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(We will change the page numbers at the very end of editing the document)

Preface

Toll roads are constructed in particular districts or as part of a national trunk road network, using borrowed construction funds, so as to avoid delays in construction caused by shortages of funds. The loan is paid back, and other maintenance costs met, wholly or partially from the tolls paid by users.

The aim of this Knowledge Data Base (KDB) is to collect information on the maintenance and operation of toll roads, principally from 18 countries which currently use them. We hope to find patterns in the experiences of these countries and thereby to supply data which may help in reaching policy decisions at each stage of the construction of toll roads. The KDB seeks to cover the entire range of information necessary to toll road maintenance and management, including all the various financing methods. The contents are classified into five chapters, covering the following areas:

1. From Establishment of Master Plan to Toll Road Management
2. Criteria for the Decision on Whether to Adopt a Toll-Road System
3. Financing of Toll Roads
4. Legal and Organizational Structures for Toll Roads
5. Operational Management and Toll Fees

We imagine that our readers will mainly be people involved in setting road policy or active in the business of building and operating roads -- people who have some knowledge and experience of toll roads and have an interest in establishing sustainable toll road systems.

The KDB is one of the fruits of cooperative studies carried out under a technical cooperation agreement made between the World Bank and the Ministry of Construction of Japan in September 1997. The Ministry has enjoyed the support

of the Japan Highway Public Corporation, the Metropolitan Expressway Public Corporation and the Hanshin Expressway Public Corporation. We hope that the data we present here will be put to full use in the years to come.

Chapter 1: From Establishment of Master Plan to Toll Road Management

A master plan is usually a project covering a comparatively long-term plan of 20-30 years, and this database looks mainly at intercity motorway networks.

Establishing and announcing a master plan, with clearly stated objectives for construction and maintenance of networks, is an important step toward assuring the continuity and consistency of policy. The master plan also helps to decide the order of priorities for construction under the prevalent social and economic conditions and to prepare necessary resources for the execution of plans. Having said that, there are cases where master plans once decided are repeatedly revised before its completion, and sometimes several trunk roads are built before a master plan is even made.

The nature of stand-alone toll roads (a term used where one or more individual segments of a network are to carry tolls, rather than the entire network; see Section 2.1 below) is such that they do not unnecessarily require a master plan. Nevertheless, a few countries do include linking trunk highways and high-standard arterial roads in their master plans. Such roads account for approximately 2,500 linear km in Japan).

In cases where private-sector or semi-public corporations have a role in the management of toll roads, a number of enterprises should be able to take part on the basis of the competition principle, in theory at least. However, history shows that increasing the number of companies does not always produce a better result, as will be explained in Section 4.3. This suggests that it might be advantageous to draw up another master plan to cover the operating bodies of toll roads. However, no country has designed such a master plan yet.

1.1 Master Plans for Toll Roads (by Country)

Master plans to operate expressways and trunk roads, both toll-free and tolled, have been drawn up in many countries.

In many cases, master plans for intercity motorways are revised in the course of execution. Japan has had comparatively few revisions: just three (3,730 km in 1957, 7,600 km in 1966 and 11,520 km in 1987), whereas France has carried out seven revisions, in 1952, 1960, 1970, 1977, 1988, 1990 and 1992. The French plan was originally designed not so much as a long-run project but as a series of medium-term ones with terms of 5-15 years. That is one reason why the plan has been revised so often.

Table1.1 shows the latest master plan for motorways in each country, including planning and revision dates, necessary procedures for establishing the master plan, the latest figures for in-service operational road-length and survey date. The table also distinguishes between toll-free roads and toll roads.

Table1.1 Master Plans for Intercity Motorways and Operational Lengths in 18 Countries

Name of country	Master plan for intercity motorways				Recent operational length		Toll or toll-free <2>
	Kinds of road	Gross extended length (km)	1st plan and date of revision	Procedures for plan	Total extension (km)	Date	
Japan	Intercity roads	11,520	Revised Sept 1, '87	Law	6418	Jun 22, 1999	Toll
China	National trunk roads	35,500	Plan Sept '95	Government ordinance	6,222	End of 1998	Toll
Malaysia	Toll roads <3>	2,271	N/A <1>	N/A	1,125	Mar,1999	Toll
Indonesia	Toll roads <3>	2,154	N/A	N/A	486	1998	Toll
Thailand	Intercity roads	4,345	1997	Government ordinance	145	1996	Toll
Philippines	Intercity roads	633	N/A	N/A	126	N/A	Toll
Hong Kong	Trunk roads	N/A	N/A	N/A	212	Jun, 1998	
Argentine	Toll roads <3>	9,580	N/A	N/A	8,982	1992	Toll
Chili	Concession roads <4>	729	N/A	N/A	0	1998	
Columbia	Toll roads <3>	2,101	N/A	N/A	10,862	1998	
Mexico	Toll roads <3>	6,067	N/A	N/A	5,120	1995	
Brazil	Concession roads <4>	21,647	Plan Oct '93	Government ordinance	800	N/A	Toll
U.S.	Interstate highways	74,546	Revised June 9, '98	Law	74,546	1997	Toll-free
France	Motorways	12,120	1992	N/A	7,225	1997	Both
Italy	Motorways	7,515	Revised 1985	Law	6,469	1996	Both
Spain	Motorways	18,750	Plan Dec '95	Law	7,750	1997	Both
Hungary	Motorways	3,500	N/A	N/A	421	1996	
U.K.	Motorways	4,360	1989	Government ordinance	3,226	1996	Toll-free

Note 1: N/A = "Not Available".

Note 2: 'Toll' indicates that all motorways carry tolls. 'Toll-free' indicates that roads are free in principle. 'Both' indicates a mixture of toll and toll-free roads. In U.K., there are a few toll sections but their overall length is much shorter than that of toll-free ones.

Note 3: 'Toll roads' in column 2 indicates that the master plan covers all toll roads, including those planned at least for the time being as stand-alone toll roads.

Note 4: 'Concession roads' indicates toll roads that are known to be operated through a concession agreement.

1.2 Principles to be Taken into Consideration in Preparing Master Plans for Intercity Motorway Networks (by Country)

The following are principles and considerations generally taken into account at the time of establishing or revising a master plan for intercity motorways. Only few countries have announced how much study went into each master plan, meaning that even countries not cited here have probably also been taken into consideration.

(1) Political considerations

- Connecting state, provincial and prefectural capital cities (many countries).
- Concern for economically underdeveloped areas (Japan and Italy).

(2) Economic considerations

- Connecting commercial and industrial centers, tourist resorts etc. (France and many others).
- Economic feasibility (many countries).
- Financial feasibility (many countries).
- Enhanced convenience for users (France).
- The form of words varies, but estimated traffic volume is also one of the indices used in drafting master plans
- In the case of toll roads, financial viability is not so much a consideration as an indispensable condition.
- (Economic feasibility and financial feasibility are explained in Section 1.4 in relation to individual roads. The principles are no different at the master planning stage, though estimates are inevitably a little less accurate than those made in evaluating individual toll roads).

(3) Transportation considerations

- Connecting international airports with districts served (Japan and others).
- Connecting important harbors to districts served (Japan and others).
- Connections with international roads and motorways of neighboring countries (European countries).
- Supplementary routes to relieve pressure on overused roads, completion of missing links etc. (Japan and others).
- Harmonization with air transportation (Japan, France and others).
- Harmonization with railroad transportation (Japan, France and others).
- Harmonization with sea and waterway transportation (Japan, France and others).

(4) The national minimum

The national minimum is the minimum demand of the people. As it is an extremely abstract concept, it is necessary to convert the idea into specific quantifiable terms on which people can agree. Only then can the national minimum be established.

One example is Japan's stated objective of creating a road network whereby "every citizen can reach one of the intercity motorway networks within an hour or so." In France, the principle is that people should be able to reach a motorway within half an hour.

Once the national minimum has been established, the next step is to calculate what percentage of the population will be able to reach each segment of the network within the time agreed, whether it be an hour, half an hour, or whatever. The network of maximum efficiency is selected. This will generally be

the one offering maximum population coverage, enabling the national minimum to be achieved.

Other goals may also be set as part of the national minimum. In France, for instance, quantifiable improvements in traffic safety are stipulated.

(5) Environmental protection

Today, environmental protection is a key concern at the decision-making stage of the master plan, even though an environmental assessment cannot be carried out until the contents of the project have been decided in some detail.

Intercity motorways are generally built in areas free of dense population. Hence they are often given a positive evaluation at the planning stage because they will relieve environment damage to existing ordinary roads.

(6) Defense strategy

- The Interstate Highways of the U.S. were originally built with national defense in mind.
- Switzerland, which is not included in the 18 countries covered by this report, has designed some sections of her intercity motorway for emergency use as runways.

1.3 Traffic Volume Forecasting for Toll Roads

Traffic volume forecasts are the most fundamental data in the financial analysis of roads from the planning stage onward. They will influence the fundamental decision on whether the road should be a toll road, and later on they will also influence decisions on the setting and adjusting of toll levels and

collection period. Traffic volume forecasts are used chiefly, as stated below:

The planning stage: Drawing up of a master plan; calculations of toll road feasibility, including profitability; selection of road category under design standards (number of lanes, particularly).

The construction stage: Decisions on toll levels and collection period.

The operational stage: Reconfirmation of profitability; revision of tolls; review of toll-collecting period; review of profitability.

It is standard practice for toll road operators to continuously revise their traffic forecasts, because it must be accurate all the time. In particular, forecasts made before commencing operations do not always have sufficiently accurate input; therefore in the U.S., for example, some operators commission forecasts from several different consultants and then check them against each other.

In Hong Kong, when large-scale toll roads are planned, financial institutions investing in them usually conduct their own traffic volume surveys, in order to verify the would-be operator's forecast.

It is often said that when concession agreements are struck, the grantor (the giver of the concession) will tend to overestimate traffic volume, whereas the concessionaire (the recipient of the concession) will tend to underestimate it and set a higher toll accordingly. Hence, traffic volume forecasting greatly influences the contents of any concession agreement. In the present discussion, however, we restrict ourselves to discussing the effect of tolls on traffic volume, before sketching the overall picture of traffic forecasting practices.

(1) Influence of toll on the diversion of traffic from existing roads to toll road

Tolls are calculated on the basis of how each level of toll charging will affect road-users' future OD (future origin-destination) on a link or links of future networks.

Broadly speaking there are two methods of making this calculation:

The first one is based on the timesaving principle: the amount of the toll is divided by the timesaving value to vehicles. The resulting "time value" puts a cash value on amount of time saved for each vehicle type. Naturally the actual amount of time saved will depend on the individual vehicle, but an average for each type of vehicle is adopted in making the calculation.

The second way utilizes the diversion ratio curve, which is derived from the relation between "the toll amount charged, divided by the time saving resulting from using a toll road instead of an existing toll-free road" and "the percentage of vehicles that will divert from the free road to the toll road". These diversion ratio curves are calculated for each type of vehicle.

Variations on this approach include adding parameters to the diversion ratio curve, including not only the toll/time-saving ratio, but also with net benefit (saved time multiplied by time value, plus saved driving cost minus toll fees). Other approaches derive the diversion ratio curve for each driving distance band or driving time band.

The time value for each type of vehicle can be obtained by calculation to some extent but eventually should be based on experience. Time values and diversion ratio curves will have to be revised repeatedly in accordance with the actual traffic volume on toll roads as the years pass.

Regardless of the method used, results derived in one country or region cannot easily be applied to other countries or regions.

(2) Methods for calculating the influence of tolls on traffic at the stage of forecasting

When the first toll road is built in a given region, it is impossible to employ the method stated in (1) due to the absence of empirical data. The usual approach in such a situation is to conduct questionnaire surveys among potential users. The subjects are carefully selected from drivers' organizations, truck driver's associations, tourist associations and businesses with large fleets of company cars.

Questionnaires generally appear to work well, although there are differences in accuracy deriving from the skill with which they are employed.

(3) Monitoring and recalculation of toll influence on traffic diversion during toll road operation

Even after being initially decided, the fees of toll roads are often revised, mainly because of inflation. These cases generate data that afford an opportunity to revise the model used for estimating the marginal effect of toll-rates on traffic assignment.

If an X percent rise in the toll produces a Y percent decrease in traffic volume, the Y/X value is called the toll elasticity index. In the case of national expressways in Japan, a toll elasticity of approximately 0.3 has been observed in the past three analyses. However, this will not necessarily continue into the indefinite future.

(4) The significance of traffic forecasting in the toll pool system

The system of cross-subsidization between plural toll roads will be explained in Section 3.4 below. One simple example is Japan's toll pool system, under which all the nation's intercity expressways are operated under a single set of accounts.

In the mature period of a toll pool system, established operational sections are far longer than newly opened sections, so that even if the future traffic forecasts are slightly inaccurate, the total accuracy of toll-revenue estimation will be maintained because of the high level of accuracy of the future traffic volume forecasting on established sections. This is a further merit of the toll pool system.

(5) The overall framework of traffic forecasting

The following are the general procedures of traffic forecasting by country:

□ Going by the manual

In the U.S., there was a time when consultants would be called in to decide traffic forecasting procedures. Today, however, many newly opened roads simply adopt the four-stage method outlined in the manual of the American Association of State Highway and Transportation Officials (AASHTO): (1) Zonal generation traffic volume; (2) Origin and Destination traffic; (3) modal split; and (4) traffic assignment on routes.

If the existing road is improved and changed into a toll road, the trend method of traffic forecasting is more practical. For example, traffic volume projections can be derived from past increases in traffic volume using average growth rates for each region served. It is of course necessary to factor in the effect

of tolls.

□ Methods of estimating OD traffic

There are various methods for estimating future Origin and Destination (OD) traffic, such as the Freighter method, Detroit method, the Growth Curve method, the Recurrent Analysis method, the Average Growth Rate method and so on. Which method is adopted will vary with countries and consultants.

□ Demands for re-analysis

There are cases where the influence on road usage of the tolls that will need to be charged is not sufficiently accounted for in traffic forecasting. Where that is suspected to be the case, financial institutions considering investing in the project, the World Bank, for example, may require that the operator furnish the materials on which its analysis was based. That is why we have taken the liberty of explaining what may seem rather basic items in parts (1) to (3) of this section.

In Indonesia, the government is in the habit of forecasting traffic volume before concessionaires tender, using its own forecasts as part of the tendering information. The government has established its own regulations covering traffic forecast accuracy.

□ Induced traffic volume and developed traffic volume

Most of the traffic using a new toll road, or any new road, will have diverted from existing roads. However, there will also be "developed traffic" (traffic volume produced by economic development along the route of the new road) and "induced traffic" (traffic induced by the improved service on the new road; stemming from demand that was latent in the existing low capacity roads.)

The induced and developed traffic volume in specific stand-alone toll roads, like tunnels and bridges, sometimes surpasses 30% of total traffic volume. Hence developed and induced traffic must be forecast carefully. However, procedures for estimating these items remain diverse, and no standard approach has been established.

□ Responsibility for traffic forecasting

The toll road enterprise will generally take responsibility for traffic forecasting, but not in all cases, and not necessarily in full.

If a concession contract includes a traffic forecast made by the grantor, then the grantor must also be responsible for the accuracy of the forecast. In the cases of Malaysia's partial contract and Hungary's concession contract, the agreement includes guarantees against losses stemming from over-optimistic traffic forecasting, meaning that the grantor has complete responsibility for the traffic forecast.

In other countries like Mexico, the enterprise is permitted to request an extension to the concession term if the actual traffic volume is less than the volume estimated by the government and toll revenue is consequently lower than estimated. Argentina and Chile have introduced similar guarantees. In these countries, the government is wholly responsible for traffic forecasting.

1.4 Toll Road Evaluation (by Country)

Evaluation of toll-road projects may roughly be classified into those carried out before and after the road is opened. Pre-project studies are designed to judge whether the project is economically viable, while those carried out after the

project is complete are designed to revalue it in the light of hard data generated from at least the initial phase of operation. Hence the latter need not rely on assumption and conjecture to nearly the same degree as the former.

This section is concerned mainly with pre-project evaluation.

When a toll road is financed with loans from international financial organizations, the generally demanded feasibility study consists of the following items:

(1) Social and economic background
(2) Traffic forecast
(3) Road design and construction cost estimates (technical feasibility)
(4) Economic feasibility
(5) Financing plan and financial analysis (financial feasibility)
(6) Environmental assessment
(7) Energy-use reduction effect
(8) Execution schedule

At this stage, alternative plans for road design, route selection, environmental protection and many other aspects of the project are intensively discussed and evaluated. Among the eight items listed, here is an outline of how economic and financial feasibility are evaluated.

