US$ 70.6 and US$ 93.2 million in 1986 and 1987 respectively. Although there are questions about the sufficient revaluation of assets, nevertheless CyPF is generating significant resources, particularly when considering that SCT's annual investment plan was less than US$ 200 million in 1987.

Toll Setting Principles

As with the objectives of tolling, the pricing principles varied over time. When the highways were originally constructed the main criterion appeared to be the recovery of at least the operating, maintenance, and administrative costs and debt service charges of CyPF. Full cost recovery
was not the objective, particularly since alternative free roads existed. As the Mexican economy was growing during the 1960s and first half of the 1970s, traffic growth rates generated sufficient revenues for CyPF to meet its obligations. Also, as oil prices improved there appeared to be little or no incentive for Mexico to use toll highways as a source of financing, and the toll highway system was not expanded.

As indicated earlier, the situation changed radically in 1982 when the new administration, in critical need of resources, redefined tolls as general taxes. The main principle in setting tolls appeared to be what the market could bear - so long as mass diversion of traffic to alternative roads was avoided. Tolls were increased across the board by 200 percent in January 1983 and by 40 percent in May and September, followed by a 30 percent increase in February 1984 in an attempt to catch up with inflation. As table 4 indicates, present tolls per kilometer vary widely from highway section to section. The relatively high tolls on short sections near urban areas such as Guadalajara-Zapotlanejo and Puebla-Amozoc indicate market pricing and the reflection of congestion of the local roads.

In line with the principle of pricing according to market demand, the government in 1983 put into effect a variable pricing scheme. Tolls were reduced in the evenings and nights and increased on weekends for the main corridors leading out of Mexico City, since highway demand has notable peaks during both the day and weekends. This was a form of congestion pricing to reduce the queues which often develop at the collection booths during weekends. However, soon after the implementation of night time pricing new queues started to form around the toll booths at the times of price changes, and the scheme was dropped. The weekend pricing system, while lasting longer, was also found too complicated to administer efficiently and was dropped.

More recently, tolls are being influenced by overall macro-economic policy. In an attempt to keep up with the rapid inflation during 1987 (about 150 percent), tolls were increased several times during that year. However, tolls have been frozen since January 1988 as part of the government's effort to curb inflation; the estimated increases in prices since then have been in the order of 40 percent (see graph 1).

Toll Rates

Compared to most international standards, toll rates in Mexico are still relatively low: The average for the entire system is 57 pesos per vehicle-kilometer (US$ 0.025). Vehicles are divided into nine classes: cars, buses, and seven sizes of trucks. The toll rate for cars varies between highway sections, but averages about US$ 0.02 per km (graph 2). As can be seen from table 4, the rates are fairly progressive according to vehicle size. A truck with five axles pays about 2.6 times the rate of car and a nine-axle truck pays over 6 times the rate of car.

Based on a study of BANOBRAS, the Mexican infrastructure development bank, the average toll rates being considered for a new toll highway are:
Toll rates per kilometer

<table>
<thead>
<tr>
<th></th>
<th>Two Lane</th>
<th></th>
<th>Four Lane</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peso</td>
<td>US$</td>
<td>Peso</td>
<td>US$</td>
</tr>
<tr>
<td>Cars</td>
<td>51.3</td>
<td>0.022</td>
<td>60.8</td>
<td>0.027</td>
</tr>
<tr>
<td>Bus</td>
<td>82.1</td>
<td>0.036</td>
<td>95.6</td>
<td>0.042</td>
</tr>
<tr>
<td>Truck (average)</td>
<td>93.7</td>
<td>0.041</td>
<td>114.0</td>
<td>0.050</td>
</tr>
</tbody>
</table>

These rates still appear to be low and probably reflect concern about traffic diversion and the desire to be close to the range of existing rates.

Toll Rates and Traffic Diversion

The measurement of the impact of toll rates on traffic diversion is complicated since it depends on the individual road section under consideration and since numerous factors affect traffic, such as seasonality, performance of the economy, and inflation. In general, however, it appears that the range of toll rates applied in Mexico has not had a significant effect on diverting traffic to alternative roads and thus increasing economic transportation costs. As indicated earlier, Mexico's constitution requires that a free alternative road be available, but the quality of the alternative is not defined. In some cases the alternative is parallel but in others it is circuitous and offers a poor level of service.

Table 5 provides traffic data on several major corridors. Traffic volumes on the toll highways are usually three to four times the volumes on the alternative free roads. The toll highway traffic data does not indicate any major trend or change that can be directly related to toll rate increases. Although traffic volumes have declined since 1982, this probably is more an indication of the severe decline in economic activity than to toll increases. In addition, the traffic data in 1985 and 1986 show that traffic on the free roads varies considerably from section to section; the low volumes in some sections suggest that most of that traffic is local in nature.

There are other indications that the present tolls do not result in significant traffic diversion. In December 1987, toll rates on highways were increased by 100 percent, yet traffic volumes on the overall toll highway system increased by 7.2 percent compared with December 1986. Similarly, after a further 65 percent increase in tolls in December 1987, traffic on the system was still 4.3 percent ahead of volumes recorded in January and February of 1987. Also, tolls are usually relatively low as compared to vehicle operating and time costs (table 6 and graph 4).

Toll Collection Efficiency and Control

Overall, toll road operating costs were calculated to be 13.6 percent and 12.4 percent of revenues in 1986 and 1987, respectively (table 3). These percentages are within the internationally accepted range. If administrative costs (prorated between sales, maintenance, and operations) are added to this
operating costs, the results are still within the acceptable range. As indicated, however, in the Bank's study of Mexican toll roads, in 1983 there were considerable variations in the ratio of collection cost to revenue between individual toll highways, with some ratios 50 percent or higher. The increase in tolls since 1983 has no doubt improved the situation, but more investigation in this area would be warranted.

As in many businesses which deal with cash transactions, the control of toll booth collection operations is difficult. CyPF uses a system of automatic axle counters to cross check the toll collection and the vehicle type. Also, there are various levels of supervision to make the diversion of funds more difficult. However, field inspections and discussions with local officials give reason to believe that collection control could be tighter. An indication of some revenue leakage is provided by the fact that traffic count information does not appear to coincide with toll booth collections. Also, while the automatic axle counting machines indicate the number of axles of a vehicle, there are difficulties in that a bus and a car both have two axles, and mechanical failures do appear from time to time. The administration of CyPF is taking steps to tighten controls and is acquiring new machines that will enable a better automatic classification of vehicle types. The new machines will take into account the number of axles, the space between the axles and the number of tires on each axle.

**Future of CyPF**

The new administration, which is to take office on December 1, 1988, is now giving consideration to alternative future organizations for CyPF. The movement towards decentralization is strong. One alternative would be to make CyPF an autonomous organization which would sell stock and borrow capital in order to finance future toll roads. Another alternative mentioned is that CyPF could be divided into regional organizations, and the existing toll highways could provide capital for joint venture operations with the private sector in order to further extend the existing toll road system. The new administration is keenly interested in the development of toll highway concessions which will take advantage of private sector participation; this is dealt with in the following paper of this volume.
# Toll Highways in Mexico

## Inventory of Highway Managed by CyPF

<table>
<thead>
<tr>
<th>No. OF ROADS</th>
<th>HIGHWAY</th>
<th>DATE OF INauguration</th>
<th>PARTIAL LENGTH (km.)</th>
<th>TOTAL CONVERTED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 LANES</td>
<td>4 LANES</td>
</tr>
<tr>
<td>99-O</td>
<td>MEXICO-CUERNAVACA</td>
<td>20 Nov. 1962</td>
<td>423</td>
<td>18.5</td>
</tr>
<tr>
<td>115-O</td>
<td>LA PERA-CUAUTLA</td>
<td>19 Jul. 1985</td>
<td>33.1</td>
<td>1.1</td>
</tr>
<tr>
<td>99-O</td>
<td>CUERNAVACA-IGUALA</td>
<td>20 Nov. 1964</td>
<td></td>
<td>91.7</td>
</tr>
<tr>
<td>100-O</td>
<td>MEXICO-PUEBLA</td>
<td>6 May 1982</td>
<td></td>
<td>116.0</td>
</tr>
<tr>
<td>156-O</td>
<td>PUEBLA-CORDOBA</td>
<td>29 Nov. 1964</td>
<td>96.6</td>
<td>76.3</td>
</tr>
<tr>
<td>196-O</td>
<td>NUEVO TEAPA-COSOLEACO</td>
<td>17 Oct. 1984</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99-O</td>
<td>MEXICO-TILATUNA</td>
<td>1 Nov. 1964</td>
<td></td>
<td></td>
</tr>
<tr>
<td>132-O</td>
<td>ENL. MORELOS-TEOTIHUACAN</td>
<td>11 Nov. 1987</td>
<td>21.9</td>
<td>9.8</td>
</tr>
<tr>
<td>57-O</td>
<td>TEPALACA-PALILLAS</td>
<td>1 Oct. 1966</td>
<td></td>
<td>97.1</td>
</tr>
<tr>
<td>46-O</td>
<td>QUEMATA-IRAPUATO</td>
<td>12 Feb. 1992</td>
<td>48.3</td>
<td>46.8</td>
</tr>
<tr>
<td>96-O</td>
<td>IAPOTLANO-QUADRILLARA</td>
<td>29 Nov. 1988</td>
<td>27.0</td>
<td>7.6</td>
</tr>
<tr>
<td>206-O</td>
<td>CHAPALILLA-COMPOSTELA</td>
<td>17 Nov. 1978</td>
<td>36.6</td>
<td></td>
</tr>
<tr>
<td>1-0</td>
<td>Tijuana-Ensenada</td>
<td>25 Apr. 1967</td>
<td>39.0</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>509.6</td>
<td>624.2</td>
</tr>
</tbody>
</table>