□ Economic feasibility

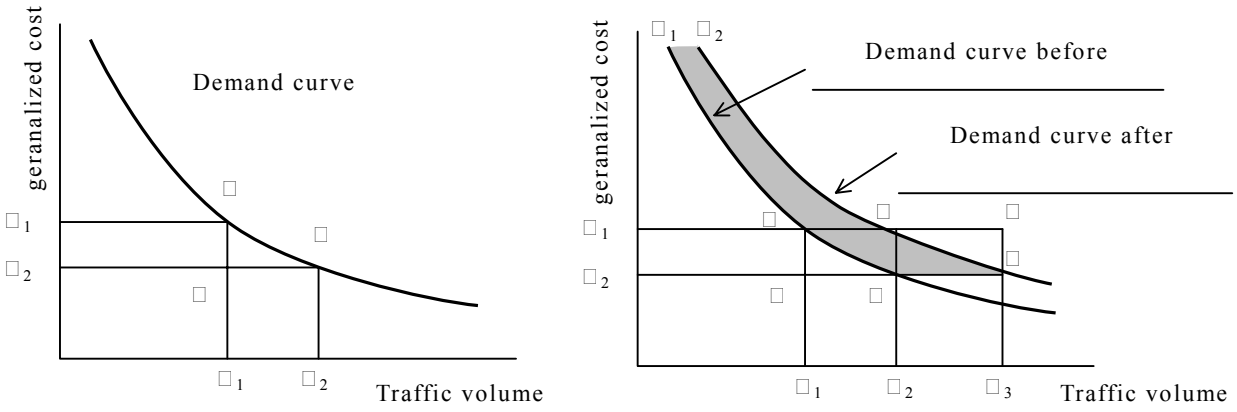
Economic feasibility studies analyze the relation between the social costs and benefits of the project based on units of economic cost (roughly speaking, this means market prices after subtracting taxes, but usually not all the taxes but only protective duties are subtracted). Most actual calculations are conducted using a

standard conversion rate from market cost to economic cost.

Benefits may include reduced driving time, reduced driving costs, fewer accidents, and environmental improvements. Most benefits are estimated in terms of the traffic volume diverting from existing roads to new roads. It is naturally assumed that diverted traffic is able to enjoy the full value of benefits, which are calculated in cash terms by subtracting the cost of new roads from that of existing roads. The benefit to *diverted* traffic is shown diagrammatically as P_1P_2CA in Fig 1.1 (a). In the same diagram, the curve Q_2-Q_1 illustrates *induced* traffic volume and the total value of benefits is shown as triangle ABC. The benefit to induced traffic is roughly equal to half the benefit to diverted traffic.

On the other hand, the benefit to *developed* traffic may be represented by a shift of the demand curve, as shown in the shaded part of Fig 1.1 (b). D_1 is a demand curve before improvement and D_1 is a demand curve after improvement. Practically, it is difficult to estimate D_2 and therefore DBEF is regarded as the approximate value of benefits to developed traffic, although theoretically ABED is more correct. The unit of benefit value employed is the same as that used in calculating the value of benefits to diverted traffic.

Fig 1.1 Illustration of Benefits to Traffic



(a) Benefit to induced traffic

P_1: Generalized cost before improvement of road
P_2: Generalized cost after improvement of road
Q_1: Traffic volume before improvement of road

(b) Benefit to developed traffic

Q_2: Traffic volume after improvement of road
Q_3: Traffic volume after shift of demand curve due to road improvement

Over the last 20 or 30 years, various methods have been used to formulate the relation between costs and benefits, including classical cost/benefit ratios, incremental cost/benefit ratios, net present value and so on. Current practice among international financial institutions when making decisions on loans is to analyze costs and benefits in terms of the economic internal rate of return (EIRR). The internal rate of return is a discount rate calculated so as to equalize the net present value of cost with that of benefit.

There is no standard criterion for defining the level of EIRR that makes any given road project viable. The social discount rate is one indicator, but as yet no one has come up with a concrete formula for obtaining the social discount rate. In

practice, the minimum viable level of EIRR will depend on the circumstances of each country at each chronological stage. In the Philippines, the figure has been set at 15%. In developing countries generally, projects with an EIRR estimated in excess of 15% tend to carry a high priority for realization.

Since most of the benefit from new roads depends on the volume of diverted traffic, it follows that if existing roads are improved, the benefit accruing from newly constructed roads will diminish correspondingly. Therefore, the operators of intercity expressways in Japan conduct thorough re-evaluations of overall benefit at every stage of network expansion. Some people argue, however, that national expressways form an independent network from the ordinary road network, so that they do not function very well as alternative routes contributing to the benefit of motor traffic.

□ Financial feasibility

Financial feasibility poses relatively few accounting problems, since it is concerned with enterprises' income and expenditure in terms of actual costs including taxes. Nor need the period of analysis necessarily match that of the economic analysis.

The actual analysis is carried out as an estimate of cash flow estimation, and to this extent, it differs from economic analysis. But so long as the analysis aims at obtaining the Financial Internal Rate of Returns (FIRR), the methods employed are similar: a discount rate is calculated that will equalize the net present values of expenditure and income. Expenditure comprises construction costs, right-of-way acquisition costs, maintenance and operating costs, fund-raising costs and interest. Income included road tolls and also governmental share of construction costs and/or government subsidies (including contributions to interest payments).

In addition to cash flow estimation, a financing plan and repayment plan making due allowance for foreign exchange fluctuations are also necessary.

The higher the FIRR is, the more profitable the project will be. However, if tolls are set at an excessively high level, the number of users may decrease or the operator may make too much profit. To prevent these undesirable outcomes, some countries set a maximum level for FIRR. In the Philippines, for example, the maximum level of FIRR is set at 12%.

□ Relation between EIRR and FIRR

The rates of EIRR and FIRR are calculated in similar ways, but their content and meaning differ greatly.

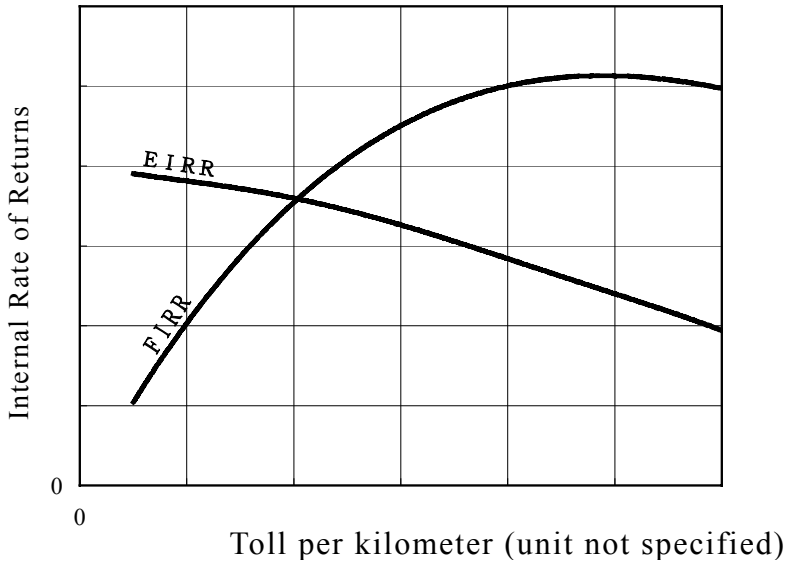
Diversion traffic rises most when the new road is free, and decreases as the toll rises. It follows that EIRR, likewise, is maximized when the road is free and decreases as the toll rises. In contrast, FIRR is zero when there is no toll charged, rises initially as the toll grows higher, and then turns back down when the toll becomes too high and traffic volume decreases too much (see Fig 1.2).

When the toll is set at a reasonable level, FIRR usually falls in the range of 50% to 80% or 90% of EIRR. Precise values cannot be obtained since economic cost differs from actual cost, but in theory at least, if FIRR exceeds EIRR this signifies that the cost of paying the toll is exceeding the benefit of the road to its average user, and hence there are likely to be problems with generating a sufficient volume of traffic. On the other hand, too low a level of FIRR means low profitability and the enterprise may be scrapped in favor of other public works.

In Fig 1.2, the EIRR curve resembles the curve showing the relation

between toll level and traffic volume. Around the crossing point of EIRR and FIRR, traffic volume tends to decrease rapidly

Fig 1.2 Relation between Toll Rate, Economic Internal Rate of Return and Financial Internal Rate of Return



It is in the nature of these two measures that EIRR is applicable to all kinds of roads, whereas FIRR can only be applied to toll roads. In the case of toll-free roads, FIRR is automatically zero. This does not necessarily obviate the need for financial analysis. When toll-free roads are constructed with loans, a repayment plan is of course essential.

As was stated in Section 1.2, master plans for intercity motorways often include calculations of national minimum road requirements, redundant capacity for use in the event of disasters and other political goals in addition to the items (1) to (8) listed above. These political goals are often among the justifications for governmental subsidies.

Here now are the evaluation standards used in several advanced countries:

United States

All projects assisted by federal aid are obliged to undergo cost-benefit analysis. Micro BENCOST, a practical cost-benefit calculation software package, is widely used. The analysis covers a period of 20 years, but factors in a residual value on the assumption that the road will continue to generate benefit thereafter. (Similar practical calculation software is available in other countries.) In practice, sensitivity analysis is always carried out.

France

The following ten items have to be evaluated:

a) Regional economic development and national land development
b) Safety
c) Benefit to users (in time and driving cost)
d) Environment
e) Reductions in traffic congestion, accident black spots, and noise.
f) Influence on other modes of transportation
g) Direct effect on employment
h) Energy cost
i) Financial balance sheets of public institutions and of concessionaires
j) Cash-based cost/benefit analysis

Out of the ten items, (e), (f) and (g) are particularly characteristic of France.

Italy

The government conducts annual, three-yearly and ten-yearly cost-benefit analyses in each field of public works, (covering not only transportation but also all other fields of public works), on the basis of which it draws up the national transportation plan. When new segments of toll motorways are allocated to concessionaires, they in turn will carry out detailed cost/benefit analysis and submit reports to the government.

U.K.

The Ministry of Transport draws up project plans, which include traffic demand estimates, economic evaluation and environmental assessment.

COBA software is used for traffic demand evaluation and MEA for environmental assessment. As for the integrated program for traffic demand estimation, an 'evaluation framework' is used.

Features of cost/benefit analysis:

a) Same procedures used nationwide
b) Cost/benefit analysis must be conducted on at least two alternative plans -- the proposed plan and one that would satisfy minimum requirements.
c) On the assumption that the service life of roads is thirty years, net present values will be calculated using a social discount rate of 8% with 1992 as the base year.
d) Sensitivity analysis by change of discount rate will be carried out using two scenarios, assuming high and low economic growth in U.K. respectively.

e) Costs comprise capital costs including management fees. They may also include survey costs incurred in originating a project, though many countries do not attempt to recoup survey costs.

f) The cost of maintaining the road network is included.

g) Costs include those caused by delays in construction.

h) Benefit is estimated by the consumer surplus according to willingly payable toll of users.

1.5 Sequence of Procedures from Initial Project Decision to Management and Operation of Toll Roads (by Country)

Toll roads offer superiority in safety, comfort and traffic efficiency. They are built and utilized all over the world, in developed and developing countries alike.

There is a certain limit to the freedom of movement by motor vehicles. Traffic accidents, disasters, traffic jams etc. can be reduced but never entirely eliminated. The *raison d'être* of the toll road is to remove weak points in the road network as rapidly as possible, albeit wholly or partially at the expense of the users.

The first step is for the government to survey total traffic distribution, refer to national and regional land-use plans and decide what new road links are required. After a basic study on concrete road plans and examination of financial requirements, bids are invited from contractors. In Malaysia, Indonesia and the Philippines, it also possible for private sector to propose toll roads, though naturally roads that fit in with the governmental master plan are given the highest priority.

The series of procedures from deciding to build a toll road to actually operating it differ by country and by project. The regional picture around the world, is roughly as follows:

(1) In the case of national expressways in Japan, 'scheduled routes' are specified under the National Development Arterial Expressway Construction Law. The 'basic plan' is drawn up with reference to the location, design standards and main operator (e.g. the Japan Highway Public Corporation). Technical studies and environmental assessment follow. Balancing consideration with those other

public works and development plans, a ‘construction plan,’ including rough estimates of construction costs, is finalized.

Then a construction order is given to the Japan Highway Public Corporation, which prepares a plan to carry out construction. After that, explanatory meetings are held for people living near the highway, who are also consulted on the design of the road, and right-of-way acquisition follows. While construction is in progress, preparations for opening are carried out, including decisions on toll-levels and on managerial and operational procedures.

This procedure is carried out according to the law, though it is not uncommon for some minor elements to be revised along the way.

(2) In Southeast Asian countries (the Philippines, Malaysia, Indonesia, Thailand), national governments draw up plans on the basis of feasibility studies similar to those of the industrialized countries. Even if private companies submit a toll road proposal, it is the government that decides the route and the concessionaire.

The fact is that proposals by private companies are comparatively rare. As a toll road is a highly public facility, it is only natural that national master plans generally precede their construction.

(3) In some European countries, where semi-private or purely private bodies operate toll roads, common people have far more opportunities to participate in project formation.

In France, approximately two years is spent on surveying, data collection and preliminary design of a section of 10 km to 20 km , followed by meetings with representatives of local residents, and public hearings. Then the route is selected,

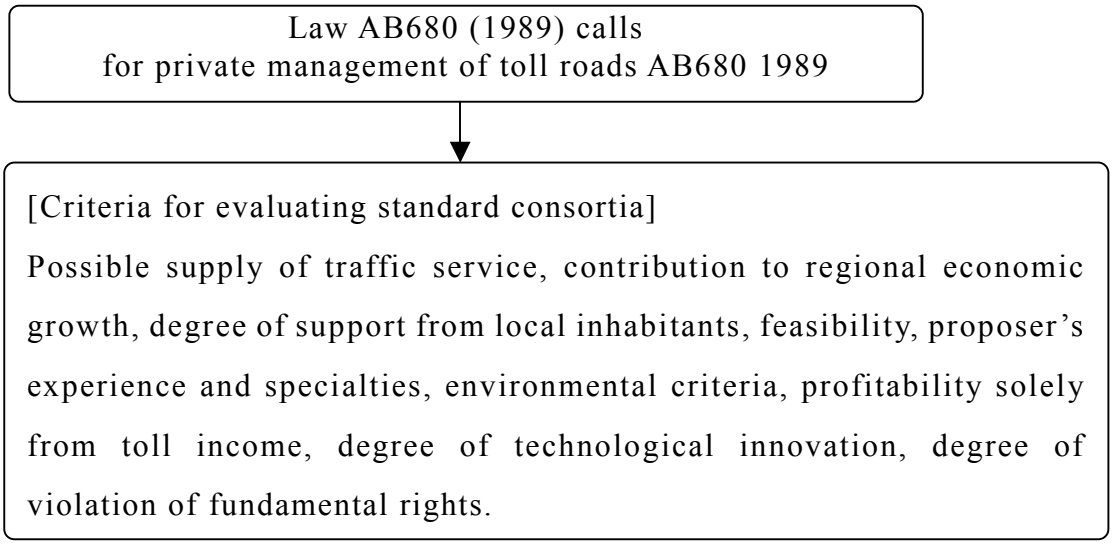
typically with a width of 300 meters, and announced to the public in the form of a "government ordinance declaring a public utility." This takes a further 2 to 15 months. A concessionaire is then appointed and proceeds to prepare detailed designs. Evaluation continues after the road has opened.

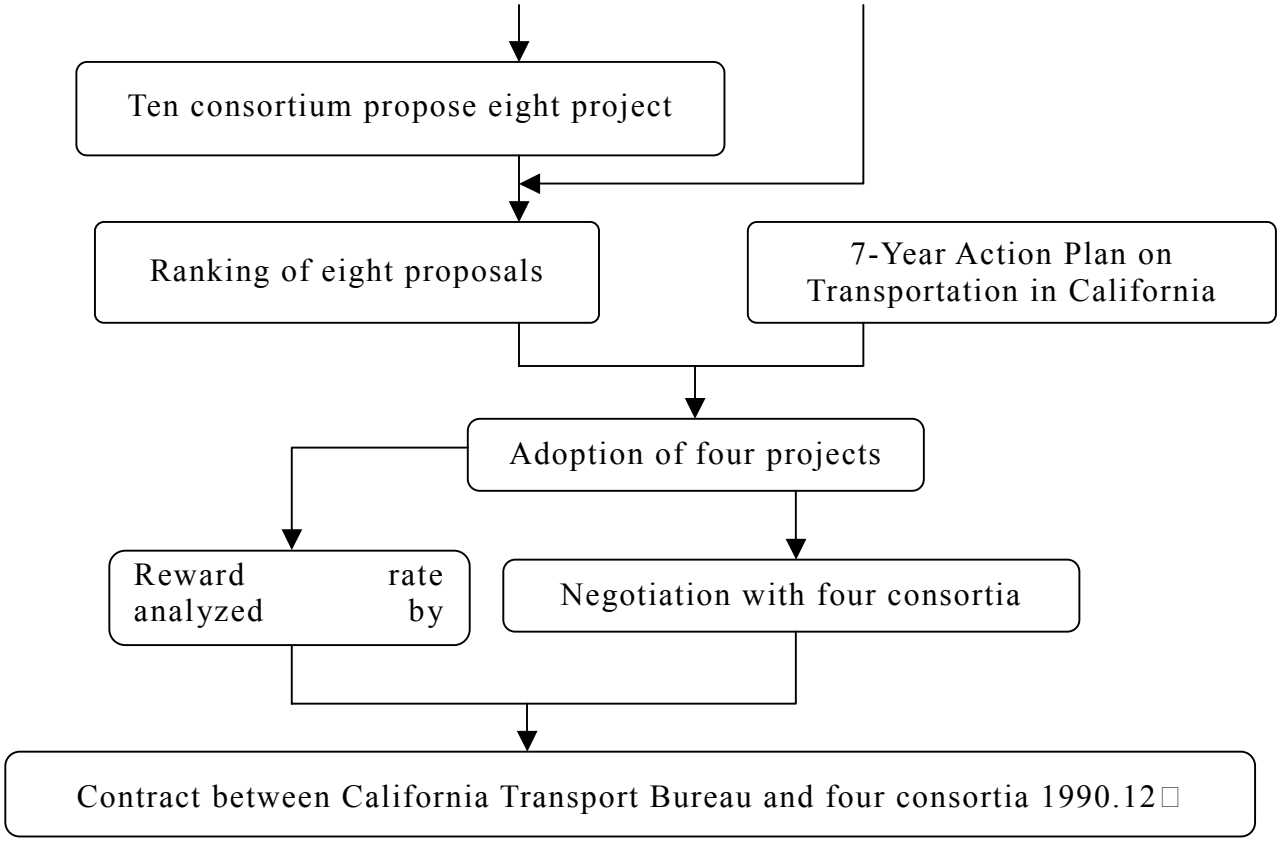
In the U.K., a preparatory study is made to ascertain residents' views. Out of alternative route plans, the best one is selected through public hearings, with local assemblies making the final decision. All through the process, necessary amendments can be made in response to public opinion.