## Mexican Toll Road Traffic

### Average Annual Daily Vehicles (thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mex-Cu</td>
<td>18.4</td>
<td>18.6</td>
<td>19.5</td>
<td>21.5</td>
<td>22.9</td>
<td>19.0</td>
<td>19.0</td>
<td>20.8</td>
<td>2.8%</td>
</tr>
<tr>
<td>Cu-Acss</td>
<td>6.6</td>
<td>6.8</td>
<td>6.7</td>
<td>9.7</td>
<td>10.5</td>
<td>9.1</td>
<td>7.5</td>
<td>7.5</td>
<td>1.25%</td>
</tr>
<tr>
<td>Amz-Anz</td>
<td>2.7</td>
<td>3.9</td>
<td>5.0</td>
<td>6.6</td>
<td>6.9</td>
<td>5.2</td>
<td>4.8</td>
<td>4.8</td>
<td>2.4%</td>
</tr>
<tr>
<td>Mex-Quetr</td>
<td>18.4</td>
<td>18.6</td>
<td>23.5</td>
<td>27.8</td>
<td>28.4</td>
<td>20.4</td>
<td>20.6</td>
<td>20.9</td>
<td>2.2%</td>
</tr>
<tr>
<td>Quer-Coj</td>
<td>7.8</td>
<td>7.8</td>
<td>10.0</td>
<td>11.7</td>
<td>12.6</td>
<td>9.4</td>
<td>9.4</td>
<td>10.6</td>
<td>8.15%</td>
</tr>
<tr>
<td>Mex-Pub</td>
<td>22.1</td>
<td>20.1</td>
<td>29.4</td>
<td>32.7</td>
<td>35.6</td>
<td>27.1</td>
<td>25.9</td>
<td>27.0</td>
<td>1.8%</td>
</tr>
<tr>
<td>La Por-Cas</td>
<td>4.4</td>
<td>4.1</td>
<td>6.2</td>
<td>7.7</td>
<td>8.2</td>
<td>6.4</td>
<td>6.8</td>
<td>6.1</td>
<td>1.4%</td>
</tr>
<tr>
<td>Tiju-Ensen</td>
<td>4.4</td>
<td>4.6</td>
<td>6.2</td>
<td>6.9</td>
<td>5.9</td>
<td>5.4</td>
<td>6.3</td>
<td>6.7</td>
<td>3.0%</td>
</tr>
<tr>
<td>Apa-Irap</td>
<td>4.1</td>
<td>4.7</td>
<td>7.0</td>
<td>8.3</td>
<td>8.6</td>
<td>6.9</td>
<td>6.2</td>
<td>6.6</td>
<td>4.4%</td>
</tr>
<tr>
<td>Oriz-Coa</td>
<td>0.4</td>
<td>0.8</td>
<td>12.2</td>
<td>18.8</td>
<td>14.4</td>
<td>11.6</td>
<td>15.0</td>
<td>11.8</td>
<td>8.0%</td>
</tr>
<tr>
<td>Guad-lap</td>
<td>6.2</td>
<td>6.8</td>
<td>7.3</td>
<td>8.6</td>
<td>9.0</td>
<td>9.2</td>
<td>9.6</td>
<td>9.1</td>
<td>2.8%</td>
</tr>
<tr>
<td>Com-Pes-Chap</td>
<td>0.7</td>
<td>0.7</td>
<td>1.0</td>
<td>1.2</td>
<td>1.8</td>
<td>1.2</td>
<td>1.2</td>
<td>1.6</td>
<td>7.4%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100.0</td>
<td>97.5</td>
<td>164.0</td>
<td>165.0</td>
<td>164.7</td>
<td>129.4</td>
<td>129.0</td>
<td>112.3</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

### COF (trillions of 1997 Pesos)

<table>
<thead>
<tr>
<th>Year</th>
<th>COF (trillions of 1997 Pesos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>148.9</td>
</tr>
<tr>
<td>1977</td>
<td>151.5</td>
</tr>
<tr>
<td>1980</td>
<td>193.4</td>
</tr>
<tr>
<td>1990</td>
<td>205.0</td>
</tr>
<tr>
<td>1995</td>
<td>196.9</td>
</tr>
<tr>
<td>1996</td>
<td>204.4</td>
</tr>
<tr>
<td>1997</td>
<td>196.5</td>
</tr>
</tbody>
</table>

**Source:** Comunicación y Pontones
Table 3
Toll Highways in Mexico
The Toll Highway Authority (CyPF)
Statement of Revenue and Expenses 1986 and 1987

<table>
<thead>
<tr>
<th>REVENUES</th>
<th>Billions of Mex Pesos</th>
<th>Millions of US Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway Tolls</td>
<td>48.5</td>
<td>79.3</td>
</tr>
<tr>
<td>Bridge Tolls</td>
<td>16.2</td>
<td>26.5</td>
</tr>
<tr>
<td>Net Sales</td>
<td>9.4</td>
<td>15.4</td>
</tr>
<tr>
<td>Others</td>
<td>16.6</td>
<td>27.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>90.7</td>
<td>148.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COSTS AND EXPENSES</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs of Sales</td>
<td>9.6</td>
<td>15.7</td>
</tr>
<tr>
<td>Maintenance</td>
<td>18.0</td>
<td>29.4</td>
</tr>
<tr>
<td>Operations</td>
<td>8.8</td>
<td>14.4</td>
</tr>
<tr>
<td>Administration</td>
<td>4.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Financing</td>
<td>6.7</td>
<td>11.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>47.5</td>
<td>77.6</td>
</tr>
</tbody>
</table>

| NET INCOME                | 43.2                   | 70.6                   |

Maintenance/Highway & Bridge Revenue: 27.82 25.74
Operations/Highway & Bridge Revenue: 13.62 12.49
Operations + H & B Admin.(1)/H & B Revenue: 14.42 13.31
Highway Maintenance (2) per Two-Lane Km. (US$1,000): 14.3 15.9

(1) H & B Admin. pro-rated by Sales, Maintenance, and Operating Costs.
(2) Highway Maintenance pro-rated by Highway and Bridge Revenue.

Table 4
Toll Highways in Mexico
Toll Rates for Various Highway Sections for 1988

<table>
<thead>
<tr>
<th>Link</th>
<th>km</th>
<th>Pass./link</th>
<th>Pass./km</th>
<th>US$/km</th>
<th>Trucks (number of sales)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2, 3 &amp; 4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Puebla-</td>
<td>13.8</td>
<td>7900</td>
<td>4400</td>
<td>9800</td>
<td>12000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>208</td>
<td>5219</td>
<td>156</td>
<td>629</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0096</td>
<td>0.146</td>
<td>0.154</td>
<td>0.233</td>
</tr>
</tbody>
</table>

| Amapas- | 76.8 | 7900       | 4400     | 9800     | 12000      | 15000      | 17000      | 19000      |
|       |     | 37         | 65.8     | 66       | 66         | 129        | 156        | 198        |
|       |     | 0.018      | 0.028    | 0.028    | 0.042      | 0.067      | 0.098      | 0.098      |
|       |     | 0.098      | 0.098    | 0.098    | 0.098      | 0.098      | 0.098      | 0.098      |

| Espejo- | 79.8 | 7900       | 4400     | 9800     | 12000      | 15000      | 17000      | 19000      |
|       |     | 37         | 65.8     | 64       | 96         | 129        | 157        | 197        |
|       |     | 0.018      | 0.028    | 0.028    | 0.042      | 0.066      | 0.089      | 0.089      |
|       |     | 0.028      | 0.028    | 0.028    | 0.028      | 0.028      | 0.028      | 0.028      |

| Guadalupe- | 27.8 | 2100       | 3500     | 5000     | 7400       | 9700       | 11000      | 13000      |
|          |     | 71         | 112      | 125      | 126        | 126        | 131        | 273        |
|          |     | 0.011      | 0.049    | 0.066    | 0.067      | 0.110      | 0.137      | 0.182      |
|          |     | 0.166      | 0.193    | 0.215    | 0.215      | 0.215      | 0.215      | 0.215      |

| Mexico- | 81.8 | 2300       | 4100     | 6100     | 8700       | 10000      | 12500      | 14600      |
|          |     | 37         | 90       | 67       | 67         | 99         | 133        | 162        |
|          |     | 0.018      | 0.028    | 0.028    | 0.048      | 0.064      | 0.081      | 0.103      |
### Toll Highways in Mexico

#### Traffic Volumes on Toll and Free Roads 1976 - 1986

**Average Annual Daily Traffic**

(Thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Road</td>
<td>23-71</td>
<td>4.4</td>
<td>4.3</td>
<td>4.4</td>
<td>4.6</td>
<td>6.2</td>
<td>5.7</td>
<td>6.4</td>
</tr>
<tr>
<td>(Lowest Section)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toll Road</td>
<td>23-79</td>
<td>15.6</td>
<td>17.3</td>
<td>20.0</td>
<td>22.9</td>
<td>25.0</td>
<td>21.2</td>
<td>21.3</td>
</tr>
<tr>
<td>(Lowest Section)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico-Puebla</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free Road</td>
<td>29-124</td>
<td>3.1</td>
<td>5.0</td>
<td>4.8</td>
<td>6.8</td>
<td>8.7</td>
<td>7.1</td>
<td>6.3</td>
</tr>
<tr>
<td>(Lowest Section)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toll Road</td>
<td>28-124</td>
<td>14.9</td>
<td>16.5</td>
<td>17.0</td>
<td>19.3</td>
<td>19.3</td>
<td>18.0</td>
<td>17.8</td>
</tr>
<tr>
<td>(Lowest Section)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cuernavaca-Iguaña**

| Free Road         | 37-120   | 1.4  | 1.9  | 2.1  | 3.7  | 1.8  | 3.3  | 2.2  |
| (Lowest Section)  |          |      |      |      |      |      |      |      |
| Toll Road         | 37-98    | 4.6  | 4.4  | 4.8  | 4.2  | 7.3  | 6.7  | 6.9  |
| (Lowest Section)  |          |      |      |      |      |      |      |      |

**Tijuana-Ensenada**

| Free Road         | 28-104   | 1.4  | 1.5  | 1.5  | N/A  | 2.0  | 1.4  | 1.5  |
| (Lowest Section)  |          |      |      |      |      |      |      |      |
| Toll Road         | 34-106   | 4.8  | 4.9  | N/A  | 8.7  | 9.3  | 5.5  | 5.8  |
| (Lowest Section)  |          |      |      |      |      |      |      |      |

**Source:** SAHOP, Annual Traffic Counts, 1976-1986.

### Vehicle Operating Cost

**Terrain**

<table>
<thead>
<tr>
<th></th>
<th>Auto Speed (km/hr.)</th>
<th>Bus Speed (km/hr.)</th>
<th>Truck Speed (km/hr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>220</td>
<td>70</td>
<td>670</td>
</tr>
<tr>
<td></td>
<td>0.90/km</td>
<td>0.30/km</td>
<td>0.29/km</td>
</tr>
<tr>
<td>Rolling</td>
<td>222</td>
<td>778</td>
<td>664</td>
</tr>
<tr>
<td></td>
<td>0.47/km</td>
<td>0.34/km</td>
<td>0.37/km</td>
</tr>
<tr>
<td>Mountain</td>
<td>226</td>
<td>12.70</td>
<td>1970</td>
</tr>
<tr>
<td></td>
<td>0.14/km</td>
<td>0.10/km</td>
<td>0.06/km</td>
</tr>
</tbody>
</table>

**Vehicle Operating Cost with Time Cost**

<table>
<thead>
<tr>
<th></th>
<th>Auto Speed (km/hr.)</th>
<th>Bus Speed (km/hr.)</th>
<th>Truck Speed (km/hr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>260</td>
<td>90</td>
<td>680</td>
</tr>
<tr>
<td></td>
<td>1140</td>
<td>438</td>
<td>381</td>
</tr>
<tr>
<td>Rolling</td>
<td>260</td>
<td>1160</td>
<td>860</td>
</tr>
<tr>
<td></td>
<td>1140</td>
<td>438</td>
<td>381</td>
</tr>
<tr>
<td>Mountain</td>
<td>362</td>
<td>1.79</td>
<td>2064</td>
</tr>
<tr>
<td></td>
<td>0.1717</td>
<td>0.1074</td>
<td>0.6772</td>
</tr>
</tbody>
</table>

Graph 1

□ Average Auto Toll

△ Consumer Price Ind.
AUTO TOLL RATES—SELECTED SECTIONS

Graph 2

Toll Highways in Mexico

Toll: US Cents/km

mornavaca

+ Amacuzac-Iguala

○ Guad.-Zapotlanejo
TOLL RATES BY VEHICLE TYPES

Graph 3

- Mexico-Cuernavaca
- Guad.- Zapotlanejo

TOLLS: US cents/km

Vehicle Types:
- Autos
- Buses
- 2, 3 & 4
- 5
- 6
- 7
- 8
- 9
- 10 axles
MEXICO--TOLL HIGHWAYS

Toll Rates vs. Vehicle Operating Costs

Mexico - Cuernavaca: MT = Toll, MV = VOC, MVT = VOC + Time Costs
Guadalajara - Zapotlanejo: GT = Toll, GV = VOC, CVT = VOC + Time Costs
Financing, Construction and Operation of Highways Through Concessionary Arrangements in Mexico

Gabriel Castañeda Gallardo

The purpose of this paper is to review very briefly recent experience relating to toll roads in Mexico, and set out some general ideas that could illustrate possible future toll road development through concessionary arrangements.

I

It is fair to say that toll roads as such became an institutional part of the Mexican road system since the birth in 1963 of Caminos y Puentes Federales de Ingreso y Servicios Conexos (CyPF), a public entity entrusted to finance, construct, operate, and maintain toll roads, less than 400 kilometers at that time. Today, CyPF operates a network of about 1,000 kilometers, most of it concentrated around Mexico City and conurbated areas, comprising 18 sections, of which just four serve more than 60 percent of the network traffic.

The last highway built and operated by CyPF was opened in 1973, and since then there has been only marginal expansion of capacity, despite the fact that recent years have shown annual traffic growth rates in the range of 6 to 8 percent, indicating demand for expansion of existing capacity.

In fact, the limitations imposed on public finance since 1981 by Mexico's economic problems have prevented the government from investing in infrastructure projects long overdue. CyPF's income is unrelated to its network expansion. CyPF's current income is more than enough to cover maintenance, reconstruction, and collection costs. Surpluses are sent to the federal treasury, since they are not earmarked. One may wonder why earmarking has not been adopted as a policy, at the cost of neglecting a much needed growth of capacity, especially when the government has taken the right steps towards a sound pricing policy since 1983, through the implementation of several toll rate increases.

Urgent action was needed to find new ways to finance and build priority roads, and in 1986 the government enlisted Banobras (the Banco Nacional de Obras Publicas) a public works development bank, to help it analyze concessionary arrangements as an alternative to general revenue financing.

After some preliminary surveys and general examination of international experiences relating to toll road financing, the government and Banobras found:

1. That there were some positive indications from recent independent reports as to the possibility of implementing concessionary arrangements, such as:
a) high traffic volumes on some of the priority roads that need, therefore, to be expanded;

b) general high traffic growth rates (i.e., 6 to 10 percent);

c) road users are not very sensitive to toll rate increases but are, to savings in time and vehicle operation costs;

d) high rates of return on some sections of the road system could attract potential investors.

2. That, to avoid failure, many aspects demanded study and caution before engaging in a widespread program, and thus to begin with an experimental scheme would be highly desirable.

It was then decided that a trust could be used as a legal form to explore new concessionary arrangements. The trust in Mexico, a “fideicomiso”, is a legal device by which an individual or juridical person (“fideicomitente”, or settlor in anglo-saxon law) assigns goods or rights to some specific and lawful objective, entrusting a fiduciary institution (that has to be a bank) to that effect. The beneficiary of such objective would be the investor. Thus, under this arrangement the fideicomitentes would be the investors; the goods or rights assigned in trust would be the investment needed for the fulfillment of the objective; the objective would be the construction and operation of the highway under the concession agreement in order to obtain some rate of return (in addition to repayment of the original investment). The fiduciary would be Banobras.