(4) Development of toll roads in the U.S. may be broadly divided into four periods, the latest being the period covered by the Transportation Equity Act for the 21st century (TEA21).

Under this law, consortia are publicly recruited, their proposals are evaluated, and a contract is made with the winning consortium. This system is innovative in its transparency, and in the degree of initiative allowed to private enterprises in drafting proposals.Fig 1.3 illustrates the process by which operators were selected for four private-sector enterprises, including California State Highway 91.

Fig 1.3 The Process which Operators were Selected for Four Private-Sector Projects, including California State Highway 91





As can be seen from the account of toll-road management in the four regions discussed above, these systems are not made at once but are refined over a long period of time.

Two key points where improvement is required are transparency and public involvement. It is open to question how far proposals from private enterprises can harmonize with master plans and retain the essential character of roads as public utilities. However, it is important to keep alive the possibility of private-sector initiatives for the sake of future progress.

□ Transparency and the principle of free competition

The series of procedures for toll roads from project decision to road operation requires transparency and competitiveness above all. Generally speaking, the more procedures are subject to laws and ordinances, the more transparent they are. It is most important that projects and the selection of operators for them be publicly announced. So long as this golden rule is observed, transparency can be considered secure.

The case of Indonesia is exceptional that procedures were insufficiently clear in the early stages of network development, to the point where it was not even clear who was the *grantor* of a concession contract. Consequently procedures had to be revised in a short period of time.

□ Public involvement

In order to define the basic laws governing toll road procedures, especially during the crucial phase from project decision to commencement of operations, it is essential that democratically elected parliamentarians discuss the issues. Such a system is in principle people-oriented.

However, public involvement usually means more direct participation by people. Chances of participation may be divided into various stages, from the broad decision on which roads to schedule for construction, through basic planning (for example the decision on the width of the road), detailed route planning, all the way to construction and operation. Private enterprises, and national and local governments, are inevitably involved at every stage. By contrast, the public and its representatives have a tendency to become less involved as projects move from the big picture down to smaller regional levels. Similar patterns may be observed in decision-making processed on city planning and environmental assessment.

Chapter 2 - Criteria for the Decision on Whether to Adopt a Toll-Road System

2.1 Patterns of Toll-Road Adoption (by Country)

2.1.1 Role of Toll Roads within Road Networks and Characteristics of Operators

Toll roads may be categorized in various ways, but two of the most important criteria are their role within broader road networks, and the characteristics of the bodies responsible for operating them.

Using these two features as the horizontal and vertical axes, the following matrix (Table 2.1) may be drawn up, giving a picture of how toll roads are operated in various different countries. (Note that able 2.1 excludes the "shadow toll" system, in which road users do not pay tolls themselves, but the government pays the operator an amount of money corresponding to the toll based on road traffic volume on the road in question. Shadow tolls are used in Malaysia, the U.K., and Spain.)

Table 2.1 Classification of Toll Roads by Operator and Role in Toll Road Network[1)]

Toll roads / Operator <2>	Type of road on which tolls are levied			
	Network toll roads	Stand-alone toll roads <4>		
	Inter-city and urban motorway networks	Tunnels, bridges etc.	New roads, including by-passes	Existing roads after widening or improvement
Run directly by govt or public organization	Malaysia, China, Mexico, Colombia, Brazil, Chile	----	Japan, China	----
Public corporation, publicly-owned company etc.	Japan, Thailand, Mexico, Indonesia, Brazil	Japan, U.S.	Japan, U.S., Malaysia	----
Public/private sector joint ventures	France, Italy, Spain, Malaysia, Indonesia, Philippines	France, Italy	Philippines	U.S.
Private sector only <3>	France, Italy, Malaysia, Philippines, Hungary, Mexico, Argentina, Colombia, Chile	Japan, U.S., UK, Hong Kong	Japan, U.S., Hong Kong, Philippines	Brazil

Note 1: Data is for 1998 and is presented only for the 18 countries covered by the KDB.
Note 2: Operators have been categorized mainly by capital composition. Some of them restrict their activities to maintenance administration, including the collection of tolls.
Note 3: This includes countries that have instituted systems for harnessing private-sector vitality and issued declarations of intent to hand toll roads over to private operators in future.
Note 4: "Stand-alone toll roads" are toll roads that do not belong to a toll-road network. "Network toll roads" are those that do belong to a toll-bearing road network.

It is interesting to note here that countries such as France, Spain, Italy, Hungary etc. have coexisting networks of toll and toll-free motorways. This phenomenon will be discussed in Section 2.2 below.

2.1.2 Categorization by Mode of Toll Collection

In addition to the criteria for categorization used in Fig 2.1, it is also possible to categorize toll roads according to the toll collection system. Of particular importance is the distinction between distance-related fees, in which tolls vary according to the distance, and flat-rate fees, where there is a single fee for use of any part of a particular stretch of road. This distinction will be discussed in detail later, in Section 5.3.2.

2.1.3 Categorization by Mode of Management

Just as important as the distinction between public- and private-sector management used in Fig 2.1 is the question of how the relationship between the two sectors is organized. The most popular arrangement is the Build, Operate, Transfer (BOT) formula, whereby the private sector builds the road, then holds the concession to collect tolls on it for a specified period, after which the road is handed over to the government gratis. There are other formulas, however. These will be discussed shortly, and also in Sections 3.5 and 4.3.1 below. On the question of fund-raising, see Ssection 3.3 (Use of Private Funding) below.

One alternative approach entails the public sector undertaking the construction work, using the toll revenue only to cover the subsequent maintenance costs. Among the 18 KDB countries, Indonesia has a publicly run joint-stock company called Jasa Marga, which used this approach in the initial period after its launch. China also uses this approach for its ordinary national roads. Discussion of this system is limited to the present section.

(1) The basic pattern of toll road management

The basic pattern of toll road management entails a private-sector body raising funds, building the road, collecting tolls from users, managing the road,

and then handing the road over to the public sector gratis once costs have been recouped in full or in part.

(2) Management of toll roads directly by government bodies or public corporations

This is the basic pattern of management, and management structures close to this pattern are common in some countries.

It should be mentioned, however, that there are variations on this pattern. In some cases, toll revenue is planned to cover the entire cost of construction and maintenance during the entire period for which tolls are levied. In other cases, only part of those costs are earmarked to be met from toll income, with the public purse bearing the rest of the costs.The operators are not permitted to make a profit.

(3) Management of toll roads by public/private bodies, or by purely private enterprises

This kind of arrangement often entails a private-sector company being granted a concession by the public sector to run toll roads, though in some cases "commission" might be a better term than "concession".

Toll-road concessions are generally divided into the following categories:

☐**BOT** (Build, Operate, Transfer) - The private sector builds and operates the road, then transfers it to a government body after an appropriate period. A variation is BOTT (Build, Operate, Transfer, Training), in which the private sector supplies the necessary training to government operators after transfer.

☐**BTO** (Build, Transfer, Operate) - The private sector builds the road, transfers it

to a government body, then operates it as a toll road for a certain period.

☐**BLT** (Build, Lease, Transfer) - The private sector builds the road, leases it to a government body, (usually taking payment by installments), operates it, and finally hands it over after an appropriate period.

☐ **ROT** (Rehabilitate, Operate, Transfer) - The private sector makes improvements to an existing road, operates the road, and then transfers it to a government body after an appropriate period.

☐**BOO** (Build, Own, Operate) - The private sector builds the road, and owns and operates it permanently. A variation is **BOOS** (Build, Own, Operate, Sell), in which the private contractor subsequently sells the road to a government body.

Of the above, BOT is the formula most frequently employed, with BTO in second place. One way in which BTO differs from BOT is that the private-sector concessionaire need not pay land-ownership taxes etc. In China, there are cases where toll roads are built by the public sector, then handed over to third-sector hybrids for management and maintenance. Sometimes the public sector appropriates part of the profits that subsequently accrue, but since the operator does not supply any of the project finance, these roads fall into the category to be discussed in Section 3.5.2 below.

We have not gathered cases of BOO or BOOS. Roads are basically public assets, and there is generally a resistance felt to leaving them in private ownership indefinitely.

Another formula one occasionally comes across is DBFO (Design, Build, Finance, Operate), but in practice this is very close to the BOT formula. Admittedly government supervision of the design process is necessary in the BOT case, but the private concessionaire generally has the right to make design proposals. Indeed, this is one aspect of the operation where there tends to be ample scope for the concessionaire to make a difference to the project through

its own efforts. In the U.K., the view is often taken that DBFO and the shadow toll system are two sides of the same coin. As mentioned, the latter is a system where the granter of the concession pays the grantee a sum of money calculated to be equivalent to toll income.

(4) The principle of free access after costs have been recouped

The common feature of the three management patterns discussed above is that they assume that roads should be free in principle, and that toll systems should be temporary devices to solve the problem of how to finance roads. It is a fact that in the U.S. many toll roads run by public corporations ("authorities") have indeed completed the process of repaying capital investment and have been made available to the public toll-free. In Japan too, many toll roads have been made toll-free, either because capital investment has been recouped or because the road has been bought out by a government institution.

However, looking at the global situation, there are many countries that have not declared adherence to the free access principle, and many countries that have actually declared that tolls will be levied permanently, for particular projects or in general.

Take the example of Italy's Roads Agency, Azienda Nationale Autonoma delle Strade (ANAS). For many years ANAS was an organ of central government; it became a public corporation in 1994. ANAS is in charge of running Italy's national highways and motorways; it oversees construction of toll-free motorways directly, and grants concessions to private operators in the case of toll motorways. ANAS' publicly proclaimed principle is that when concessions expire, ANAS will take over management of the roads and continue to levy tolls itself. There are cases in the U.S., too, where the principle of permanent tolls has been recognized, generally as a means of covering maintenance costs: the New Jersey

Turnpike Authority is one such case. Addition to these extreme cases, there are countries where there hints are dropped that the end of the concession period does not necessarily signify the end of the toll-collection period. There have been instances of this in Malaysia and Indonesia; see Section 4.2.4, "Conditions on Ending Concessions," for further details.

(5) Comparison between direct governmental management of toll roads and hybrid or private-sector management

It is impossible to say make anything authoritative on this point. Since it is impossible to build two toll roads with identical conditions -- they would have to be in exactly the same place at the same time -- one can only make comparisons between cases where conditions, inevitably, differ.

Having said that, Table 2.2 is a rough attempt to make that comparison, included in hopes that it may be of some use in thinking about this important issue.

Table 2.2 Comparison Between Direct Governmental Management of Toll Roads and Hybrid or Private-sector Management

Item	Management by government institution or public corporation/s	Management by private sector or mixed public/private body
Number of agencies involved	The fewer bodies involved, the easier it will be to formulate toll-levying policy. Dividing the project between geographical areas involved may have pluses and minuses.	Loyalty to the principle of free competition demands that there should be as many as possible. But some countries, such as France, have found problems with unlimited expansion.
Juridical characteristics	Must be established by legal statute; must be non-profit.	Governed by company law.
Contract with government	Legal statute renders contract unnecessary.	Contract with acceptable content is essential (see 4.2.1).
Right to expropriate land	Yes.	A few countries grant expropriation rights to private companies for railway construction; almost none do so for toll-road construction.
Risk prior to completion of road	Responsibility clearly rests with public body.	Necessary to clarify allocation of risk between contract-issuing body and contractor/s.
Government support and subsidies	Flexibility makes for ease of financial management.	Necessary to strictly stipulate terms in contract.
Political risk	Generally considered low; but should really be considered high, because of need to respond faithfully to changes in government policy.	Unavoidable unless there are strictly worded protective clauses in the contract.
Availability of financial credit	Government guarantees usually make all the difference.	Very necessary.
Guarantor	The government.	A third party.
Availability of loans from international institutions	No problem.	At present must be done indirectly, via government body.
Enterprise's pace of progress	Generally slow but steady.	Rapid in early period when toll system is introduced. Risk of drastic slowdown later on, when less profitable aspects of project remain. Further risk that most profitable road segments will be cherry-picked by private sector.
Toll policy	Generally easy to reflect government policy.	Varies with composition of concessionaire (public/private vs. private only, etc). Difficult to establish unified toll policy where many private firms involved, hence necessary to clarify toll policy as far as possible in

		contract.
Appetite for involvement in related enterprises	Low. There may, however, be a willingness to invest in gasoline stations, restaurants and shops.	Generally high.

2.2 Conditions for the Adoption of a Toll System (by Country)

The basic background factors to the decision as to whether or not to adopt a toll system are as follows: How necessary does the public authority responsible for roads see a new project? Is it necessary to raise the funds for building, maintaining and managing the new stretch of road from it users? And would such a move be socially acceptable?

How the necessary conditions for a toll road are decided varies enormously according to the social and economic environment in each country, and there is no generally applicable rule. A World Bank report drawn up for the Republic of Vietnam lays out the following economic principles:

☐ The average daily traffic should be at least 4,000-5,000 vehicles.
☐ The toll should not be set at a level to excessively discourage use of toll roads.
☐ Where suitable alternative routes are not available, relatively high tolls can be set.

It should be borne in mind that item ☐, the minimum daily traffic requirement, is quite variable. It can be affected by the amount of capital that needs to be raised to cover construction costs etc.; and by the [political] decision on what proportion of that capital is to come from tolls.

Influences on the adoption of toll systems are listed below.

2.2.1 Government Policy

In many countries, the decision as to whether to levy tolls on the motorway network, or on some parts of the road network, is a matter decided by central government. Even if there is no general government policy on the subject,

government authorization will certainly be required in order to levy tolls on a public facility. Therefore, one may say that government policy or authorization is a necessary condition. Often government policy or authorization is also required to raise the necessary funding for the project. Government policy on toll roads may be broadly categorized as follows:

☐ Inter-city motorways and urban expressways carry tolls: Japan, Indonesia, China, Philippines, Hong Kong, Mexico, Argentina, Brazil.
☐ Inter-city motorways carry tolls, urban expressways are toll-free (including cases not yet decided): Malaysia, France (initial period).
☐ Urban expressways carry tolls, inter-city motorways not yet decided: Thailand.
☐ Mixture of toll-roads and toll-free roads: France, Italy, Spain, Hungary.
☐ Roads free in principle: U.K. (but see below).

Let us add a little detail regarding countries in the last two categories:

In France, urban expressways and supplementary motorways linking segments of the inter-city network used to be toll-free in principle. Many of these roads are temporarily restricted to just two lanes of traffic. At the start of 1996 France had 1,091 km of toll-free motorway, equivalent to 15% of the total motorway system.

In Italy, motorways tend to be toll-bearing in the north of the country and toll-free in the south. Toll-free motorways recently accounted for approximately 14% of the total.

In Spain, toll-bearing motorways (*autopista*) co-exist with toll-free motorways and partially access-controlled motorways (*autovia*). Government policy emphasis shifts between the two according to which party is in government. As of 1997, toll-free motorways predominated, with 73% of the motorway

network to 27% toll-bearing motorways.

In Hungary, the motorway was originally toll-free. Since 1993, the government started to impose tolls on the most heavily used sections. As of 1996 there were 421 km of motorways in the country, of which 185 km carried tolls.

In the U.K., tolls are levied on motorways only where they cross bay bridges, such as the Severn Bridge, or go through tunnels, such as the Dartford-Thurrock Crossing. Otherwise, the system is toll-free. However, plans are now taking shape for toll-bearing extensions to the motorway network.

2.2.2 Financial Viability

Whether tolls are to be applied to an entire network or to a stand-alone road or segment of road, the most fundamental issue is whether the income from tolls will be sufficient to cover the costs of building and maintaining the road. If the sums do not add up, the project will not be feasible from the start.

☐ Costs

Construction costs -- in full or in part. In some cases, these may exclude the cost of acquiring the necessary land.

Maintenance costs -- including the cost of collecting tolls during the toll-bearing period of the road's existence.

Financing costs -- all the costs of raising funds to finance the project; principally the cost of interest payments.

Profit -- will be set at zero for an entirely public-sector project, but will be

necessary for private-sector or hybrid projects. Level to be set in concession contract.

☐ Income

Tolls -- variables include rates charged, revisions to rates, period for which tolls are levied and volume of traffic during that period.

Public investment -- investment subsidies, interest-payment subsidies, exchange-rate loss compensation etc.

Other sources -- where permitted, policies to return development profits to the project. Toll road operators may seek to generate extra income from incidental facilities, roadside developments etc.

There have been cases in France where it appeared as if the entire cost of a new segment of motorway would be borne out of a concession already granted**.** In fact this was no more than a form of words. The unit for concessions was defined as long stretches of road rather than the individual segment. Hence it would be more appropriate to account for income from the new segment as being pooled with toll income from all segments to cover overall costs once the segment was made open to the public.