The trust would have to be a private concern in order to avoid all governmental procedure and budgetary control to which public trusts are subject to. Under this basic idea the government would grant the concession directly to Banobras.¹

The next step was to explore possible sources of finance; several options were at hand:

a) Finance corporations: Informal talks showed that finance corporations required concessionary arrangements over toll roads already in operation under CyPF in exchange for new financing for the proposed highways. No fresh or complete schemes were proposed;

b) Revenue bonds: Due to the considerable risks involved in private financing of roads; the attractive alternative investment options available in the markets; and the need for government guarantees to back up road bond issues, this mechanism was postponed for future analysis. It could, however, be used to refinance costs once a toll road is operating;

¹ While Banobras is wholly owned by the government, it is a financially independent entity and not subject to government procedures and controls.
c) **State governments:** Due to potential regional benefits several state governments were approached to invest in new roads and considerable interest was found among them;

d) **Construction industry:** Very hard hit by recession, and lack of funding, this sector was the perfect candidate for participation in a new scheme with deferred payments. Construction companies enthusiastically responded to the general proposal.

With these findings in mind, two projects were selected by the government for completion through concessionary arrangements with a two-fold intention: to continue works that were halted due to lack of financial resources, and to start experimenting with a new concession mechanism. Preliminary analyses carried out on the two projects (Guadalajara-Colima and Atlacomulco-Maravatio) suggested the possibility of attractive rates of return on investments. Information gathered by the Secretariat of Communications and Transport (SCT) showed traffic close to 5,000 vehicles per day and that the investment needed was manageable as the government had already constructed part of the roads.

SCT then preselected contractors that it considered the most able to undertake the works, with good records, and they were invited to participate in the new scheme. They agreed to finance up to 25 percent of the investment needed, by being paid only 75 percent of their corresponding receivables. Such participation plus a real interest rate over the financing cost to be repaid by the trust. SCT negotiated unit construction prices below those in the official price catalogue.

The governments of Jalisco and Michoacan agreed to cover 25 percent of the investments and to cooperate in acquiring the right of way from private owners. Banobras would finance the remaining 50 percent through a loan to the trust.

The main risk to cover was a substantial underestimate of costs by SCT, since final engineering was not available for the construction projects. The government agreed to provide the necessary financial resources to complete the roads should that happen.

Other risks of concern were: a) delay in the construction work; b) inflation and higher financial costs; and c) errors in traffic forecasts by SCT and lower revenues. These risks were thought to be covered by the concession that granted a larger road section and the maximum legal period of 20 years.

Investors are to be repaid on a pari-passu basis as soon as net positive inflows from toll collection are obtained. In the meantime, the unpaid interest is to be capitalized (rolled over). Toll rates are to be adjusted from time to time, considering the financial viability of the trust, the elasticity of traffic demand, and the general level of tolls collected by CyPF in its network.

The trust then applied for and obtained the concessions, and works were immediately started. Concession agreements were granted to Banobras as
fiduciary to construct, operate, and maintain the toll roads, under the following main conditions:

a) the roads should be constructed according to SCT technical standards and under its supervision;

b) once completed, the roads would be operated by CyPF under a contract;

c) toll rate increases should be previously authorized by SCT;

d) concessions would last 20 years and then roads would revert to the government.

The roads thus selected are still in the construction process. The problems found so far -- the most important being a substantial cost overrun -- have provided valuable lessons. It is still too early to offer a final judgement of this experimental scheme, but some of the lessons learned are taken into consideration in the following section.

II

If fully private, concessionary arrangements are to be established as a reliable alternative to government financing of public works in Mexico, the change of attitudes that will have to take place is rather more important than the implementation of new legislation.

Mexican law allows the federal administration to grant concessions to prospective investors, although it does not prescribe specific mechanisms. The development and operation of a general framework for concessions would not demand an exhaustive change of legislation, but rather a new and liberal approach to the decision making process, along with a simple but complete set of operative and legal documents that would guarantee an unbureaucratic relationship with the concessionaire.

First of all, the government has to decide which roads, bridges, tunnels, and eventually other facilities such as airports or maritime ports are susceptible of concessionary arrangements, considering their importance for national or regional economic development.

The selected projects would then have to be evaluated using broad criteria, considering, of course, direct and indirect benefits to the users, possible sources of finance, the risks involved and their possible sharing by the government, toll level adjustments, potential traffic, costs, etcetera, in order to assess their feasibility.

The help the government could offer to prospective concessionaires could be, for instance, the granting of concessions over contiguous sections of facilities to be built in order to guarantee the repayment in due time; the acquisition of the land; currency exchange insurance, etc., such help to be granted according to the probability and importance of the risks involved in each project.
Selected projects would be included in a general program and implemented on a pre-determined schedule. The cost of final designs could be financed by Banobras and recovered at a later stage from the concessionaire.

The concessions would then be subject to public bidding in order to obtain maximum efficiency and transparency, through a procedure that shall take all aspects into account, whether related to finance, construction, or operation of the object of the concession. Taking into account the above-mentioned elements, the government would design exhaustive ad-hoc concession agreement drafts, tailoring "made to order suits" for each project, and specifying the terms and conditions under which the government would be willing to grant the corresponding concession. Draft bidding documents for these new arrangements are provided in the Annex.

The concession should be awarded to the bidder that offered the shortest period to enjoy the concession and the best combination of other elements, including toll rate levels, that guarantee the best terms and conditions for the government.

In summary, this general proposal suggests the implementation of a flexible scheme that would allow the government to strike the right balance between interests of the private concessionaire and the public interest, and thus attract investment and the management skills of private enterprises.

### III

The general ideas discussed above may indicate some useful conclusions:

1. The implementation of concessionary arrangements seems to be a feasible way to attract private financing and managerial skills for public works in Mexico.

2. The experimental scheme tried by Banobras through the trust mechanisms has provided a good foundation for further analysis from the practical point of view.

3. It is fundamental to design a complete legal and financial framework if concessionary arrangements are to be implemented as government policy. Such framework must consider:
   a) definition of a program covering several projects for potential concession, and its disclosure to the private sector;
   b) the use of the bidding process as a clear and efficient mechanism;
   c) the need to call for bids only when complete or almost complete designs are available;
   d) the advisability of supervising and regulating the concession through exhaustive agreements that nevertheless allow the indispensable flexibility.
ANEX
MEXICO
PRIVATE CONCESSION PROPOSAL
DRAFT BIDDING DOCUMENTS
PUBLIC ANNOUNCEMENT

The Secretariat of Communications and Transport calls for competitive bidding on the following:

1. PURPOSE: The administrative concession to build, operate and maintain the ___________road, which shall be operated under a toll regime.

2. SUBMISSION AND OPENING OF BIDS: Bids shall be submitted at (respective agency and address), on ____________. On such date, at ___ a.m., the opening of bids will take place in a public act led by officials particularly appointed by the Secretariat of Communications and Transport.

3. DOCUMENTS TO BE PRESENTED BY BIDDERS: Those mentioned in the General Conditions for Bidding. Bids lacking any requisite set forth in the Call for Bids will be rejected.
Bases

I. General Information:

The purpose of the present call is to open the bidding process for awarding the concession to build, maintain and operate under a toll regime the road.

The road's layout comprises from km ___ to km ___ in the States of _____________________________.

II. Information the Secretariat of Communications and Transport Will Provide to Potential Bidders:

Starting the working day following publication of the present Bases (in the Official Gazette of the Federation, the Official Gazettes of the States of ___________ and ___________, and in the three largest-selling daily newspapers edited in Mexico City and the States traversed by the road), copy of the following documents will be at the disposal of potential bidders:

a) The road's basic design project.

b) The technical specifications the concessionaire must comply with to build, operate and maintain the road, including average maximum toll rate to be applied initially and preserved at constant value throughout the concession term, independently of the toll adjustment formula set forth in the Concession Title draft.

c) The preliminary researches and reports relating to the road prepared by the Secretariat of Communications and Transport, with the understanding that such materials will be handed out as reference and might be perfected or modified by bidders.

d) The General Conditions for Bidding.

e) Draft of the Concession Title and its annexes.

This information can be obtained during working days and hours at (agency name and address) upon payment of $______________ to cover the cost of delivered materials.

III. Requisites Bidders Must Meet:

Bids may be submitted by individual or juridical persons comprised in Article 12 of the Law of General Means of Communication.

Bids submitted by all bidders must comprise all elements set forth in the General Conditions for Bidding referred to hereabove in Item II, clause d):
IV. DOCUMENTS TO ENCLOSE WITH BIDS:

Besides the complementary documentation set forth in the General Conditions for Bidding, bidders must enclose the following with their bids:

a) Designation of legal domicile in Mexico, D.F., legally authorized to receive all communiques related to the bidding.

b) The performance bond or deposit set forth in the General Conditions for Bidding.

V. MANNER OF SUBMITTING BIDS:

All bids must be submitted in closed and sealed envelopes at (agency and address).

All bids and enclosed documents will bear the following legend:

"Proposal for the Call for Bids by the Secretariat of Communications and Transport to award the administrative concession to build, operate and maintain the [toll road name] toll road".

VI. AWARDING OF THE CONCESSION

The Secretariat of Communications and Transport will examine accepted bids and shall award the concession to the bidder offering the shortest term to operate the concession, term for which the concession will be awarded. In the absence of such bidder, the bidding might be declared void.

Should there be a tie, the Secretariat will award the concession to the bidder offering to finish the related works by the earliest date. If the tie should persist, the Secretariat will award the concession to the bidder whose bid shows greater consistency, congruence and solidity in the execution of works and financial programs referred to in the General Conditions for Bidding.

VII. GENERAL DETERMINATIONS:

Provisions unforeseen herein will be judged and settled by the Secretariat of Communications and Transport.
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GENERAL CONDITIONS FOR BIDDING

I. BIDS:

Bid submissions have to comprise the following elements:

1. A record of all individual or juridical persons sharing the future Concessionaire Company's equity, with the understanding that under no circumstances might the share of foreign individual or juridical persons exceed 49% of the equity, as stipulated in the Law to Promote Mexican Investment and Regulate Foreign Investment.

2. The projected By-laws of the future Concessionaire, containing the elements required to perform and execute the projected Concession title and all requisites set forth herein; such projected By-laws will take into account the following:
   a) The Concessionaire shall be legally established as a stock company.
   b) The Company's sole objective shall be to build, operate and maintain the road previously concessioned by the Secretariat of Communications and Transport.
   c) The Company shall be of Mexican nationality and shall therefore be subject to Mexican Law and to the jurisdiction of Mexican Courts. Consequently, all foreign individuals or juridical persons participating in the Company's capital shall expressly agree to be regarded as natives in relation to their participation in the Company and will irrevocably waive their right of calling upon their governments to protect their investments; a breach of this stipulation will be punished with the loss of their share in favor of the Mexican Nation.
   d) The Concessionaire will be legally domiciled in Mexican Territory.
   e) The Concessionaire will exist for a period at least equal to the concession's agreed term, which will be determined upon formalization of the company's constitution.
   f) Stock representing the company's equity will be nominative.
   g) Companies with a foreign share in their equity will include an explanation of the provisions taken, should the concession be awarded to them, to comply with the regulations stipulated by the Law to Promote Mexican Investment and Regulate Foreign Investment.

3. Additions or modifications that, from the bidder's point of view and based on the design project approved by the Secretariat of
Communications and Transport, will result in an improvement of the project.

4. A quarterly building program and maximum term for completion of the works. Completion is understood as the road being in an immediate working condition.

The program will include the following aspects pertaining to each of the sections to be built in order to complete the road:

a) Building projects.

b) Term for beginning of the works.

c) Term for opening the road to traffic.

Under no circumstances will the building of the road begin later than six months after the award of the concession.

5. Total investment estimated for completion of the road. Investment shall be considered in its broadest sense and will be computed by adding up the following items: management and administration costs of the works; financial costs throughout the construction period; and, in general, cost of acquisition and/or construction of all assets directly related to the building and operation of the road.

6. Projected equity of the future company, setting forth total amount and percentage of the estimated total road investment costs that it represents. Such percentage may in no case be lower than 15%. In the event part of the equity is subscribed by foreign individuals or juridical persons or by Mexicans residing or domiciled outside Mexico, such part will also be explicitly set forth.

7. Amount of external resources, domestic and foreign, to complete the funding of the road investment, omitting the ratio between them, which, in all cases, shall adjust to the limits stipulated in the projected Concession Title.

8. Procedures and guarantees considered for obtaining the funding specified hereabove, in accordance with the conditions in the projected Concession Title.

9. Investment redemption program, divided by road sections liable to be self-operative.

The program will outline the regime proposed by the bidder to cover the differences between total expenses incurred, including financial expenditures, and total operation revenues, during each fiscal year of the operation term.

10. Planned toll-system, indicating all possible origin-destinations and distances traveled by users of the facility and location of toll booths.
11. Proposal on how maximum initial toll rates for each vehicle type will be applied; bidders shall include in their offers a chart distinguishing for all vehicle types every possible journey compatible with the adopted system, as well as tolls expressed in Mexican pesos for each case.

12. Proposed concession term, expressed in years and months. Such term will begin when the concession is awarded and will under no circumstances exceed twenty years.

13. Proposed location and operation of the road’s service areas indicating services to be rendered by the facilities established in each area. Location and number of maintenance areas should also be indicated.

14. Economic and financial program of the future company, which shall be divided in two parts for exhibition purposes:

   a) Anticipated economic results, together with proof of the project’s economic feasibility; an estimation of the investment’s yield, and basis for the toll level estimated to reach economic balance during the concession term.

   This program should also specify financial and operating expenses and receipts, as well as redemptions.

   b) Financial provisions, whose object should be to verify the coherence and compatibility between the amount of money available and its application.

15. Legal accreditation of the bidder’s legal status and capacity. In the case of juridical persons, such accreditation shall be done with notarial testimony of its constituent Title deed. The individual person signing the bid on behalf of the pertaining entity shall accredit his capacity to do so through a power of attorney on his behalf or, if such individual pertains to an organism with the authority to oblige upon him, with a certification of his appointment being in force issued by the Secretary of the Board of Directors or the management organism of the company placing the bid.

16. Proof of execution of a bid bond for $ (approximately, 2% of total investment), which will be refunded to the interested parties after assessment of the bids.

The guarantee of the Awardee of the Concession, shall be withheld until legalization of the concession, at which time it will be replaced with a bond guaranteeing the fulfillment of all obligations related to the concession at the time and in the form established by the Secretariat of Communications and Transport.
Bidders will obtain evidence of having submitted their bids, setting forth day and hour of delivery as well as total number of closed and sealed envelopes in their bid.

II. BIDDING AND AWARDING

17. On ___________19____, the Opening of Bids shall be held at (agency and address), under the conduction of (assigned officials by title), who shall examine the documents and will immediately reject bids lacking any feature or not conforming to the provisions set forth herein and in the Bases for Bidding.

The Act's respective certificate shall be drawn up. Rejected bids will be at the disposal of the submitters.

18. The Secretariat of Communications and Transport will examine accepted bids and will identify the most favorable within two months. The acknowledgement will be based on standards set forth in the Bases for Bidding.

The Secretariat of Communications and Transport may request bidders to clarify, explain or provide additional data related to their bids when deemed necessary.

19. The Secretariat of Communications and Transport shall award the concession to the bidder whose bid is considered the best in accordance with the Bases for Bidding.

The written communication of the adjudication will be published in the Official Gazette of the Federation within five working days after the date of adjudication.

20. The Awardee shall proceed to establish the stock corporation whose projected By-laws were an integral part of the bid documents; such establishment will strictly adhere to the text of the projected By-laws, exclusive of unsubstantial changes previously authorized by the Secretariat of Communications and Transport.

The Corporation must be established within two months after publication of the written communication of adjudication.

21. In a term not exceeding one month after publication of the written communication of adjudication, the Awardee must fix, and keep, a bond or deposit to guarantee the performance of the future obligations stipulated in the Concession; such bond or deposit will amount to ______________(approximately 10% of the expected investment).

22. In a term not exceeding __________after publication of the written communication of adjudication, the Awardee will be obliged to pay to the Secretariat of Communications and Transport an amount of ________________, corresponding to the cost of the final project design serving as basis to build the concession road.
III. CONCESSION

23. After fulfillment of the requisites set forth herein, the Secretariat of Communications and Transport shall proceed to sign the Concession Title with the Awardee.
DRAFT OF THE CONCESSION TITLE

CONCESSION GRANTED BY THE FEDERAL GOVERNMENT OF THE UNITED MEXICAN STATES THROUGH THE MINISTRY OF COMMUNICATIONS AND TRANSPORT (HEREIN CALLED "THE MINISTRY"), REPRESENTED BY ITS MINISTER_________________________, IN FAVOR OF_________________________(HEREIN CALLED "THE CONCESSIONAIRE"), REPRESENTED BY______________________________, TO BUILD, OPERATE AND MAINTAIN THE ROAD, BASED ON ARTICLES 36 OF THE ORGANIC LAW OF THE FEDERAL PUBLIC ADMINISTRATION; 4 AND 5 OF THE INTERNAL BY-LAWS OF THE MINISTRY OF COMMUNICATIONS AND TRANSPORT AND 1, 2 AND 8 OF THE LAW OF GENERAL WAYS OF COMMUNICATION, AND CONSIDERING THE FOLLOWING ANTECEDENTS

I. Complying with the National Communications and Transport Program, THE MINISTRY has carried out the building of roads to satisfy the demand for land transportation; nonetheless there is a pressing need for increase the road network's capacity at an accelerating rate in order to provide greater and better means of communication.