In the case of private-sector and private/public sector hybrid projects, it is necessary to generate profit from the gap between income and expenditure, but here there is much variation in the conditions imposed by different countries, and in the methods used to stipulate those conditions. Economic viability is a necessary but not complete condition for toll-road development, and each country must be studied separately to ascertain the ways in which it determines viability and limits private-sector profitability.

A detailed examination of the conditions mentioned above shows that the proportion of construction costs earmarked for recouping also varies from country to country. There are variations, too, in the amount of funding supplied in the form of public investment, and the way in which that public funding is applied. It follows that the decision on toll roads is not just a decision on whether or not to levy tolls, but also a decision on *what form* the toll roads should take.

Calculations of financial viability are used not only in deciding whether to levy tolls, but also in deciding the level at which tolls should be set, in making adjustments to that level, and in deciding and revising the period for which tolls should be levied. In the case of private enterprises, these calculations are also used to forecast project profitability. Hence these calculations are not only made at the planning stage: they are repeated throughout the project. Project managers pay great attention to the model used to make these calculations, and are equally careful to adjust the figures that are input into the model.

2.2.3 Considerations Relating to Competing Highways

Some countries will not permit the construction of toll roads unless there are alternative, toll-free roads offering competition. There have also been cases of the reverse position, where a condition for the construction of toll roads is that there should be *no* strongly competitive toll-free alternative route. Other countries have no particular rules on this matter.

Countries that make the *existence* of alternative routes a necessary condition for construction of toll roads: Japan, Mexico, Indonesia, Italy.

Countries that make the *non-existence* of alternative routes a necessary condition for construction of toll roads: No country has publicly declared such a

policy, but in the U.S., the state of California has included guarantees that it will not build competing roads during the period of the concession in concession contracts signed with the concessionaires for toll road projects.

Countries with no particular rule on alternative routes: U.S., U.K., France, Spain, Hungary, China, Malaysia, Thailand, Philippines, Hong Kong, Argentina, Colombia, Brazil, Chile.

In 1956, the government of Japan passed the Law Concerning Special Measures for Highway Construction (*Dôro Seibi Tokubetsu Sochi-Hô*), usually referred to as the Toll Road Law (*Yûryô Dôro-Hô*). One of the items specified in this law is that there should always be an alternative route to a toll road, so that users are not faced with a situation where there is no choice but to use the toll road. In practice, however, the provision on alternative routes has been applied very liberally. For example, where new toll bridges have been built across a strait, ferry services or extremely circuitous roads have been recognized as fulfilling the "alternative route" requirement.

Countries that do not have such a legal provision are generally looked upon as attaching great weight to the financial viability of toll roads, perhaps with a view to hurrying up the date when the toll can be lifted. Alternatively such countries may simply feel that there is no need to attach special legal status to toll roads.

Chapter 3 Financing of Toll Roads

Toll road operation is a business that involves constructing regionally indispensable roads more rapidly than would otherwise be possible, using loans to prevent road construction from being retarded due to financial difficulties in the public works budget. The operator borrows the capital needed to construct and operate the road, and the funds should be repaid with income from users' tolls over a definite period -- though exceptionally, there are also cases of permanent toll roads.

In many developing countries, financial difficulties in public works is an inevitable fact of life. Especially in the motorway field, demand for trunk road construction tends to be intensely concentrated in a short period prior to the people's attainment of a substantial level of income. The degree of financing difficulty in these cases can be acute.

Accordingly, toll roads are an important means to fill the gap between the demand for construction of trunk roads in a given region and the financial ability to meet that demand.

Traditional financing approaches have depended on an all-inclusive system backed by the credibility of the government. As the limits of this approach have become apparent, more and more countries have seen the advantages of converting to new financing systems, where the all-inclusive credit guarantee offered by the state treasury is replaced with limited credit guarantees where investors from the private and public sectors are invited to contribute on the basis of the credit-worthiness of each project. A growing number of countries are seeking to reform their entire system of public finance by using these new approaches that aim to activate private-sector vitality.

3.1 Financing Toll Road Construction (by Country)

It is unheard-of for a toll road to rely on a single source of financing. The various sources used are illustrated in Table 3.1. They include general and earmarked taxes, equity (investment), mezzanine (an intermediate mode of financing between investment and loans), debt, guarantees, toll revenue, retained earnings, asset securitization, stock-market flotation, capital stock increases, and value capture. As stated in Chapter 2, toll road enterprises come in various forms: (1) central and local government; (2) public corporation; (3) public-private hybrids; and (4) purely private enterprises. Financing methods vary accordingly. For simplicity, we will look at fund raising methods in two broad categories: (1) public funding from tax income and (2) private enterprise financing.

Table 3.1 Financing Means for Toll Road Projects

Financing means			Private funding	Public funding
General funding			None	Common tax
Specific funding			None	Earmarked tax
Equity<1>			Common stock	
Mezzanine finance<2>	Equity type		Preferred stock, stock with selling option, etc.	
	Debt type		Subordinated loan, subordinated bonds, convertible bonds	
Debt	Loans		Commercial loans (syndicated loans)	Loans from government or international financing agencies, regional development banks
	Bonds	Private place-ment	Project bonds	Government guaranteed bonds, municipal bonds, public corporation bonds, bonds guaranteed by international financing agencies
		Public offering		
Guarantees			Guarantee by commercial bank, credit line,<3> standby facility,<4> monoline insurance<5>	Guarantee by government, govt. financing agencies, international agencies, regional agencies
Project income			Toll revenue, income from supplemental projects	
Retained earnings			Retained surplus, retention fund	
Asset securitization			Bond	None
Stock increase of capital			Stock market flotation	None
Value Capture; partial use of profit from development due to the project			None	Increased tax on real estate, benefit assessment, special assessment district, impact fee, dedication, space lease, tax increment financing. (See Table 3.3).

Note 1: Investment

Note 2: Forms of fund supply between investment and loan.

Note 3: -Frame of loan for each borrower by bank.

Note 4: - Guarantee within specified frame.

Note 5: - Insurance by exclusive financing insurance company.

3.2 Use of Public Funds (by Country)

3.2.1 General Funds and Special Funds

In any business, the structure of financing flows looks basically like this:

Fund supplier → Funding intermediary → Financing means → Demander of funds

Here, of course, the demander of funds is the toll road operator. Public funds generated by taxation are sub-classified as general funds and earmarked taxes. As seen in Table 3.2, in the case of public funds, the supplier is the people, and the intermediary is a governmental organization.

Table 3.2 Financing Flow

Fund supplier	Intermediary	Financing means	Toll road operator
The people (tax payers)	Governmental organization	General funds (ordinary taxes)	Government itself
Ditto	Ditto	Special funds (earmarked tax)	Mainly public organizations
Public and private institutions	Securities companies	Investment	Public, semi-public, private
The people (investors)	Commercial financing institutions	Loan (syndicate loan)	Ditto
The people, private enterprises, private financial institutions, foreign investors	Securities companies	Bond	Ditto

When the operating body is (1) the central or local government or (2) a public corporation, general funds and earmarked taxes often account for a portion of the funding, although they rarely exceed half of total funding. The form of financing varies, including investment, government subsidies, interest payment subsidies, interest-free or low-interest loans, debt guarantees etc.

The earmarked tax system is used by many countries around the world, including Argentina, Columbia, Ghana, Japan, the Republic of South Africa, the United States (where it is used in the Federal funding system and in 33 state funding systems) and Zaire.

There are three main arguments supporting the introduction of earmarked taxes:

1) As traffic demand grows, the supply of road funds also increases. In other words, total investment varies in accordance with demand, as expressed in the scale of payments from taxpayers. Hence a quasi market is formed.
2) A stable fund for road improvement is secured.
3) Since service is clearly linked with an equivalent cost, taxpayers are easily persuaded of the legitimacy of the tax.

The main argument against earmarked taxes is that they impose limits on the scope of central government decision-making.

Opinions on this issue vary widely, among decision-makers as well as economists. Therefore there are some countries which do not use earmarked taxes.

3.2.2 Use of Public Funds

(1) Loans

The most common form of public funding is lending from a governmental financing organization. These are low-cost funds, raised by the issuance of government-guaranteed bonds or long-term, low interest or interest-free loans supplied from general or earmarked accounts. The toll road business needs

long-term funds for three basic reasons: (1) it entails huge initial outlays, (2) tolls are often kept artificially low out of political considerations, and (3) investment is recouped over a long period of toll collection. It follows that long-term, low-interest loans from governmental financing organizations are one of the most important sources of financing. These loans tend to be repayable over a period of 15-30 years. One example would be France's construction advance loans and balance advance loans -- interest-free loans, the latter designed to harmonize toll levels throughout the country. The government of Spain also issues low-interest loans.

Besides government financing institutions, other important sources of loans are international financing organizations such as the International Finance Corporation (IFC), the International Bank for Reconstruction and Development (IBRD): the World Bank, the International Development Association (IDA) etc.; and regional development banks like the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), the Asian Development Bank (ADB), the Inter-American Development Bank (IDB) and the African Development Bank (AFDB).

These institutions use funds deriving from share capital contributed by member countries and from the issue of bonds, to supply long-term low-interest loans for public and private toll road business. Loans from these prestigious international organizations have the advantage of adding credibility to toll road projects, thereby stimulating further financing from the private sector. As we shall see later, loan and investment guarantees from these organizations have much the same effect. Many instances of this form of financing may be observed in Eastern Europe and South America.

Besides these international financing organizations, bilateral aid supplied via institutions such as the Japan Bank for International Corporation (JBIC), or

Germany's Kreditanstalt für Wiederaufbau (KfW) also have an important role in supplying long-term, low-interest funding with long grace periods for public toll road projects in developing countries.

These governmental and international financing organizations do not generally supply funds directly to private toll road enterprises (concessionaires etc.), though there are some exceptions made in the cases of the IFC and EIB. Usually support to private operators is made indirectly, being channeled through public financial institutions of the recipient country in the form of two-step loans.

(2) Bonds

When public-sector bodies issue bonds, they most often do so by public offering. These include government-guaranteed bonds, local authority bonds, public corporation bonds, and bonds guaranteed by international financial organizations or regional development financing organizations. In short, this is a form of financing generally backed by public bodies with high credit ratings. Issuing bodies are usually central or local governments, and/or public corporations engaged in operating toll roads. However, there are cases where private enterprises issue bonds backed by public-sector guarantees, such as those issued by the Trans-Tokyo Bay Highway Corporation in Japan and the M1 and M15 enterprises in Hungary.

Bonds issued by public toll road construction bodies constitute an important source of financing. However, redemption periods used to be set at 0-15 years, not necessarily long enough for a toll road enterprise, and consequently toll road operators have sometimes been obliged to reissue bonds later on in the course of the project.

3.2.3 Public Support

Public support for toll roads naturally includes the financing support mentioned above. However, there are other forms of public support as well, which may be roughly divided into two categories: monetary and systematic. Monetary support includes investment, subsidies, partial share of maintenance and operation costs, acquisition of rights of way, and other direct monetary aid. Systematic support includes debt guarantees and tax reductions or exemptions etc.

The following is a general survey of public support for toll roads in each country surveyed. Please bear in mind that not all the countries cited here necessarily use all the forms of support in each category, while conversely some countries not cited here may in some cases use those forms of support.

(1) Capital investment

Central and/or local governments invest in toll roads in Japan, China, Indonesia, Thailand, the Philippines, the United States (in the case of the Toll Highway Authorities), France, Italy, Hungary and other countries.

It is relatively rare for public organizations to invest the total funds required, though this is the case with a few of Japan's public corporations. More frequently they supply only a part of the capital investment. This is the case with public investment in semi-public enterprises in most countries.

Capital is basically redeemable and dividends payable (see Section 3.3.1).

(2) General subsidies and interest-payment subsidies

We have confirmed cases of toll road subsidies in Japan (though only in the

initial stage of toll road development), France, Italy, Spain, Hungry etc. As the name suggests, there is no need to repay subsidies.

Interest subsidies need not be repaid either; they entail a public organization paying part of the interest on loaned capital in place of the operator. When interest rates are high or changeable, interest subsidies serve to keep toll road projects financially stable. They are generally set to kick in when interest rates rise above a certain level and are paid in years when that happens.

In the case of Japan's national expressways, both capital and interest subsidies are annually adjusted in order to keep financial cost (averaged interest) low and stable. It follows that the way capital is handled is rather different from the situation in most other countries. Financial cost is calculated as follows:

$$\frac{\text{paid interest} - \text{interest subsidy}}{\text{outstanding debt (with interest)} + \text{capital investment (without interest)}}$$

The purpose of subsidies other than interest subsidies varies. Most general subsidies are designed to supply a part of fixed costs -- that is, toll-road construction costs. In Japan, the government supplied the entire cost of strengthening work against earthquakes necessitated by the stricter earthquake-proofing construction standards imposed in response to the 1995 Hanshin Earthquake.

(3) Sharing of construction costs

In Malaysia, the government paid for part of the construction costs of the North-South motorway in its early phases. In France, the private company, COFIROUTE, took over sections of the motorway system from the state while construction was still in progress. In Columbia, the government shared the costs of constructing tunnel sections, and in Mexico, the government has a special

provision under which it pays that part of costs in excess of 115% of the original budget. Effectively this is a guarantee that costs will not overrun by more than 15%. These are all cases of government sharing construction costs with project operators.

Instances of shared construction are not uncommon. For example, a tunnel or a bridge may be built and operated as a stand-alone toll road while the approach sections at either end are constructed and maintained exclusively with public funds. This kind of arrangement functions as a kind of subsidy.

(4) Acquisition of rights-of-way by public organization

Acquisition of rights-of-way here means that a public body handles the appropriation of land for a new road, including the costs incurred. Countries that have adopted this form of support include China, Malaysia (only for a part of the North-South Motorway), Thailand, the Philippines, Columbia, Hungary etc.

(5) Sharing of maintenance and operational costs

There is an exceptional instance of operational assistance to toll road operators by California's Transportation Corridor Agency (TCA) in the U.S. The TCA is a public corporation formed by a conglomerate of counties and cities. Its assistance to operators does not include toll-collection costs.

(6) Systematic support

Systematic aids are discussed in various other chapters, so a brief explanation will suffice here.

 Debt guarantees (See Section 3.3.4)

Government guarantees of bonds and long-term loans are made in Japan, Malaysia, Thailand, Columbia, the United States, Italy and Spain. The Philippines and France used to issue debt guarantees in the initial period of toll road operation, but have abolished the system.

□ Encouraging introduction of foreign capital

These policies have been noted in China and Spain. They may include currency exchange-rate guarantees. The government of Spain was once obliged to pay out a large amount of compensation due to an exchange rate guarantee.

□ Acquisition of rights-of-way

This paragraph covers cases where rights of way are acquired by a public organization although the toll road operator still has to pay the cost of the land. This system of support is adopted in countries where private enterprises are not authorized to expropriate land, including Malaysia, Indonesia, Thailand, the Philippines etc.

□ Favorable treatment in taxation

See Section 4.1.6.

□ Alleviation of requirements for stock-market listing

Observed in Malaysia.

□ Acting on operator's behalf in acquiring permissions and approvals

Observed in Columbia.

□ Guarantee of minimum level of traffic and toll income

Observed in Malaysia, Hong Kong, Columbia and Mexico

□ Other forms of systematic support

Other systematic support policies include the toll revenue pool system within a single enterprise, and cross subsidies between enterprises (see Section 3.4 below).

(7) Key aspects of public support

Having outlined the various forms taken by public assistance in Items (1) to (6) above, let us now consider the various important aspects that must be taken into consideration when public institutions get involved in supporting private enterprise. These include the need to provide sufficient incentives while avoiding moral hazards, the effect of public support on cost efficiency, the timing of support etc.

□ Offering incentives to stimulate business efforts while avoiding moral hazards

Incentives and moral hazards are two sides of the same coin when it comes to public support for private enterprise, so they are best explained together.

Overly easy adoption of monetary support such as subsidies is liable to cause moral hazards. The fact that more countries do not offer subsidies to toll road projects implies governmental concern to provide incentives for business effort by private enterprises while avoiding moral hazards.

Nevertheless, as seen in the case of France's COFIROUTE in its early stages, subsidies do not necessarily damage business incentive. In COFIROUTE's case, it helped that the amount of the subsidy was clearly set down in the concession contract. It is also important to decide and announce for what purpose the subsidy is to be used (for example, in order to activate economic development in a specified region, or for the realization of toll adjustment policy as in the "balanced advances" used in France). Likewise it must be made clear *how* the subsidy will be applied, for example, the rate of subsidy and average interest rates charged on loans may be adjustable in accordance with road conditions, and *when* in the course of the project the subsidy will be applied.

□ Risk allocation between the public and private sectors

Spain's disastrous experience with exchange-rate guarantees is often cited as a cautionary tale. Clearly it is not advisable for a government to issue subsidies that are heavily susceptible to changes resulting from external causes. However, one cannot simply say that private enterprise should have born the whole risk. One can well imagine that Spain in those times was short of long-term capital denominated in the domestic currency and that the whole country was in need of foreign currency.

However, with so many different currencies in use around the world, it is possible that Spain’s case might have had a quite different outcome if the country’s toll road operators had borrowed their funding in plural currencies rather than concentrating on the Swiss franc, which carried low interest rates but rose steadily against the Spanish peseta.

□ Cost performance: (1) Timing of public support

The cash flow from toll road operation varies with the costs that need to be

repaid and the timing of repayments, along with the annual increase in toll revenue (amount of toll x volume of traffic), and the level and timing of subsidies. Outstanding debt tends to rise during the first ten years or so, and then to decline. Hence the earlier monetary aids such as subsidies are applied, the more effective they will tend to be in improving profitability. This is one reason why many countries tend to give subsidies mainly in the initial stages, cutting them back as the operational finances stabilize.