II. The Federal Government has prepared the Toll Works Program, which assigns priorities to the execution of works considered essential for the nation's development; the Program also considers advantageous the participation of private capitals in financing, building, operating and maintaining high-standards roads, in order to enlighten the burden that such works lay on the federal budget.

III. The ___________________ road is comprised in the program mentioned hereabove and its building shall induce the following benefits for the country's economy.

a) ______________________________.
b) ______________________________.
c) ______________________________.
d) ______________________________.

IV. In order to grant the concession to build, operate and maintain the ___________________ road, the Federal Government has called, through THE MINISTRY, for its public Licitation, as a result of which THE CONCESSIONAIRE placed the best bid according to the expected procedure.

V. THE CONCESSIONAIRE has fixed a guarantee that will be in force during the entire term of the granted concession and it has met all requisites established in the respective procedure.
CONCESSION

Based on the Antecedents hereabove, THE MINISTRY grants the concession to build, operate and maintain the road, which will be located amidst km and in the States of and:

THE MINISTRY shall provide whatever is necessary in order that THE CONCESSIONAIRE obtains the right of way free of cost and following a schedule suitable for the rhythm and measure of advancement of the Works Plan referred to in Annex 2 hereunder, to the effect that execution of works will not be delayed.

THE CONCESSIONAIRE can and must build, operate and maintain the road subject to this concession, as well as all related services or activities (the services or activities, like crane service, restaurants, gas stations, hostels, maintenance areas, workshops, hotels, etc., must be specified), which he may operate by himself or authorize by onerous or gratuitous Title a third party to operate them, provided that he fulfills, or the third party if obliged to fulfill, the following.

CONDITIONS

FIRST: Throughout the entire Concession term, THE CONCESSIONAIRE shall keep its legal personality as a Stock Corporation and will thus be subject to the Law of Mercantile Corporations and to the rest of the legal regulations corresponding to its nature and social purpose. It shall abstain from modifying the By-laws established when constituted without THE MINISTRY'S previous authorization. A certified copy of such By-laws has been appended hereinafter in Annex No. 1.

SECOND: THE CONCESSIONAIRE shall perform all works corresponding to the building of the concessioned road observing the maximum periods of time set forth in the Building Program appended hereinafter in Annex No. 2, and will maintain and rebuild the road complying with such Program.

THE MINISTRY will certify the company's strict compliance with the plans, programs and building reports, as well as the unrestricted fulfillment of the term for beginning of the works, for opening the road to traffic and for carrying on the maintenance and rebuilding works specified in Annex No. 2 hereunder.

THE MINISTRY will not be held responsible for defects or flaws resulting from the execution of the corresponding works.

THE CONCESSIONAIRE will be at freedom to hire a third party for execution of the works, but will be the sole responsible before THE MINISTRY with regard to the fulfillment of the obligations stipulated herein.
THIRD: THE CONCESSIONAIRE will partially or fully operate the concessioned road conforming to the terms and order established in Annex No. 3, hereunder.

Likewise, THE CONCESSIONAIRE is obliged to partially or fully operate the road in strict compliance with provisions established in the Regulations appended hereinafter in Annex No. 4.

FOURTH: If for any reason imputable to THE MINISTRY, or to the Federal Government in general, THE CONCESSIONAIRE was prevented from performing on time the Building Program appended hereinunder in Annex No. 2, THE MINISTRY shall compensate THE CONCESSIONAIRE for the lost time by ways of extending the initial term of concession. Such compensation will be determined after examination and clearly reasoned determination of the damage inflicted upon THE CONCESSIONAIRE by THE MINISTRY or Federal Government.

A likewise procedure shall ensue in the event of THE CONCESSIONAIRE not being able to partially or fully operate the road for any reason imputable to THE MINISTRY or Federal Government in general.

FIFTH: THE CONCESSIONAIRE will additionally:

a) Pay from its subscribed amount of which represents 15% of the estimated total road construction costs. This obligation must be fulfilled before beginning the respective works and such percentage must be kept throughout the entire concession term.

b) Observe the use of resources set forth in the Financial Program detailed in Annex No. 5 hereinunder.

c) Adjust itself to the procedures and guarantees anticipated for obtaining the credits indicated in the Financial Program referred to hereabove.

d) Adjust itself to the investment redemption plan forming part of the Financial Program referred to hereabove.

Any modification made to the Financial Program must be previously authorized by THE MINISTRY, who will see to its strict performance; nevertheless, under no circumstances will the external resources percentage be greater than 85% of the total estimated investment for building the road.

SIXTH: THE CONCESSIONAIRE will, by no means, be able to declare dividends before fully or partially operating the road.

SEVENTH: After repayment of operation, administration and maintenance expenses, financial costs, fiscal liabilities and all amounts due implying a decrease on gross profits, THE CONCESSIONAIRE will apply the remainder as follows:
Financing, Construction and Operation of Highways

a) To set up and keep the legal reserve.

b) If profits are greater than_____% of the nominal capital, to set up a special reserve corresponding to_____% of the excess over such percentage.

EIGHT: In all partial sections of the road, THE CONCESSIONAIRE shall apply the initial tolls set forth in Annex No. 6 herein under and will only be able to modify them conforming to variations in the national Consumer Prices Index, according to the mechanism set forth in Annex No. 6 hereto.

Should for any reason THE MINISTRY temporarily restrain adjustment to tolls as arranged in Annex No. 6 hereto, THE CONCESSIONAIRE will be entitled to compensation in cash for the damage being inflicted by THE MINISTRY; such compensation shall at all time conform to the principles and mechanism set forth in the second part of Annex No. 6 hereunder.

NINTH: The present Title shall be in force for a term of_______ years and_______ months as of the date of its issuing. At its conclusion, all assets attached to operation of the road shall revert in favor of the Federal Government, in good working condition, free and clear of any lien and encumbrance whatsoever, under the terms of Article 89 of the Law of General Means of Communication.

TENTH: THE CONCESSIONAIRE is constrained to submit quarterly financial statements and the corresponding yearly audited statement to THE MINISTRY, as well as to render each year to THE MINISTRY the reports referred to in Article 120 of the Law of General Means of Communication.

ELEVENTH: THE MINISTRY will be entitled to perform during any time inspections of the installations attached to the operation of the road in order to verify its condition; therefore, THE CONCESSIONAIRE is compelled to provide maximum facilities to inspecting officers appointed by THE MINISTRY.

TWELFTH: THE CONCESSIONAIRE may not assign or encumber, partially or fully, its rights under this concession or the assets attached to the operation of the road without THE MINISTRY'S previous consent.

THIRTEENTH: The Federal Government reserves its rights under Article 26 of the General Law of National Property to release the concession, according to proceeds set forth herein.

FOURTEENTH: As stipulated by prevailing laws, the present concession will not grant THE CONCESSIONAIRE real rights or proprietor ship of the road.

SIXTEENTH: To operate the road, THE CONCESSIONAIRE will be constrained to pay the Federal Government 1/2 of then fixed toll yearly revenues, according to Article 110 of the Law of General Means of Communication.

The above-mentioned amount will be paid at the Federal Office of the Ministry of Finance during the first thirty days of January following the corresponding year, notwithstanding the rest of the fiscal obligations deriving from operation of the concessioned road.

SEVENTEENTH: THE CONCESSIONAIRE is restrained to comply with provisions related to operation of the services furnished in the road, as well as to staff and assets control, in addition to, through according to, the Regulations set forth in Annex No. 4 hereto.

EIGHTEENTH: In addition to revoking causes set forth in Article 29 of the Law of General Means of Communication, THE MINISTRY might decide to administratively revoke the concession if any of the following events take place:

a) Unfulfillment of the obligations set forth herein and in the annexes hereto;

b) Repeated delay to meet the time limits established herein and in the annexes hereto;

c) Services carelessly rendered or not following the Operation Regulations set forth in Annex No. 4 hereto;

d) Collecting tolls not authorized by THE MINISTRY;

e) Not keeping the road in good maintenance;

f) Repeated disobedience of regulations established by THE MINISTRY within its legal functions.

g) Modification of THE CONCESSIONAIRE'S By-laws without THE MINISTRY'S previous written consent.

In the event of enforcing the concession’s revokement, THE MINISTRY will proceed according to provisions set forth in Article 34 of the Law of General Means of Communication.

Alternately, to avoid revoking the concession’s, THE MINISTRY may impose the conventional penalties set forth in annex No. 7 hereto.

NINETEENTH: In addition to provisions set forth in the Law of General Means of Communication, the concession maybe revoked should:
a) THE CONCESSIONAIRE declare bankruptcy or interrupt payments;
b) THE MINISTRY and THE CONCESSIONAIRE mutually agreed upon it;
c) The road be mostly destroyed;
d) THE CONCESSIONAIRE abandon service or stop operating the road more than 48 hours without justification or previous notification to THE MINISTRY;
e) THE CONCESSIONAIRE waived to its rights under the concession.

In any of these events, THE MINISTRY may take control of the road's operation, if proven advantageous and possible, and the bond previously fixed by THE CONCESSIONAIRE will be lost.

TWENTIETH: In case of unfulfillment of the fiscal obligations related to operation of the concession, THE CONCESSIONAIRE expressly agrees to submit to the administrative procedure of execution set forth in Section V, Chapter III, of the Fiscal Code of the Federation.

TWENTY-FIRST: For all provisions related to building, operation and maintenance of the road unforeseen herein, the regulations set forth in the Law of General Means of Communication, as well as all regulations, legal publications and notifications prescribed in the future by THE MINISTRY or corresponding authorities, will apply.

TWENTY-SECOND: Any dispute arising out of this Title, which the Federal Government is unable to resolve administratively, will be settled by the Federal Courts of Mexico City; therefore, THE CONCESSIONAIRE waives any immunity it may claim for itself or its assets in any jurisdiction by reason of its present of future domicile or by any other reason. To such effects, THE CONCESSIONAIRE is compelled to give written notice to THE MINISTRY of any change of domicile throughout the entire concession term; in case of omission, all notifications will be given, and considered received, when published only once in the Official Gazette of the Federation.

TWENTY-THIRD: Employment in any form of the present document implies unconditional agreement of THE CONCESSIONAIRE with all its provisions.

Given in Mexico City, Federal District, on ____________19______.
ANNEX NO. 1

(Testimony or certified copy of THE CONCESSIONAIRE's Constituent Title Deed).

ANNEX NO. 2

(Construction Program or Schedule)

ANNEX NO. 3

(Operation Program of Schedule)

ANNEX NO. 5

(Financial Programs)

ANNEX NO. 6

(Projected initial tolls, Formula and Mechanism for toll variations. Mechanism to compensate untimely toll variations by act of authority)

ANNEX NO. 7

(Unfulfillment Penalties)
Some Empirical Evidence: Road Funds in Mali and in Central African Republic

William Oakland

MALI

Let us first consider Mali. Landlocked and impoverished, Mali has employed earmarking for highways since 1971. A portion of taxes on fuel and certain highway toll proceeds are earmarked to the Road Fund (Fonds Routier). These resources are augmented by appropriations from the general budget and by grants from foreign governments and international agencies. The sources of Mali’s highway expenditure are shown in table 1:

Table 1
Highway Expenditure, Mali, 1971-83
(millions of MF)

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Total Spending on Construction and Maintenance</td>
<td>3431</td>
<td>6100</td>
<td>3159</td>
<td>6738</td>
<td>6163</td>
<td>5618</td>
<td>6146</td>
<td>8342</td>
<td>9733</td>
<td>10989</td>
<td>19764</td>
<td>18908</td>
<td>23715</td>
</tr>
<tr>
<td>Road Fund</td>
<td>1400</td>
<td>1921</td>
<td>1933</td>
<td>2308</td>
<td>1882</td>
<td>1884</td>
<td>2446</td>
<td>2685</td>
<td>4287</td>
<td>4240</td>
<td>4842</td>
<td>5270</td>
<td>5311</td>
</tr>
<tr>
<td>National Budget</td>
<td>157</td>
<td>176</td>
<td>209</td>
<td>278</td>
<td>557</td>
<td>530</td>
<td>473</td>
<td>380</td>
<td>337</td>
<td>283</td>
<td>435</td>
<td>451</td>
<td>461</td>
</tr>
<tr>
<td>External Sources</td>
<td>1874</td>
<td>4003</td>
<td>957</td>
<td>2072</td>
<td>3724</td>
<td>3202</td>
<td>3227</td>
<td>5277</td>
<td>5109</td>
<td>6446</td>
<td>14487</td>
<td>13187</td>
<td>17943</td>
</tr>
<tr>
<td>2. Total Road Fund Expenditure</td>
<td>1400</td>
<td>1921</td>
<td>1933</td>
<td>2308</td>
<td>1882</td>
<td>1884</td>
<td>2446</td>
<td>2685</td>
<td>4287</td>
<td>4240</td>
<td>4842</td>
<td>5270</td>
<td>5311</td>
</tr>
<tr>
<td>Investment</td>
<td>736</td>
<td>936</td>
<td>1050</td>
<td>940</td>
<td>1180</td>
<td>1073</td>
<td>1415</td>
<td>1119</td>
<td>1875</td>
<td>1484</td>
<td>2689</td>
<td>3125</td>
<td>3575</td>
</tr>
<tr>
<td>Maintenance and Other</td>
<td>664</td>
<td>965</td>
<td>883</td>
<td>1448</td>
<td>702</td>
<td>811</td>
<td>1031</td>
<td>1566</td>
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<td>2756</td>
<td>2153</td>
<td>2055</td>
<td>1736</td>
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<tr>
<td>3. Current Highway Expenditure</td>
<td>697</td>
<td>906</td>
<td>1123</td>
<td>1726</td>
<td>1259</td>
<td>1158</td>
<td>1334</td>
<td>1946</td>
<td>2749</td>
<td>3039</td>
<td>3126</td>
<td>3164</td>
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<td>4. Road Fund Receipts</td>
<td>1400</td>
<td>1921</td>
<td>1933</td>
<td>2309</td>
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<td>3296</td>
<td>3302</td>
<td>5068</td>
<td>4320</td>
<td>6013</td>
<td>6248</td>
</tr>
</tbody>
</table>

*a. Includes maintenance, administration, PHREBC, and urban streets.
*b. Reflects approximately 1,000 of IDA participation.

External sources are seen to account for the largest share of highway outlay, ranging from a low of 30% in 1973 to a high of 76% in 1983. A good deal of this upsurge is accounted for by the Sevare-Gao project, which in 1983 accounted for nearly 60% of total highway expenditure. While foreign

This section was drafted in 1986, and although it has not been updated, it was considered of interest for this volume.
sources are generally devoted to construction projects, some of IDA's contribution in later years has been targeted towards maintenance.

Responsibility for maintenance falls primarily within the province of the Road Fund. The division of Road Fund expenditures between investment, on the one hand, and maintenance and administration, on the other, is also shown in table 1. With the exception of the 1978-80 period, investment outlays, usually the provision of local counterpart funds, have consumed a majority of Road Fund resources. This has been the source of considerable frustration to Bank staff who believe that maintenance outlays should receive much higher priority. Total non-capital highway spending, including that financed through foreign aid, is shown in line 3 of the table. It is seen that this often substantially exceeds Road Fund maintenance outlays, suggesting considerable participation by foreign agencies.

Road Fund outlays have not always been synonymous with Road Fund receipts as item 4 of table 1 shows. The divergence began to appear in the mid-seventies and was the result of the illiquidity of the Mali Postal Saving System. A significant portion of Road Fund receipts came in the form of deposits in the Postal System. These deposits were frozen; hence, authorities were sometimes unable to spend Fund balances.

Because of significant inflation the figures in table 1 give a misleading picture of the growth or decline of highway resources over the period. Using the GDP price deflator (unavailable for 1982 and 1983) several of the figures in table 1 are converted to constant purchasing power in table 2:

Table 2
Highway Expenditure, Mali, 1971-81
(millions of 1972 MP)

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Total Spending on Construction and Maintenance</td>
<td>3677</td>
<td>6100</td>
<td>2986</td>
<td>4238</td>
<td>4561</td>
<td>3749</td>
<td>3805</td>
<td>4708</td>
<td>4958</td>
<td>5144</td>
<td>8468</td>
</tr>
<tr>
<td>2. Road Fund Expenditure</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total Maintenance and Other</td>
<td>1500</td>
<td>1921</td>
<td>1827</td>
<td>2136</td>
<td>1393</td>
<td>1258</td>
<td>1514</td>
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<td>2183</td>
<td>1985</td>
<td>2074</td>
</tr>
<tr>
<td>3. Current Highway Expenditure</td>
<td>669</td>
<td>965</td>
<td>835</td>
<td>1235</td>
<td>514</td>
<td>541</td>
<td>638</td>
<td>884</td>
<td>1228</td>
<td>1290</td>
<td>922</td>
</tr>
<tr>
<td>4. Road Fund Receipts</td>
<td>747</td>
<td>906</td>
<td>1061</td>
<td>1544</td>
<td>931</td>
<td>773</td>
<td>838</td>
<td>1098</td>
<td>1400</td>
<td>1422</td>
<td>1339</td>
</tr>
<tr>
<td>5. Fuel Taxes</td>
<td>1500</td>
<td>1921</td>
<td>1827</td>
<td>2065</td>
<td>1529</td>
<td>2019</td>
<td>1804</td>
<td>1860</td>
<td>1682</td>
<td>2346</td>
<td>1850</td>
</tr>
</tbody>
</table>

a. Contains approximately 450 IDA participation.
If we abstract from the effects of the Sevare-Gao project in 1981, total highway spending shows modest growth over the period. Much of this growth was financed by external sources because Road Fund expenditure grew little, if any, over the period. The latter, in turn, reflected the anemic growth of fuel taxes. Indeed, before a major increase in fuel prices and fuel tax rate in 1980, real fuel taxes had been falling (see line 5 of table 2). This is not uncommon pattern for gasoline excise taxes because they are often set in specific as opposed to ad valorem terms. Consequently, they tend to be eroded by inflation.