□ Cost performance: (2) Type of public support

It follows from Item □ above that types of public support applied early in the project will tend to be the most effective -- measures such as Items 3 and 4, sharing construction costs and acquiring rights-of-way.

In addition, governmental guarantees of bonds, long-term loans and other forms of debt not only decrease the immediate governmental outlay but are often so effective as to obviate government spending on the project altogether. Problems do of course arise in the event of the bankruptcy of a toll road enterprise, but even in this worst-case scenario, the government will at least be left in possession of the road as public property. Thus guarantees are generally thought to be highly cost-effective policy instruments, so long as the right projects are selected for guarantee.

□ Government policy

Toll roads are public utilities, and as such, the government often has some control over charges imposed on users, as with other public utilities like electricity, gas and water. So long as the operator manages the toll road business honestly and openly, it is perfectly proper for government to give subsidies in order to ensure reasonable tolls, indeed this is the most common type of subsidy.

If network redundancy is included in the establishment of a master plan, a particular link in the network may struggle to show a profit due to competition from other links. In such cases, public subsidies are sometimes necessary (see Section 1.2). No country has made a statement on this matter, but it is at least logically possible.

3.3 Use of Private Funding (by Country)

Equity, mezzanine finance, debt, guarantees, toll revenue, retained earnings, securitized assets, assigned bonds, stock listing, stock capital increases and various means of value capture -- these are all potential sources of revenue for toll road operators, whether they be public, private or hybrid enterprises. In addition to these, enterprises may also derive revenue from the sources described in Section 3.2.2, such as subsidies and grants from central and local government paid with the proceeds of general and earmarked taxes.

3.3.1 Equity (Capital)

This is an ordinary investment made by purchasing common stock. When the operating body is a public or semi-public enterprise, the central or local government is usually the investor. When the operator is a private enterprise, a holding company establishes a company specifically to take charge of the toll road business and the parent company assists it financially. Investment may also come from third-party companies, such as financial institutions or infrastructure investment funds.

The more outside funding the operating enterprise has in its capital structure, the higher is its risk of bankruptcy. To minimize that risk, a certain level of equity is necessary. Where that level is set will depend on how much risk the

business carries and how difficult it is to raise funds.

The return on equity is made in the form of stock dividends. Surplus cash flow after taxation is divided among investors. Since equity usually has to offer a higher rate of return than bonds or loans, it is generally a more expensive source of capital for enterprises. Hence although higher equity assures greater stability of business, it also entails high financing costs, meaning that the enterprise needs a higher rate of profitability in order to secure returns.

Depending on the category of the company, equity other than ordinary stocks (for example, a stake in the company held by a limited partnership[1]) may sometimes be used in order to minimize taxation costs and to obtain the benefits of depreciation.

3.3.2 Mezzanine Finance

Like a mezzanine floor in a building, mezzanine finance is an intermediate form, combining elements of debt and equity. Debt has priority over equity when an enterprise makes repayments, but within the capital structure of an enterprise, most forms of mezzanine finance are normally treated as equity.

(1) Mezzanine equity

Mezzanine equity is capital in the form of preferred stock. Owners of this kind of stock usually have no right to vote on company affairs, or only limited rights. On the other hand, they take priority over ordinary shareholders in allocation of dividends and, in the event of bankruptcy, of residual assets. When

[1] A limited partnership is a form of private investment association. In Japan there are similar institutions called voluntary associations or anonymous associations.

the amount of capital raised by sale of ordinary stock is insufficient, preferred stock may be issued to strengthen the equity capital. Examples would include Malaysia's North-South motorway, and the U.K.'s DBFO (Design, Build, Finance and Operate) motorways, built under the Private Finance Initiative (PFI); a finance project initiated by the private sector.

There are also kinds of stock that carry a selling option, so that under certain conditions they can be sold, allowing the holder to realize a capital gain and to terminate his involvement with the enterprise.

(2) Mezzanine debt

Mezzanine debt is a way of raising capital by borrowing in the form of subordinated loans or subordinated bonds. Repayment of loans and redemption of bonds is subordinated to ordinary loans and bonds (which are called senior loans and senior credit) but mezzanine debt carries higher interest rates in the case of loans, and better yields in the case of bonds. Like mezzanine equity, mezzanine debt is used to strengthen owned capital. Most investors in mezzanine debt are infrastructure investment funds and financial institutions, who are attracted by the high yields on offer. Another form of mezzanine debt is the convertible bond -- a bond carrying an option to convert it into stock.

Mezzanine debt is an option quite often selected in situations where the granter of a concession (such as the government) or the sponsor of a project (such as the parent company of the operating enterprise) need to raise additional capital because, for example, the concessionaire is suffering from cost overruns. In what may be a delicate situation, investors often prefer to buy subordinated debt, on which interest is paid and original principal is redeemable, rather than simple equity.

3.3.3 Debt

(1) Loans

Commercial loans are those made by commercial banks. When banks finance major projects like roads, they usually club together in syndicates. Syndicate loans tend to be issued as part of an overall project financing system in the private toll road business. In the project financing system, a syndicate loan is organized by a main bank and other banks take part in it. A project-financing syndicate loan usually carries a higher rate of interest than ordinary corporate loans, reflecting the costs and commission fees entailed in organizing the syndicate and also the relatively high risk incurred by the financing institutions.

For toll road projects in developing countries, it is sometimes possible to arrange a syndicate loan denominated in foreign currencies, where the participating institutions are typically from Europe, North America and Japan. In most such cases, however, it is necessary to put measures in place to offset country risk and foreign exchange risk and to strengthen the credit of the operating body.

(2) Privately placed bonds and publicly offered bonds

One financing measure sometimes used to supplement and substitute loans is the issuance of bonds. Whereas a loan is a negotiated transaction between two parties, a bond issue is a form of market financing.

Bonds may be issued in two different ways. One is by public offering, under which information on the project is published and funds are raised on the general capital market. The other method is by private placement, where funds are raised from a limited range of parties, such as institutional investors, people with

specialized knowledge in the field, and persons who have some close connection to the issuer. Private-placement bonds generally carry issuance conditions inferior to those on public-offering bonds, in that the loose regulations on information disclosure tend to be reflected in contractual restrictions on re-sale, which limit the instrument's liquidity.

A toll road enterprise can issue its own corporate bonds. These are divided into two types: those issued with a guarantee from a third-party body, which will be explained in the next section, and those issued without guarantee. An operator that can provide guarantees from prominent financing agencies, or a professional guarantee company (monoline insurance), can issue bonds at lower cost. A good credit rating from ranking agencies, such as Moodies or Standard & Poors, can also bring down the cost of bond issuing. The DBFO motorway projects carried out in he U.K. under the Private Finance Initiative use this mode of bond issuing to raise funds on the mature capital markets of London.

3.3.4 Guarantees

Credit lines and standby facilities constitute guarantees without direct lending, or a commitment to supply funds in the case of urgent need. They are also important tools of financing.

Public financing deals may feature guarantees by government, governmental financing agencies, international financing agencies and regional developmental financing agencies, which strengthen a project's credit standing by guaranteeing its bond issues, thereby reducing the cost of financing.

In private financing, support may be offered by private banks in the form of guarantees, credit lines or standby facilities, or by insurance companies in the form of monoline insurance etc.

3.3.5 Operational Income

In addition to external financing, toll revenue is of course a major source of funding for a road business. Additional revenue from service areas and other commercial activities on the roads may also be available where those incidental items are included in the concession.

3.3.6 Retained Earnings

Once a toll road business starts to generate profit, it will be possible to retain a portion of earnings as "retained surplus," or as "accumulated reserves" after dividend outflows. These funds are applied to fresh investment or other items of capital demand.

3.3.7 Asset Securitization

After a toll road business has become well established and has started producing an assured profit, it will be able to issue bonds on the security of the business itself, with its stable cash flow, and thereby collect additional capital from investors. Broadly speaking, financing is made possible by so-called asset securitization -- the issuance of stocks and bonds backed by the cash flow generated by assets.

In the U.S., it is quite common even for new construction projects to be financed in this way, through the issue of "revenue bonds" securitized on the project's anticipated future cash flow. Similar financing techniques are seen in the DBFO motorway projects in the U.K.

In China, too, the practice of asset securitization is gradually spreading,

having started in Kwangtung Province. The practice there has been for existing assets, such as roads constructed using loans from the World Bank, to be transferred to a public/private hybrid toll road operating company. This company draws investment from the provinces served and then has its stock listed to raise capital on the Shenzhen and Hong Kong stock markets . This mode of securitization seemed to be on the increase, at least until the Asian currency crisis.

3.3.8 Stock Listing on the Stock Market and Capital Increase

After the toll road business starts producing an assured cash flow and the stock value of the company increases, it will be possible to raise new funds from the local or international capital markets.

There have been cases in the U.K., China and Hong Kong where a holding company owns several toll road businesses and raises capital by issuing stocks and bonds on the security of the pooled assets.

3.4 Cross-Subsidization

In order to make good use of private and semi-private companies in the management of toll roads; it is effective to increase the number of enterprises involved and foster competition between them to put market principles to work.

On the other hand, perfectly fair competition is not attainable because it is impossible to operate more than one toll road in the same place or under identical conditions. Obviously costs will be affected by topographical, geological and climatic conditions (influencing construction and maintenance costs), and by social conditions (influencing the cost of acquiring rights of way, and also personnel costs). If roads are constructed at different periods, construction costs

will also be affected by changes in inflation and interest rates. Hence it is only natural that toll levels and toll collecting periods will vary too.

In Japan, for example, among the 65 stand-alone toll roads operated by the Japan Highway Public Corporation, the difference in toll per km between the most and least expensive (max/min ratio) exceeds 10.

One of the countermeasures used to correct big differences in toll level is a policy to support each road (or each segment in the case of a motorway) with different subsidies. This is the principle behind the "balanced advance" that has been introduced in France.

A second approach is a cross subsidy system to enable toll roads to support each other. Originally the major purpose of the cross-subsidy system was to help toll road projects with low profitability by transferring funds from those with high profitability. Later versions of the idea developed the concept of harmonizing toll levels.

In this chapter, the term "cross-subsidy" is used in two senses. Narrowly defined, it denotes a toll pool system internal to a single toll road operator; broadly defined it denotes a cross subsidy between different toll road operators. Our survey of cross-subsidization practices starts in France.

(1) France

The cross subsidy system used in France started as an internal subsidy between different segment of toll motorways run by the same enterprise -- what is called a toll pool system in Japan. In 1973 France was in the grip of the financial crisis triggered by the oil shock, and quite a number of private and semi-public toll road enterprises appeared in danger of bankruptcy. As one of the

countermeasures used to save these enterprises, the cross-subsidy system was widened into the form of an "inter-company" cross-subsidy under which profitable concessionaires would provide capital support to those at risk of bankruptcy, via a public agency called Autoroutes de France (ADF), established in 1982. After that, the system developed to include an internal subsidy whereby a concessionaire already holding one motorway concession would be permitted to raise tolls or extend the toll-collection period when given a new concession to extend the segment.

The introduction of the cross-subsidy system in France has accompanied a reduction in the number of toll road companies. Where there used to be 12 (eight semi-public and four private), there are now just four (three semi-public groups and one private). The system will be explained in detail in Section 4.3.1 below. As well as shoring up operators' finances, the system is also designed to harmonize tolls, pegging the max-min ratio at or below 3. There is more on this in Section 5.2.1.

(2) Italy

The history of cross-subsidization in Italy differs somewhat to the French case just discussed. Once there were as many as 28 companies operating toll roads. Six of them were affiliated under the Autostrade company around the time of the financial crisis following the oil shock. At the same time Autostrade was given the concession for an additional 1,134 km of toll roads, on top of the 1,121 km which Autostrade had already been given under Law 729 in 1961. The total of 2,255 km was to be operated under a pool system, and this was the start of cross-subsidization in Italy.

In 1978, a package of reforms embodied in Law 813 made the following provisions: (1) Toll roads whose tolls were lower than those operated by

Autostrade were permitted to raise their tolls to the Autostrade level; (2) An additional 3 lira/km for passenger cars and 9 lira/km for heavy vehicles was added to the tolls on all toll roads; (3) The extra revenue from items (1) and (2) was to go into a special account, run by the government and used to subsidize unprofitable toll roads; and (4) Debts owed by loss-making concessionaires to subcontractors or suppliers would be temporarily borne by the government.

The reform in 1978 has since been modified, making Items (1) and (2), originally planned as temporary measures, permanent. In addition, a central credit association has been established to take over operators' debts and to convert short-term debt into long-term debt. Since 1980, the government has been subsidizing interest payments on debts and has increased subsidies to the national motorway network as a whole. Concessionaires at risk of bankruptcy have been absorbed by Autostrade. The government's role in the system would now appear to be permanent.

(3) Japan

Cross-subsidization of national expressways started out with somewhat different objectives to the cases previously discussed, and has followed a somewhat different course over the years. The first national expressway was 190 km long and stretched from Nagoya to Kobe. It was opened to traffic in 1964, and the construction cost was 600 million yen/km. The second national expressway, running between Nagoya and Tokyo, was 325 km long and opened in 1969. The construction cost was far higher, at 1 billion yen/km, but tolls were set at equal levels. The idea was that the two expressways could be operated at the same toll level, with the redemption period varying to adjust for differences in costs. Indeed, since the two expressways were constructed under different laws, their accounts were kept strictly separate, meaning that redemption period would inevitably differ.

After the National Development Arterial Expressway Construction Law expanded the master plan to 7,600 km in 1966, the Toll Road Law (officially named the Law Concerning Special Measures for Highway Construction) was amended in 1972 so that all the toll expressways were unified under a shared accounting system. This is called the toll pooling system. It provides for mutual support among all the expressways operated by a public corporation. Japan has managed to maintain a standard toll per km nationwide under this system, as well as ensuring the financial stability of the expressway network.

Unlike the national expressways, stand-alone toll roads have maintained independent accounting systems. However, where a number of stand-alone toll roads are obviously in a mutually close relation (for example, when toll roads lead on to each other so that many vehicles use both/all of them during the same journey, or when use of one toll road increases traffic volume on a linking toll road), regional pool systems are starting to be introduced.

(4) The effects of cross-subsidization

Here are the effects of cross-subsidization, as observed in the three countries discussed above:

- Toll motorway networks have been developed rapidly (France, Italy and Japan).
- Toll levels on national intercity motorways have been kept fairly standard. Japan's national expressways have adopted uniform tolls from the outset. France's revised toll schedule aims to reduce the max/min toll ratio to no more than 3. More than half of Italy's motorway network has adopted amended uniform tolls.
- Cross-subsidization can be a useful tool to rescue toll road enterprises in financial difficulties (France and Italy).

The Road Council, an advisory organ of Japan's Ministry of Construction, has issued a series of reports on the functioning of the toll pool system for intercity expressways. The following is a summary of the latest report, issued in November 1995:

□ Latest thinking on the role of the toll pool system in the national expressways

- The toll pool system has facilitated the establishment of fair tolls.
- The system makes it possible to use revenue from existing routes to finance the construction of new routes, such as the second Tokyo-Nagoya-Kobe Expressway and express ring roads around major cities, which require enormous investment and are necessary to ease traffic congestion in big cities.
- Since regions served by existing expressways are already enjoying the benefits of expressway construction, those regions can hardly object if some of the revenue from those roads is used to finance the construction of roads in regions where road development is lagging behind.
- In the days when inflation was higher, differences in the timing of construction caused corresponding differences in right-of-way acquisition costs and hence in overall construction costs. Cross-subsidization was an effective tool to obviate toll differences stemming from differences in construction schedule. Thus the system assured fairness between succeeding generations of road users, and smooth repayment of debts.

□ Limitations or adjustments to the operation of the toll pool system

- A clear ceiling should be imposed on subsidies from profitable to unprofitable routes.
- The total subsidy payable to unprofitable routes should also be restricted.

- To realize the above two objectives, the government should strive to increase public investment in expressways and subsidies on interest payments, always maintaining a flexible approach to decision-making.
- When planning extensions to the expressway network (extensions that are mandated by law), it will be desirable to extend the pool system by degrees to include the new routes, once the effects of their construction and their economic viability have been ascertained.

The toll pool system for national expressways in Japan is being operated in accordance with this report from the Road Council and its predecessors.

Today, detailed accounting information disclosure is a legal requirement. As well as the balance sheet for the whole network covered by the pool system, individual accounts for every expressway route in the network can be viewed at the home page of the Japan Highway Public Corporation (http://www.japan-highway.go.jp).

(5) Restrictions on cross-subsidization in Europe

In Western European countries, the establishment of the European Union has led to stronger demands for competitiveness and transparency in the financing procedures of public agencies in member countries. As a result, various kinds of friction have arisen in countries like France and Italy that have constructed toll motorways using the cross-subsidization system. The most dramatic incident to date concerned the A86 -- the outer Paris circular road -- in France. In February 1994, the French government granted the concession for part of the A86 to a private enterprise, COFIROUTE. However, in February 1998, this decision was ruled invalid by a French administrative court that judged it to be in breach of an EU order mandating competitive tender. The French government had to put the contract up for tender once more. Thus the public financing policy of the EU has

made it impossible for the governments of France and Italy to award concessions without competition. Although it remains unclear just how strictly the EU will insist on competition and transparency in the selection of concessionaires in the future, the new rules should at least discourage arbitrary application of the cross-subsidization system.

3.5 Public-Private Partnerships (PPP) (by Country) (See also Section 2.1.3)

As stated above, there are various methods of financing toll roads using private funds. If we look at the kinds of partnership between the public and private sectors that are to be found in the toll road business from the viewpoint of financing, two basic patterns emerge: (1) project finance systems; and (2) other modes of financing.

3.5.1 Project Finance Systems

Project finance systems are adopted in concession-type public-private partnership projects using formulae such as BOT, BTO, BLT, BOO, ROT, DBFO and so on. In the case of the the U.K.'s private Finance Initiative (PFI), project financing is applied to public-private joint ventures in railway development, meaning that operators can access private financing as well as government grants.

Whenever toll roads are financed jointly by the public and private sectors, the division of roles and risk between the two must be defined clearly by mutual agreement. This is because the financial institutions that club together to organize project finance demand as a condition of financing that all the risks arising from the project should be allocated to the party best positioned to render those risks controllable. Moreover, the distribution of risk should be established by a contract with legally binding force.

Project finance systems are among the more reliable tools for converting a system of inclusive financing backed by the credit-worthiness of the government into a system that allows operators to raise funds directly from financial markets under conditions of "small government."

3.5.2 Non-Project Finance Systems

One representative example of this form of financing is the Tokyo Bay Crossing Toll Highway. As we shall see, rather than raising finance for the entire project with a view to repaying investment from operating revenue, the contractor had a contractual arrangement with a separate body to which it would sell the completed infrastructure.

The Special Measures Law on the Construction of the Tokyo Bay Crossing Highway was enacted in 1986. This law established the Tokyo Bay Crossing Highway Company Ltd., a public-private joint venture company. This is an enormous enterprise running a 1.2 trillion-yen business. The company concluded a construction agreement with the Japan Highway Public Corporation (JHPC), under which all infrastructure would be transferred in bulk to the JHPC immediately after completion of construction, with the entire cost to be paid back to the company by installments over the next 30 years. Thus the company is not subject to any market risk such as the unpredictability of future traffic demand. The management and maintenance of the highway is undertaken by the JHPC.

Financing of the enormous construction cost has been supported by the public sector in various ways: capital investment from public corporations and local authorities; interest-free loans from highway development funds; and the issuance of government-guaranteed bonds. The combination of private-sector business dynamism backed by the massive resources of the public sector proved most effective. Work on the \1.2 trillion megaproject started early and was

completed rapidly.

3.5.3 The PFI Tool Kit of the World Bank

It is planned to take in the World Bank report , which is to be prepared by mid-2001.

3.6 Risk Allocation (by Country)

3.6.1 The Type of Risk and its Allocation

(1) Categorization and definition of project risk

The main risks confronting private toll road projects are pre-construction risk, risk during construction, risk of traffic volume and income after completion, risk from competitive infrastructure, financial risk including exchange-rate risk on international borrowing, risk from natural disasters beyond human control, risk of unlawful acts, and political risk. These risks must be fully investigated before investors can be persuaded to put their money into the project.[2]

□ Pre-construction risk

If the operator neglects to finalize right-of-way acquisition, undertake a thorough environmental assessment, or complete any of the other necessary preparatory steps, construction may be held up and excess costs incurred. Generally, the government takes the risk and responsibility associated with right-of-way acquisition, environmental problems, construction of related infrastructure, acquisition of necessary licenses and permissions and all other

[2] The statement on risk in this paragraph owes much to passages in "Private Financing of Toll Roads" by Gregory Fishbein and Suman Babbar, December 1996.

preliminary procedures. However, a number of cases have been observed where the private-sector partner had to shoulder the risks entailed in acquiring rights of way and estimating acquisition costs.

Where projects are put up for competitive tender, each bidding company will of course incur expenses in preparing its bid, although it may well fail to win the tender. This is another kind of pre-construction risk, although cases have been observed where governments compensate those applicants that make it to the final round of selection.

□ Risk during construction

Changes of design during construction, unexpected difficult geological conditions, bad climate, and shortages of materials or labor are all among the factors that can cause delays and cost overruns during construction. These risks are usually borne by concessionaires, since their contract will tend to specify a fixed price and completion deadline. Concessionaires mostly pass on the risk to subcontractors by getting them to sign contracts with similar conditions. The government sometimes accepts part of the risk arising during the construction period. For instance, the government may take responsibility for government-controllable risk and activity, such as the construction of connecting roads, interchanges and other facilities contributing to the project. Sometimes the government will take responsibility for extra costs due to large-scale changes in its own road designs and specifications.

There are cases where projected participants take shared responsibility for unpredictable geographical conditions and other major risks, such as the risk of concerted action by local residents against construction.

In cases where construction costs can be comparatively easily estimated, for example, when rights of way have already been acquired, or when geographical conditions are good for construction, the government does not

usually have to bear any responsibility for risk. On the other hand, in cases where there are elements of uncertainty in the project, such as the need to take the road through a geographically risky region with hazards like rivers or mountains, the government may find it necessary to accept a share of the construction risk in order to win the agreement of a private company to undertake the work.

Construction risks tend to be higher in new projects than in projects for lengthening, widening or rehabilitation of existing roads.

□ Traffic volume and toll revenue risk

The unpredictability of traffic volume may constitute the biggest single risk in the toll road business. This risk, of course, is that traffic volume and hence toll revenue may fall below the level projected. The risk is especially great for a new toll road project on a route with no existing road, because it is difficult to forecast traffic volume correctly without any reliable past traffic data. Risk stemming from estimates of traffic volume and income is shared in various ways. Sometimes it is borne entirely by the private company; in other cases the government guarantees a minimum traffic volume and minimum income, with upside profit likewise shared between the public and private sector in the event that revenue exceeds estimates. Another risk to income is the possibility that it may not be possible to revise tolls along the lines assumed (see Section 1.3).

□ Risk from new alternative routes

This is the risk that other competitive transportation infrastructure (toll roads, toll-free roads, or railways) may be constructed on routes parallel to the planned toll road project. Since the construction of competitive infrastructure generally has a massive influence on the economics of a toll road project, there are many countries where construction of competitive infrastructure is specifically

prohibited in concession agreements. On the other hand, in countries where route redundancy is a legal obligation, it is necessary to take measures to deal with this risk (see Section 2.2).

□ Exchange-rate risk

Exchange-rate risk is a big problem for toll road enterprises that rely for financing on capital markets in foreign countries, since exchange rates will largely determine whether domestic income will suffice to repay loans denominated in foreign currency. This risk can be avoided only if funds are raised exclusively on the domestic capital market.

Where projects are financed to a large extent by foreign funds, the government may sometimes offer guarantees against the risk of its currency becoming inconvertible, but ordinarily the private sector has to bear the risk of changing exchange rates and currency inconvertibility.

It is sometimes possible to offset exchange-rate risk by adopting a sliding system of tolls, responsive to the domestic inflation rate and to exchange rates. This approach is used in the Philippines, for example. Another way of mitigating exchange-rate risk is to raise capital abroad not just in a single currency, such as the U.S. dollar or Swiss franc, but in a basket of currencies. A third way of reducing exchange-rate risk is to prepare reserve funds in the relevant foreign currencies for the repayment of loans raised abroad.

However, when very drastic changes occur in exchange rates, as happened during the economic crisis in Asia beginning in 1997, it is almost impossible to take adequate countermeasures. In such cases, it is essential that the public and private sector share the burden of risk.

□ Unavoidable risk

This is risk that is beyond the control of the public and private participants in a project, such as the risks of flood, earthquake and war -- any of which can inflict serious damage on the ability of infrastructure to earn revenue. If the inevitable risk is insurable, it is in many cases allotted to the private sector. In developed countries, floods, earthquakes and other natural disasters are insurable by private damage insurance. Riot, war and other political risks are not insurable, however. In those cases, the government shoulders the risk burden if that is necessary to attract funding on favorable terms.

When natural or political disasters prevent facilities from operating, the government will generally extend the concession period. Ordinarily, an agreement covering each possible unavoidable hazard individually is exchanged before the project commences, so that each party's share of risk is understood in advance.

□ Defective management

This item describes the risk that a toll road operator may be legally obliged to pay costs arising from accidents on its roads. Such payments are usually undertaken by private sector concessionaires. This kind of risk is insurable.

There are cases when the government is defined as having primary responsibility for the system, and therefore must take responsibility for ensuring that damages are paid. Even in these cases, however, the actual payment is generally made by the private sector concessionaire.

□ Political risk

Political risk describes cases where governmental action makes it difficult

or impossible to earn income from infrastructure. Examples would include unilateral cancellation of the concession; imposition of new taxes or regulations that seriously reduce the value of the project from the viewpoint of investors; refusing to accept the tolls agreed in the concession contract; prohibiting investors from taking revenue out of the country; and refusing to permit a fair solution to contract disputes by a neutral judicial organization. In toll roads run under the concession system, it is particularly important to deal with this risk, because a successful outcome to the project depends entirely on the concession granted by the government to the private sector operator.

Generally speaking, the government agrees to compensate investors if the concession is suspended, or if it breaches any item in the concession contract (including the agreed toll level). But a government that breaches the contract once may do so again, by refusing to pay compensation for the original violation. The private concessionaire will have to solve problems that arise with the contract, and will have to face the risk that demands to the government for compensation when it has breached the contract will not necessarily be met. Government responsibility for political risks only means anything when fair and timely procedures are in place to compensate the concessionaire against breach of contract by the government.

The existence of such procedures, and evidence of the government's political will and economic ability to pay compensation when appropriate, are very important factors in attracting private-sector investment. It is especially important when seeking to attract inward investment from foreign parties, which are more liable than domestic investors to be influenced by political risks.

When a country with a comparatively high level of political risk sets out to finance a toll road project, support from international financial institutions such as the World Bank will be needed to reduce the political risk. Backing from such

an international financial institution secures the government's obligation to honor its side of the concession contract, by guaranteeing cash to repay the loans and protection for investors' rights, in the event that certain situations specified in the contract arise.

It is also possible to purchase insurance against political risk, which protects investors from confiscation of property, suspension of currency convertibility, and restrictions on repatriation of profits.

□ Financial Risk

Financial risk is defined as the risk that the cash flow of the project may fall short of the level needed to repay the loans and capital invested in the project. Although the government guarantees debts, capital and other finances in some cases, it is more common for the private sector to bear this risk. The government may help to reduce financial risk by offering subsidies, public investment and loans in order to raise the rate of return on private investment.

(2) Risks that can and cannot be controlled by the private sector

The basic principal of risk sharing is that any risk should be borne by the party which can best control it. Hence it is the most fundamental factor in the success of a project that all the risks be shared in a balanced way between the parties concerned, including the government. To this end, it is important to distinguish risks that can be controlled by the private sector from those that cannot.

□ Risks controllable by private companies

Private companies should only take risks that they are capable of predicting

and controlling, such as the following:

- Risk related to design and construction.
- Risk associated with services where the company has a strong track record.
- Risk of costs from improving or replacing poorly designed or located facilities.
- Risk of changes in demand which can be predicted and substantially influenced by the private operator.
- Risk of own business practices becoming outdated due to higher social expectations of road quality, safety etc.
- Risk of concealed defects.
- Risk of having to pay compensation or insurance.
- Risk of revision to general legal ordinances.

□ Risks not controllable by private companies

The following risks should be avoided wherever possible by private companies; if taken, the risk premium may be too high to secure the public interest:

- Inflation.
- Changes in services and facilities enforced by the public side.
- Changes in standards and rules by the public side.
- Possibility of trouble in acquiring permissions and authorizations needed to commence the project.
- Global economic changes affecting demand (e.g. sudden rises in oil prices).
- Risk of non-insurable deadly destruction (e.g. war, radioactive contamination from nuclear incidents etc).

□ Risks sharable between public and private sectors

Risks shared between public and private bodies are, as follows:

- Some of the risks from fluctuations in traffic demand.
- Risk of opposition movements such as environmental movements.

(3) The necessity of a safety net

It is very important to pay due attention to analyzing and allocating the various risks mentioned above. However, there is naturally a limit to which risk can be anticipated and planned for. It is therefore essential to construct a safety net for use in the event of accidents.

As privately financed toll roads are established on the premise of public and private cooperation, the institutional environment must be arranged so as to permit the system to function smoothly. However, this mode of business is a new challenge for traditional systems, and it is difficult to get the institutional environment just right. Hence it is necessary to cover the risk of poorly adjusted institutional environment in the contract.

Since toll roads constitute a public service, the greatest risk for the public side is suspension of the service due to factors on the private operator's side of the deal. In order to avoid such a situation, the contract has to include a safety net for the government side too, in the form of safeguards in the event of the bankruptcy of the private contractor. In the contract, it is important to define the circumstances in which the government and/or financing institutions would have the right to step in and take action to secure continuity of service, including the means of identifying the responsible party. It is also important to clearly establish the responsibility to repay investment and to identify which party has that responsibility; and to select a third party to take over the project and to clarify any

action to be taken by the public side in the event that there is no private-sector party to take it over.

It is even more important to include in the contract dispute-solving mechanisms to clear up trouble between public and private organizations before it escalates to the serious levels discussed above. When disputes arise, both sides should discuss the matter fully between themselves, and if necessary, accept arbitration by specialists designated specifically for the project in hand. After that, the next resort would be to an agreed domestic court of law or an international arbitration court. Once a settlement has been made, the parties should rapidly implement it, so as to prevent damage to the toll road service.

3.6.2 Risk and Profit

Before deciding the public/private share of risk, both parties must recognize that every risk has a price. If the public sector attempts to put an excessive share of the risk burden on the shoulders of a private enterprise, the latter will probably recognize the fact and include a risk premium in the price it demands.

The latest trend in risk allocation in toll road enterprises based on public/private cooperation is the attempt to quantify risk in cash terms. For example, in DBFO road projects carried out under the Private Finance Initiative (PFI) in the U.K., the cost of the PFI system is compared with the total quantity of risk allocated to the private sector, using probability theory to express risk in cash terms, and the public sector comparator,[3] which is a traditional benchmark of cost.

[3] The Public Sector Comparator is a formula used in the U.K. to calculate the theoretical cost of running a project in the traditional manner (purely in the public sector), in order to decide whether it is suitable for execution under the PFI.

Another case, this time in the U.S., is that of SR91, the Orange County segment of State Road 91 in California. The ceiling for project ROI (profit rate of investment) is estimated using (1) the risk premium method, (2) comparisons with other examples of project finance, and (3) a special version of the Capital Asset Pricing Model (CAPM).

3.7 Value Capture (Partial Use of Profits due to Project) (by Country)

Toll roads should speed development and bring economic benefits to the regions where they are built. Certain individuals and bodies in those regions may enjoy those benefits to a remarkable degree. Value capture is a system designed to capture a portion of those benefits in the form of taxes or allotted charged levied on local residents and developers, in order to return some of those benefits to the body ultimately responsible for the project, usually the local or central government. In a broad sense, value capture constitutes one of the means of financing road development.

Table 3.3 outlines some of the value captures used in the U.S. to return part of development profit to the public sector, such as increases in property tax, benefit assessment systems, special assessment districts, impact fees, dedication, lease of space and tax increment financing, etc.

Table 3.3 Outline of Use of Development Profit by Project in the U.S.

Type		System	Example	Bearer	Method
Incremental tax on land owners		Increased levy of property (land) tax	Bay Area Rapid Transport District (BART), California	Owners of property or land	Use of increased tax for repayment of asset securitized bond issued for the project
Allocation of construction cost of public works	Costs borne by land-owners	Benefit Assessment (BA)	South California Rapid Transit District (RTD)	Ditto	Use of increased tax on properties with increased value due to public works; used for repayment of bond issued to cover construction costs
		Special Assessment District (SAD)	Pleasanton City (California)	Ditto	Use of increased taxes in SAD for repayment of tax-free bond for infrastructure improvement
	Costs borne by developers	Impact Fee (IF)	San Diego and Orange County (California), Denver (Colorado)	Developer	Use of allotted payments from developer(s) to cover cost of public works needed for project
		Dedication	Palm Beach County (Florida)	Ditto	Levied on developer(s) as share of costs of construction and/or land acquisition and/or financing
Internal reserve of retained earnings		Lease of Space	Cope Lape Lace Development (Boston)	Ditto	Transportation enterprise leases own land and space to private sector
Others		Tax Increment Financing (TIF)	Prince George's County, Maryland; Davenport City (Iowa)	Ditto	Increments added to ordinary taxes such as property tax, sales tax, etc. to fund public works. Extra tax revenue used for bond repayment as with SAD system

3.7.1 Land Taxation System (Property Tax)

In the U.S., as in Japan, property taxes are one of the main sources of revenue for local government; hence financing measures based on property taxes play a major role in funding public works. In the U.S., each local government is authorized to assess property tax and to decide its own rate and how to levy it. The tax rate thus depends on each community's decision.

3.7.2 Special Assessment District (SAD)

When new public works have the effect of raising real estate prices (the value of land), the local authority may impose extra taxes on the increased value of the asset. In the SAD district, the local authority has the right to levy property tax, sales tax, income tax and other special taxes and duties.

At the start of a project, a region where land values are expected to rise because of the planned public works is designated as an SAD (on condition that land owners consent and approve the designation), and the introduction of the system is announced. As stated before, after designation, landowners must pay extra tax on the increased value of land anticipated as an outcome of the construction of new infrastructure. That is on top of the usual income tax and property tax, of course.

3.7.3 Impact Fee

When a development brings *disadvantages* to a district, such as traffic jams or environmental damage, this system refunds the improvement costs of the necessary new infrastructure (such as improvement costs of the trunk roads surrounding the developed area) by collecting fees from developers. Since the fee is a condition of permission to commence a development, it functions rather like

a development permission fee imposed on developers.