Looking at the composition of real highway expenditure, we find some modest growth in maintenance and current spending categories. Nevertheless, the growth has not been steady, with a sharp peak in 1974 followed by substantial reductions during 1975-77 and 1981. The effects of IDA participation in maintenance expenditure is evident from a comparison of lines 2b and 3. Overall non-capital spending, line 3, showed less volatility over the period. This could be interpreted as a relaxation of local funding for maintenance in the face of increased IDA contributions.

What can be inferred about the effect of earmarking upon the level of Mali resources devoted to highways? Line 2a of table 2 indicates only a small -- 10% -- increase in real Road Fund expenditures over the period. Within the time period, however, earmarking did not prevent substantial decreases in real resources available for highways.

The success of the Road Fund, however, is best judged relative to some index of overall economic activity, such as GDP, or relative to some measure of overall government spending. In the former instance, we would expect some growth in the Road Fund simply because of overall economic growth. In the latter case, growth could be expected to occur because the government sector itself is growing. Indeed the growth of total government spending might be an estimate of the growth of local resources for highways in the absence of earmarking. Inspection of lines 5 and 6 of table 3 do not paint an impressive picture for earmarking. Relative to GDP, the Road Fund fell. The average for the first three years, 1971-73, stood 20% higher than the average for the last three years. Moreover, the existence of earmarking did not prevent the share of local highway resources from falling considerably during the mid-seventies. The same story emerges even more vividly with a comparison with total government spending. Line 9 shows a considerable increase in the share of government in GDP over the period -- in marked contrast with the Road Fund. Hence, highway's share of budgetary resources fell sharply, despite earmarking -- or perhaps because of it. By being insulated from the growth of the economy and of general government revenue, earmarking may have actually served to retard the growth of local resources devoted to highways.

Nor can it be said that earmarking has increased the quality of highway expenditure. Tables 2 and 3 paint the same story about the behavior of maintenance expenditures as it did for the Road Fund as a whole. Indeed, the fraction of Road Fund expenditure devoted to maintenance averaged nearly 50% at the beginning of the period but only 26% at the end. One cannot conclude, therefore, that earmarking increased the effectiveness of highway spending in Mali.
Finally, we consider the question of the stability provided by earmarking. Table 3 shows that local outlays on highway maintenance were more volatile than the economy as a whole or than government as a whole. With the exception of 1974-75, government consumption grew fairly steadily relative to GDP. Spending upon maintenance or highways as a whole, on the other hand, fluctuated relative to both GDP and government consumption over the period, making them more unstable than both. Looked at differently, spending upon highways sometimes fell when the rest of the government was expanding relative to GDP.

To sum up, earmarking for highways in Mali does not seem to have resulted in the advantages that are sometimes attributed to it. Neither the level, mix, nor stability of highway expenditure appears to have been improved. We conclude this section with some observations as to why earmarking may have failed in Mali.

First, let us make the observation that specific taxes upon fuel, such as those underlying the Road Fund in Mali, are entirely inappropriate in an inflationary environment. At best, such taxes will be adjusted periodically so as to maintain their real value or, at worst, the tax is left to atrophy. In the former case, there are periods of feast or famine because the adjustments are likely to be excessive in the short-run but inadequate in the long-run. Moreover, with frequent resetting of tax rates, the arrangement begins to take on the character of general fund budgeting because the level
of the tax and, hence the level of expenditures, comes up frequently for decision.

In the situation at hand, prices nearly doubled over the period, whereas the tax rate was only adjusted in 1979. Moreover, part of the adjustment was diverted from highway use towards general expenditures.

A second problem was obviously the illiquidity of the Postal Checking Service. Clearly, such a problem could not be anticipated at the time earmarking was established. The effect of the crisis was to make Road Fund resources subject to the decision of the General Treasury. In effect, suspension of conversion of Postal Deposits amounted to repeal of the earmarking provision.

Third, if the concern of the Bank and other advocates was to increase the flow of resources devoted to maintenance, it makes little sense to earmark taxes to highway spending as a whole. The incentives to create monuments or to simply show tangible output are not diminished nor hampered by such an earmarking arrangement. In short, if the object is to increase maintenance expenditure, then earmarking should be restricted to this purpose. This is not to say that there would not be problems in administering such an arrangement because of the difficulty in drawing the line between investment and maintenance activities.

Finally, having said all of this, earmarking can succeed in promoting the efficiency of highway expenditures only if highway authorities are sufficiently skilled and properly motivated. Even if earmarking increases the flow of resources "directed" to maintenance, such funds could be easily squandered by poor or indifferent management. The institution of earmarking is no remedy for such deficiencies.

Central African Republic

Although no data is available on the historical path of revenues and expenditures of its Road Fund, several Bank reports have provided qualitative evidence about the performance of highway earmarking in the Central African Republic.

A Road Fund has existed on and off in the CAR since 1960. Initially, however, the Road Fund did not constitute an example of earmarking because, although legally restricted to draw on only certain revenue sources, disposition of the latter were completely at the discretion of general budget authorities. The dedication of revenues carried no more significance, therefore, than a statute which would require the U.S. government to finance the Supreme Court out of the proceeds of the Personal Income Tax. In effect, the Road Fund was simply the agency to which responsibility for spending general budget appropriations was delegated. Lacking substance, therefore, the Road Fund concept was abandoned in 1963.

In 1970 the Road Fund was revived with a truly earmarked source of revenue -- CFAF 5 per litre of fuel. However, this allotment was so small as to require large appropriations from the general treasury to conduct
highway programs. Thus, discretion as to program mixes and levels were still vested with general budget officials. For general fund resources constituted the decisive "margin" for decision-making.

With minor modifications, this situation persisted until 1981 at which time a third Road Fund was established. Under these arrangements the Road Fund took on much of the character of earmarked finance. First, the Road Fund was given a distinct legal identity, quite separate from the general government. Finances for the Fund are provided by an ear-marked tax on fuel (originally CFAF 20 per litre, then CFAF 30) which is deposited directly in its commercial bank account. Approximately 85% of Road Fund revenues are restricted to the maintenance and operation of the nation's roadways and ferries.

Preliminary indications suggest that these arrangements constitute a major improvement in highway finance. Under preceding Road Funds, maintenance was assigned very low priority; virtually all maintenance was financed by foreign sources. Under the third Road Fund, however, the local resources devoted to maintenance have improved dramatically. It should also be noted that, despite considerable inflation since 1981, Road Fund real revenues have not lost ground. In part, this reflects an agreement with foreign lenders to maintain the real value of the fuel tax assigned to the Fund and in part because the managing board of the Fund is free to propose such increases.

This sketchy evidence suggests that earmarking has tended to increase the resource flow to highway maintenance. It is not possible to ascertain whether earmarking has been too successful in promoting such expenditures. However, one Bank report suggests that Fund revenues are insufficient to meet the levels of effort established in loan agreements. On the other hand, another Bank report indicates that government-financed maintenance outlays are ineffective. This reiterates our earlier finding that availability of maintenance funds is no guarantee of successful maintenance.

An interesting and open question concerns the political viability of the Road Fund. There is already evidence of significant political pressures upon the governing board to channel Fund resources into other expenditure programs. The ability of the Fund to resist such encroachments will ultimately rest with its ability to remain in favor with the country's non-democratic leaders. It may well be that, once the Bank and other foreign lenders lose interest or pull out of the country, the Road Fund will atrophy. This is an unavoidable risk associated with non-democratic regimes, particularly those without a long tradition of governance.

To conclude this section, the lack of hard data precludes any firm conclusions about earmarking from being drawn from the CAR experience. Nevertheless, there is sufficient qualitative evidence to warrant the suspicion that earmarking might have had favorable consequences. Moreover, it nicely illustrates that the success of earmarking turns on a number of institutional arrangements -- not simply the dedication of some revenue source to some expenditure activity.