3.7.4 Dedication

While the size of an impact fee is decided from the start, that of a dedication is decided after negotiation between the city planning section and developers. This is a system that imposes a levy on the developer(s) to cover what is determined to be their share of the social finance necessary to adjust the local infrastructure to the new development project. It may be paid in kind, in the form of facilities construction or land, as well as in cash. Payment of this fee may be a condition specified in permits issued for roadside development projects.

3.7.5 Tax Increment Financing (TIF)

TIF, like SAD, designates a special district for financing public works. Unlike the SAD system, however, no special additional taxation may be made within this district. Only the marginal increase in revenues from ordinary property tax will be used to finance public works: revenues from property tax before the designation remain classified as the ordinary general fund of the community.

TIF permits public bodies to issue local bonds prior to the start of construction work, and in most cases to redeem those bonds with revenue derived from the incremental portion of revenues from the property tax. Japan Railways has adopted a similar approach to financing in its project to add a fast track to the Jôban line.

Chapter 4: Legal and Organizational Structures for Toll Roads

4.1 Drafting of Related Laws, Including Fund Procurement (by Country)

Toll roads are soundly managed and trouble-free only within an appropriate legal structure, including considerations not specific to toll roads.

Laws concerning toll roads may be roughly divided into six categories: 1) basic road management; 2) the toll roads themselves; 3) operating body; 4) road construction and its promotion; 5) financial resources and funds procurement; and 6) tax incentives.

4.1.1 Road Management Law

Laws in this category are often called "road laws," and every country has them. Some, including Japan and France, have laws on specific types of roads, such as motorways.

The Transportation Equity Act for the 21st Century (TEA21), passed in 1998 in the U.S., applies not only to roads subsidized by the federal government, but also to public transportation systems in general and related research and development.

4.1.2 Toll Road Law

(1) Laws and ordinances

Because the 18 countries surveyed all have toll systems, it follows that they all have toll road laws. Aside from executive edicts, which essentially have the same force as law, some countries depend on government regulations and ordinances where toll roads are concerned, China and Indonesia among them. (Note: Some

sources assert that Thailand has no toll road law, but in fact it does. It is an antique piece of legislation, hardly suited to modern toll roads, which are mostly access controlled, and efforts to revise it have been slow despite the need to do so.)

(2) General and specific laws

Most existing toll road laws cover the general regulation of toll roads. Some were made for specific projects, such as the Dartford-Thurrock Crossing (1988) and Severn Bridge (1992), both in the UK.

The case of the UK, which generalized its regulations under the New Roads and Streets Works ACT 1991, shows that the status of toll roads is rising even in countries where roads are generally considered to be free and toll roads the exception.

(3) Example of toll road law where government management is a precondition

Japan's toll road law (officially, the Law Concerning Special Measures for Highway Construction) promotes three policies:

a) The need for competitive, toll-free routes.
b) The principle of funding redemption and free access after redemption (tolls are collected until all costs have been paid off, after which the road is free).
c) The principle of setting fair toll standards (in accordance with the redemption principle, expressway tolls must be fair and appropriate, and stand-alone toll roads, such as the Honshu-Shikoku bridge, must carry "below benefit" tolls, i.e. tolls that do not outweigh the benefit to the user, expressed in theoretical money terms).

In the past, these principles have been faithfully observed, but now, with more

than 10,000 km of toll roads in service, there is urgent need for a review. Suggested new directions include adjusting the redemption principle to allow extension of the toll collection period to cover maintenance and administration costs, or to collect tolls according to specific services provided.

4.1.3 Laws Related to Operating Bodies

This topic is related to Section 1.5 (Sequence of Procedures from Initial Project Decision to Management and Operation of Toll Roads) and to Section 4.3 (Roles and Legal Structures Concerning Supervisory Organizations, Concessionaires and Financial-Assistance Organizations). Roles and legal structures concerning supervisory bodies, management bodies and financial-support bodies), so this section only summarizes major points.

(1) Direct government management

This requires only a legal stipulation that a government organization collect tolls.

(2) Management by public corporations

The road is subject to individual legislation or public corporation law.

(3) Management by semi-governmental or private corporation

In certain countries, laws of this kind are well developed. Examples include Indonesia's presidential edict of 1998 concerning cooperation between government and private sectors in developing and managing the social infrastructure; Thailand's Law No. 2535, which allows private-sector involvement in government business; and the Philippines' Law No. 7718 of 1993, concerning invitations to the private

sector to participate in road concessions. In France and other states where road concessionaires are determined by government authorization, procedures for selecting concessionaires are being improved for greater fairness of competition and transparency.

4.1.4 Laws on Road Construction and Promotion

Laws in this category cover a relatively large area:

1) Laws to promote toll roads, including motorways.
2) Miscellaneous laws and regulations, including procedures for selecting semi-governmental or private concessionaires, the BOT (build, operate and transfer) law, and laws covering concessions, when they are deemed helpful in promoting toll road business.
3) Laws allowing the expropriation of land when it is considered necessary for toll-road construction, although these law are very different in nature from those in sections (1) and (2).

Those belonging to the first category are Japan's expressway construction law (officially, the National Development Arterial Expressway Construction Law) and medium- and long-term plans, particularly five-year road construction plans developed by various countries.

Procedures for selecting concessionaires belong to the second category because they essentially lead to toll road construction, so we will discuss recent trends around them in terms of construction methods.

In countries like Malaysia, Indonesia and the Philippines, systems are being set up to award concessions through public participation, similar in nature to bidding, and ways are opening for proposal contracts, under which companies may submit

proposals for toll-road projects on their own initiative.

Although they emphasize public participation in principle, the developed countries of Europe have often awarded concessions in closed negotiations. The European Union Treaty presses them to undertake drastic reform in this area, advocating: (1) equal treatment; (2) transparency; (3) consistency; (4) mutual approval; (5) rules for exemptions; and (6) the protection of individual human rights.

An example from France illustrates this trend. Through negotiations, France's government first awarded a concession for the western part of the A86 (Paris loop) to the private corporation, COFIROUTE, but it later rescinded the decision and invited all interested companies to participate in the selection process.

This may be considered a transitional problem. A problem yet to be addressed is that countries like France, Italy and Spain, which have been expanding their road networks efficiently at low cost by using cross-subsidy systems between projects, or by pooling toll revenue, may be forced to restrict use of the toll revenue pool system.

The EU treaty applies not only to concession awards, but also to construction tenders issued by concessionaires, as well as the purchasing of materials and supplies and outsourcing of maintenance work (currently over 400,000 ECU).

Because toll road concessionaires are often partly owned by general contractors, the economics and transparency of construction work ordered by concessionaires often come into question. The EU treaty is expected to bring significant improvement in this area, however.

In the third category, all countries have land expropriation laws to allow for needed public works. Few problems arise from land expropriation when toll road

concessionaires are in the government sector, including government corporations, because these organizations are usually given the right to proceed with expropriation under certain laws.

Where the private sector is involved, problems can arise because, while it is quite common in the railroad business, it has been rare in the toll road business to give private companies the right to undertake land expropriation.

The Philippines issued a presidential order in 1994 to grant land expropriation rights to the Philippine National Construction Corporation (PNCC), the nation's largest toll road concessionaire. Although PNCC is a semi-governmental corporation, the 90% government stake in it dominates.

In Indonesia, land for toll roads belongs to the government; therefore the purchase of such land, under presidential decree, is the government's responsibility. Purchase costs, however, are borne by the toll road concessionaires.

In Thailand, there were lengthy delays in the government's acquisition of the rights-of-way stipulated in the concession contracts for the Don Muan Tollway and for the second phase of the “Expressway and Rapid Transit Authority” (ETA) project. It took a long time to make up the resulting losses in both cases.

In Hong Kong, on the other hand, the concession period is set more strictly and includes a construction period. To avoid delays and related losses in the government's land -expropriation procedures, concessionaires sometimes acquire parts of the required land at high prices, causing significant social unfairness.

4.1.5. Laws on Financial Resources and Funds Procurement

The specific funding resources for road construction are very important.

Japan's roads were once criticized around the world as incredibly poor; the Watkins Survey Mission on Japanese Public Roads reported in 1956 that "no other industrial country had so completely neglected its road network." But this infamous network has since been raised to a level similar to those in Europe and the United States with the help of enormous contributions from earmarked funding sources under the Emergency Measure Law for Road Improvement. At the same time, the fund has contributed to long-term maintenance of government road construction policies.

The primary national funding source for road construction in the U.S. is the trust fund created as a special account under the Highway Trust Fund established in 1956. Road taxes (applied to the acquisition, ownership and use of vehicles) are its main revenue source. Because the fund is also used to build public transportation systems, it is not strictly a road-specific resource, but the availability of these funds has been a significant factor in the promotion of road construction. The prime example is the completion of the 75,000-km federal Interstate Highway network.

In the case of toll roads, other ideas for funding may be needed, because it is usually necessary to procure funds for periods well beyond ten years.

Because fund procurement for toll roads was discussed extensively in Chapter 3, we will limit our discussion here to the related legal structures:

a) Laws to encourage financing of toll roads - For example, regulation of funding resources under BOT law in the Philippines, various systems of value capture to reinvest profits from development in the U.S., and Hungary's law on road funding and its uses as revised in 1995.

b) Laws to promote or limit foreign investment - For example, the 25% ceiling on foreign participation in Malaysia, and Argentina's 1991 law facilitating foreign capital investment, including a fixed exchange rate. Similar laws in Spain have been

abolished.

4.1.6 Tax Incentives Related to Toll Roads

The tax incentives and privileges related to toll roads are many, including relief from property taxes, value-added taxes, consumption taxes, transaction taxes and business or corporate taxes.

(1) Some tax incentives are similar to those extended to government-related organizations, such as public corporations).
(2) BOT and concession laws often provide tax exemptions or cuts (e.g., the Philippines' BOT law, etc.; in Italy, a full exemption from transaction tax was recently changed to an obligation to pay a 20% value-added tax).
(3) Tax incentives for foreign capital (e.g., China's special rules on corporation tax for foreign-owned investment companies and foreign individual investors).
(4) Some countries, including France and Spain, offer full or partial tax relief for toll roads in the early stages, but reinstate taxes once a project is mature.

Certain countries and projects prefer the BTO arrangement (build, transfer, operate) to the BOT (build, operate, transfer) model. Along with the practical consideration of exemption from property taxes, this is rooted in the concept of public ownership of road facilities and rights of way.

4.2 Concession Agreements (by Country)

The term "concession" describes a government grant of exclusive rights to a specific company to autonomously conduct a specific business. It is used here because it is slightly different in nuance from the consignment contract. Historically, concession contracts have often evolved from quite limited agreements determined by negotiation between the grantor and concessionaire into the broad rule-making of

concession law.

Concession contracts are relatively well developed in the Philippines because of that country's long history of lumbering-related concessions. It is only relatively recent that the process of concessionaire selection has developed from invitations and screening of interested companies to open bidding.

In the developed world as well, the terms and conditions of concession contracts have grown more refined, and the U.S., French and Italian examples are worth studying.

Here, we will discuss the terms and conditions for concessions, the provision of credit, credit guarantees, toll and concession periods, conditions on ending concessions, risk-sharing, profit-sharing, mutual assistance on projects, and contract revisions. We will keep the BOT model in mind, leaving out the DBFO model, where shadow tolls are a precondition.

4.2.1. Concession Terms and Conditions (see also Sections 2.1.3 and 3.5)

(1) Model for operation (classification based on operational models described in Section 2.1.3)

As terms and conditions for a concession, the model for operation must be defined, such as BOT (build, operate and transfer), BTO (build, transfer and operate) or BTL (build, transfer and lease). The first two are the most common.

Malaysia, Indonesia, the state of California in the U.S., France and Spain all stipulate that in principle the road, even under the BOT model, belongs to the country or to a specific government organization.

(2) Business considerations for concession

Obviously, the main business of a concession here is to operate a toll road, but contracts often include other details:

- Design and construction of road facilities
- Setup of toll offices and toll collections
- Auxiliary facilities for the road
- Management and maintenance of the above

(3) Rights to operate auxiliary facilities (auxiliary income)

The right to operate businesses at rest areas on toll roads, such as restaurants, stores, fuel stations and catering services, are very common components in toll road concessions. Malaysia and the Philippines are exceptions where laws do not always grant concessionaires the right to operate auxiliary facilities.

Granting concessionaires broader rights to develop areas along roads as well as auxiliary facilities is common enough in the private railroad business, but rare with toll roads.

4.2.2 Credit Provision and Guarantees

"Credit provision" as used here denotes credit given by the grantor to the concessionaire in the form of a guarantee of the latter's financial obligations. "Credit guarantee," on the other hand, means that the concessionaire is obliged to obtain a guarantee of credit in a specified form from a third party.

(1) Credit provision

The grantor's provision of credit is especially important in the early stages of a concession. Many countries, including France and Spain, have shifted policy to halt the practice once toll-road business stabilizes. Spain learned a bitter lesson from government guarantees of exchange risk, which ended up saddling the treasury with massive losses. Meanwhile, many countries still see credit from the grantor as affording positive effects.

Malaysia: The government guarantees the concessionaire's financial obligations as well as bank loans in the event that projects are aborted unfinished.

Thailand: State corporations, like the Expressway and Rapid Transit Authority, are eligible for government guarantees of financial obligations amounting to up to six times the ETA's net assets.

The Philippines: Guarantees are not allowed for foreign capital, but the law provides for government guarantees against financial defaults related to the Metro-Manila Skyway concession project.

(2) Credit guarantees

Indonesia

1) During construction, the joint venture must provide insurance as below, with the state-run toll road company, Jasa Marga, as a joint beneficiary.

   a) Insurance against all possible risks, covering all construction expenses
   b) Comprehensive compensation insurance, including third-party compensation insurance covering bodily injury and asset losses.

2) During the concession period, the joint venture must provide insurance with Jasa

Marga as a joint beneficiary.

a) Insurance amounting to total monetary compensation equivalent to total replacement cost.
b) Insurance to cover loss of profits.

Spain

1) The concessionaire must have 10-20% or more owned capital.
2) There is an obligation to procure funds from abroad.

4.2.3 Toll and Concession Periods

The toll and concession periods are the most important terms of any concession contract. Before moving to contract details, let us take a look at the relationship between the concession period and the toll collection period, which are not always the same. Because very few reference materials exist that examine the relationship between the two, it is difficult to provide a complete picture for our 18 countries.

(1) Starting the concession

Although it may seem a reasonable assumption, the concession does not always begin with the signing of a contract.

In Indonesia, for instance, either the first day of road service or the completion of the transfer of all rights of way to the concessionaire, whichever comes first, is the beginning of the concession. For France's COFIROUTE, a purely private enterprise, it is the day that half of the new motorway segments for which the company holds the concessions are opened to traffic. Malaysia's North-South

Motorway is rather an unusual case: the concession begins on the transfer of the already-built portion to the concessionaire.

Hong Kong begins its concessions earlier than any of the countries surveyed. To motivate the concessionaire to complete construction quickly, Hong Kong takes it for granted that the concession will include design and construction periods as well.

(2) Ending a concession

Concessions generally end with the expiration of their contracts. Whether this also signifies the end of toll collecting is determined by the grantor. It is possible for a grantor to continue operating the toll road (unless legislation stipulates free open after redemption, as in the Japanese toll road law). For instance, ANAS, the Italian road authority that became a public corporation in 1994, has publicly proclaimed it intention to do carry on collecting tolls on its roads indefinitely.

Thus concession periods are not always congruent with toll collection periods. Since construction usually takes 4-10 years, while concession periods often run to around 30 years, the question of whether to include the construction period in full or in part is significant.

(3) Concession periods

Several countries place ceilings on concession periods: 30 years (Indonesia and Italy); 35 years (state of California in the U.S., and Hungary); 50 years (the Philippines).

Some countries revise the concession period when a project is expanded. France, Italy, Spain and Japan are cases in point.

The Severn Bridge in the U.K. is the only example we have come across of a case where the concession ended sooner than stipulated in the contract. The concession was for 30 years, or until RCRR (Required Cumulative Real Revenue: the goal for accumulated tolls, calculated using a price index with July 1, 1989 as base date) was reached. The latter proved to be the case.

Concessions usually last 25-35 years, sometimes even 50 years. Collection periods are often revised repeatedly.

(4) Setting toll levels

As will be discussed in Section 5.2.1., there are certain principles for setting tolls. Tolls are quite often set in the concession contract, as with the toll motorways of Malaysia.

Profitability is important in running a toll road, but predicting profitability requires complex calculation, because tolls can be adjusted with an extension of the concession or to reflect the availability or level of government subsidy, offered in the form of pool systems (internal subsidies) and cross-subsidies.

4.2.4 Conditions on Ending Concessions

Most concession contracts stipulate that the road be transferred to the grantor free of charge and in good condition. Documentation confirming this point was gathered from Malaysia, Indonesia, the Philippines, France and Italy. In Japan, where public corporations operate toll roads, an adjustment period of 1-2 years is set after redemption so that toll revenues during that period may be used to rehabilitate the road.

Countries like Malaysia and Indonesia include the transfer of toll facilities in the transfer conditions. This clearly shows intention to continue operating the roads as toll roads. Indonesia requires maintenance bonds as a condition for transfer. Its contracts stipulate that within 12 months the concessionaire submit to the grantor bonds in the amount of 10% of toll revenues for the final contract year.

4.2.5 Revision of Concession Contracts

Concession contracts of some countries have clauses on revision, while others do not.

- The Philippine BOT law does not cover such clauses, so in principle revision is not allowed.
- The state of California (the U.S.), and France stipulate rules for road extensions.
- Italian law includes more general revision rules: contracts are reviewed every fifth year. In cases of low traffic, costs are covered by extension of the concession, higher tolls, and/or government subsidy.

4.3 Roles and Legal Structures Concerning Supervisory Organizations, Concessionaires and Financial-Assistance Organizations (by Country)

The operation of toll roads requires operating bodies. When the operators are in the government sector, as with public corporations, supervisory organizations are needed. When they are semi-public or private organizations, concession grantors, who do more than supervise, are needed. Generally the grantor and the supervisory organization are one and the same, but in one case, that of Malaysia, there is a supervising organization (the Malaysia Highway Authority) for part of the design and construction work, separate from the grantor (the Ministry of Works).

Indonesia established a wholly state-owned toll-motorway company, Jasa

Marga, which runs most of the country's toll motorways and is legally obliged to engage in capital participation in those that are run by private companies.

Italy gives its state company ANAS various responsibilities, including: (1) construction of toll-free motorways in the south; (2) indirect management of a few toll motorways; (3) capital participation in a special corporation related to toll motorways; 4) supervision of toll-motorway concessionaires; and (5) gathering information about public roads.

From these examples, we can see there is not always a clear line between the supervisory organization and the concessionaire. Financially, the toll road is a special case. Because it requires massive investment in the early stages, it usually takes 25 to 50 years to recover its costs through tolls, and long-term cash flow to manage the facility is essential. It is not easy to procure this kind of long-term funding on the market. Several developed countries have established and make good use of organizations that are dedicated to furnishing financial help to toll-road concessionaires.

4.3.1 Concessionaires (See also Sections 2.1.3, 3.5, and 4.2.1)

Toll-road concessionaires can be divided into governments (e.g., eight local government organizations in Japan), publicly-owned bodies (e.g., four public corporations and 43 authorities in Japan, and various authorities in the U.S.), semi-public organizations (the main concessionaires in most countries), and truly private companies (the main concessionaires in Hong Kong, Chile and Columbia; many in Mexico). France has special corporations to run the Mont Blanc and Frejus tunnels.

This chapter will focus on semi-governmental and private concessionaires, and discuss examples in each country.

(1) Toll-road operators in Japan

Twenty toll roads are run directly by local government organizations, while the Japan Highway Public Corp., wholly owned by the national government, operates intercity expressways and some stand-alone toll roads.

The Metropolitan Expressway Public Corp. is owned partly by the national government and partly by six local governments. It runs motorways in the metropolitan area around Tokyo. In Western Japan, the Hanshin Expressway Public Corp., owned partly by the national government and partly six local governments, runs urban motorways in the Hanshin region around Osaka and Kobe.

The Honshu-Shikoku Bridge Authority is partly owned by the national government and partly by ten local governments. It runs three motorways linking the islands of Honshu and Shikoku, including one with railroad facilities that are leased to a railroad company.

In addition, there are 43 regional public corporations (Authorities) running local toll roads, each one partly owned by the respective regional government, and 26 private companies running toll roads under the Road Transportation Law. Many of the roads operated by the last 26 companies are very different in nature from those covered by the Toll Road Law because they are mostly in scenic areas and the tolls are in place permanently.

(2) China

China has undertaken bold experiments concerning toll expressway operators and its commissioning system. The government gives the impression of purposefully delaying the launch of an integrated system. There are at least five kinds of toll

expressway concessionaires in China:

- The Ministry of Communications for each Province (such as the one in Shanxi)
- Special corporations founded by the Province Ministry of Communications (shareholders include government organizations, as with the Amoy toll road)
- Toll road companies (as in Zhejiang Province)
- International joint ventures (foreign joint-venture partners are currently limited to Hong Kong companies)
- Concessionaires under the BOT system (as in Guangdong Province)

(3) Malaysia

Toll motorways in Malaysia have been privatized since 1988. Except for two directly run by government corporations and one by the city of Kuala Lumpur, all are run privately under the BOT concession system.

The 847.7-km north-south motorway, the 48-km central link to the north-south motorway, and five other motorways totaling 149.6 km were being run by concessionaires as of December 31, 1997.

Projek Lebuhraya Utara-Selatan BhD (PLUS) holds exclusive concession rights to the 847.7-km north-south motorway. This massive concessionaire and several smaller concessionaires run toll motorways in Malaysia, a situation similar to Italy's.

(4) Indonesia

Under a 1978 ordinance, Jagoravi Highway and other motorways in Indonesia have been run as toll motorways by the state company Jasa Marga in much the same manner that Japan Highway Public Corp. runs motorways in Japan. Because the road

law was revised in 1985 to encourage private participation, six motorways totaling 148.07 km are now run by private concessionaires under the BOT concession system, while Jasa Marga directly runs nine motorways covering 324.15 km. Because Jasa Marga is obliged to invest in these private concessionaires, the operation is not purely private, but rather semi-public.

Indonesia has been promoting the privatization of performing state-owned companies since a Finance Minister's directive to that effect was issued in 1989. Jasa Marga falls into this category, and is watching market trends with a view to floating its shares when the time is ripe.

(5) Thailand

Established by the interior ministry in 1972, the Expressway and Rapid Transit Authority is a powerful organization that exercises land-expropriation rights as well. It directly operates three segments of urban toll expressway, covering a total of 58.3 km, and indirectly operates two other expressways, totaling 60.4 km in length, through a concession contract with a private company.

The only toll motorway run under the BOT system is the Don Muan Tollway, with the Department of Highways as the grantor. Two other roads covering a total of 153 km are temporarily being run directly by the Department while it looks around for suitable concessionaires.

(6) The Philippines

Here the Department of Public Works and Highways directly runs three toll motorways, but the government plans to expand its authority no further.

The Philippine National Construction Corp. (PNCC) was originally a general

contractor called Construction and Development Corp., founded in 1966, which won concessions on two motorways in Manila, one in the north and the other in the south. After the company suffered a round of massive losses on contracting jobs abroad, the government bought 90% of its stock and renamed it as the PNCC in 1983. Its business remains the same, including running toll roads.

Granted the motorway concession by a presidential decree of 1977, PNCC has been building the South Luzon Motorway and North Luzon Motorway. The concession for the two was awarded like a contracting job, and once the motorways are completed, PNCC will have the concession for collecting tolls to cover maintenance costs (BOT system).

Recently the country has switched from a commissioning approach to the BOT system, starting with the contract to run the Metro-Manila Skyway. Its concessionaire is a joint venture between PNCC and Indonesia's CITRA.

(7) Hong Kong

Five toll motorways, mainly tunnels, are all run by 100% private corporations.

(8) Argentina

Not enough information was available on concessionaires.

(9) Chile

The total number of concessionaires is unknown, but eight toll motorways are run by private concessionaires.

(10) Columbia

Twelve toll motorways are run by private concessionaires.

(11) Mexico

Mexican toll motorways are run by three parties: CAPUFE (the Mexico Road and Bridge Public Corporation), private companies, and state governments. Business conditions on the concessions for 44 toll roads covering 5,120 km are not very stable.

(12) Brazil

The Sao Paulo State Highway Public Corp. runs toll motorways covering 800 km. No toll motorways are or have ever been operated under the BOT system.

(13) United States

Toll roads in the U.S. have gone through four historic periods:

19th-20th centuries: In the heyday of the turnpike, 13,000 km of roads were operated by private companies, but today, none remain as toll roads.

1930s-1950s: A new wave of toll roads opened for business in over 30 states that were the prototypes for motorways. One was the 257-km Pennsylvania Turnpike, which opened in 1940. Most of these roads were operated by public corporations called "authorities," and in some areas they were run by state governments.

1950s-1980s: A strong trend developed to limit toll roads to tunnels and bridges.

1990s: Toll roads were the subject of five programs funded by the private sector under comprehensive land-transportation efficiency legislation enacted in 1991 (which evolved into TEA21 in 1998).

Out of about 7,500 km of toll roads in the U.S., 119 concessionaires operated 517 km of bridges and tunnels at 149 locations as of 1997.

Examples of privately financed toll roads in the 1990s:

- The Dulles Greenway (state of Virginia): This is run by a private company, in which Autostrade of Italy has a stake.
- California State Road 91: This is also run by a private company; Orange County buys its subordinated bonds.

(14) France

Since the days of the oil crisis, many French motorway concessionaires have fallen into financial difficulties. As shown in Figure 4.1, the concessionaires, which numbered 14 at their peak, have been reorganized into three semi-governmental groups (ASF, SAPRR and SANEF), one private company (COFIROUTE) and two special companies (the Mont Blanc and Frejus tunnels).

The largest change was to invest public funds into three private companies to turn them into semi-public companies, and then to take over, or bring under the group umbrella, several other poorly performing semi-governmental companies. Concurrent with this, cross-subsidies and corrections of toll differences among motorway segments were undertaken. The formation of the three groups also took into account geographical proximity between companies in the same region.

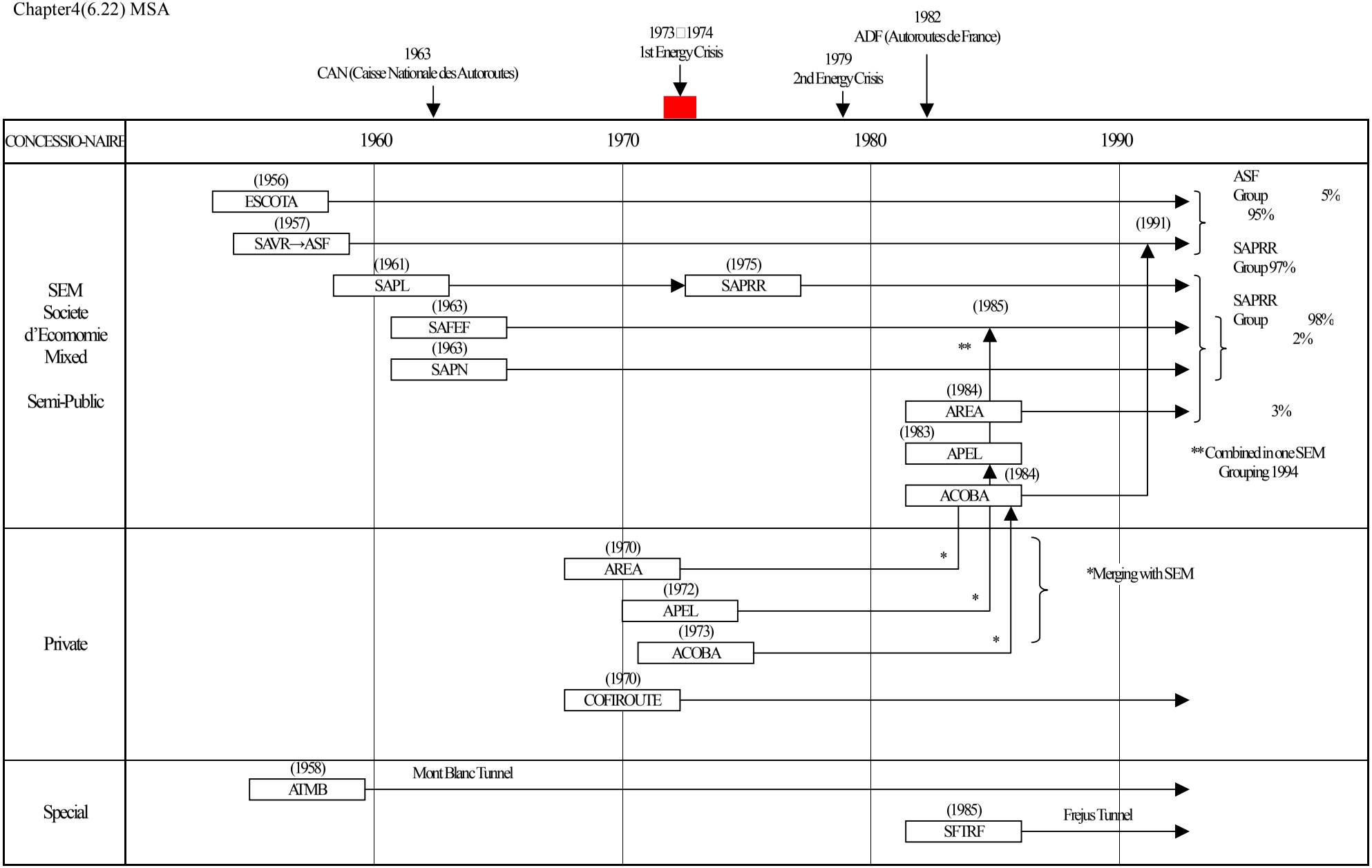


Figure 4.1 Transition of Toll Motorway Concessionaires in France

(15) Italy

Italy also faced financial difficulty in the aftermath of the oil crisis. Countermeasures since 1978 include a new toll-setting policy, which covers cross-subsidies, government bridging loans to support concessionaire obligations, longer-term debt servicing and subsidies to interest payments.

Unlike France, Italy has not reorganized its concessionaires through mergers and acquisitions, but rather by bringing them under the Autostrade umbrella through 50% and larger capital participation. Table 4.1 shows toll-motorway concessionaires in Italy as of the end of 1997.

The 25 concessionaires include one private company, one cooperative and two companies affiliated with the government ANAS; the rest are joint-stock corporations with government investment. The Autostrade group holds 53% of toll-motorway concessions and operates 56% of the toll motorways in service.

Table 4.1 Toll-Road Concessionaires in Italy

Concessionaires	Total motorway length in service (km)	Total concession length (km)
Autostrade (wholly owned state company under I.R.I)	2,854.6	2,854.6
Six Autostrade-group companies (50% or more held by Autostrade)	265.1	485.8
14 joint-stock companies (involving some government investment)	1,749.9	2,111.2
One 100% private company (Torino-Milano)	127.0	127.0
One cooperative (Sicilian road co-op)	218.0	373.6
One concessionaire directly run by ANAS	281.4	281.4

One company partly owned by ANAS (Frejus Tunnel)	79.2	79.2
Total (25 concessionaires)	**5,575.2** <1>	**6,312.8** <2>

As of the end of 1997
Note 1: In addition, there were 894.0 km of toll-free motorway operated directly by ANAS.
Note 2: In addition, there were 903.8 km of toll-free motorway

(16) Spain

As of the end of 1997, Spain had 5,687 km of toll-free motorways and 2,063 km of toll motorways in service. The latter figure has grown by only 256 km since 1985, however. Recently the government has been working toward adding 150 km of toll motorway concessions as part of plans to construct a further 500 km of motorways in total.

Spain reorganized its concessionaires in the mid-1980s because of financial crisis stemming from the oil shocks. In 1984, two concessionaires were taken over by the national government, one of them jointly with a local government, and the government offered interest-free loans. Empresa Nacional de Autopistas, a wholly state-owned company, became the special holding company for four concessionaires. Two others were also taken over by an economically stable company. Table 4.2 summarizes the 13 Spanish concessionaires and their operating lengths as of year-end 1996.

Table 4.2 Spanish Toll Motorways as of Year-end 1996

Concessionaire type	Number of concessi-onaires	Roads operated (km)		Range of concession period (years)
		Total	Each concessionaire's share of total	
100% private company	8	1,630.4	24.3 to 541.5	35-50
85.7% in private hands, 14.3% owned by state and	1	29.7	29.7	50

other governments				
100% owned by national and local government	2	129.3	16.7 to 112.6	50-56
100% owned by national government	2	243.1	86.8 to 156.3	46-50
Total	**13**	**2,032.5**	**16.7 to 541.5**	**35-56**

(17) Hungary

A company jointly owned by French, Austrian and Hungarian interests operates the country's M1/M15 project, a private concessionaire runs the M5 project, and a state-owned company is working on construction of the M3/M30 project.

(18) U.K.

Three separate companies run the Dartford Tunnel, the Skye Bridge and the second Severn Bridge.

(19) Summary of toll-road concessionaires

Worldwide, most toll road concessionaires are semi-public organizations, with 100% private companies the second most common form. Despite the name, "semi-public" companies are seldom owned 50:50 by government and private interests. They are either primarily governmental or primarily private.

The countries with long experience in toll road operations have undergone several reorganizations of concessionaires out of necessity. A major reason is that it is impossible to build two roads under exactly the same conditions. Because the business environment for each toll road, including traffic flow and construction costs, is unique, profitability varies widely.

This is the background to the trend toward mergers and abolition of toll roads. A future challenge may be how that of running toll roads while strictly adhering to the free competition principles of, for instance, the EU treaty.

4.3.2. Supervisory Organizations

Toll roads are generally supervised by the national or local authorities charged with road administration, and they are commonly the grantors of concessions. Below we have detailed the exceptions.

(1) Malaysia Highway Authority (MHA)

Like the Japan Highway Public Corp., the MHA started as a toll road operator and underwent organizational change under a national policy to privatize all toll roads. Now it undertakes land expropriation and supervises concessions from planning through construction, while forming and evaluating related technical standards.

(2) Jasa Marga (Indonesia), ETA (Thailand), and ANAS (Italy)

These were previously discussed in detail. One additional fact is that the responsibility for granting concessions in Indonesia has shifted from the Public Works Ministry to Jasa Marga. This may change again when Jasa Marga is privatized.

France's ADF is wholly owned by the government, but works as a clearing house, linking cross-subsidies among the concessionaires. The ADF is also like a stock holding company for all the semi-governmental concessionaires known as

SEMCAs, and so plays an important role, although it is not the government supervisory authority.

4.3.3. Financial-Assistance Organizations for Toll Roads

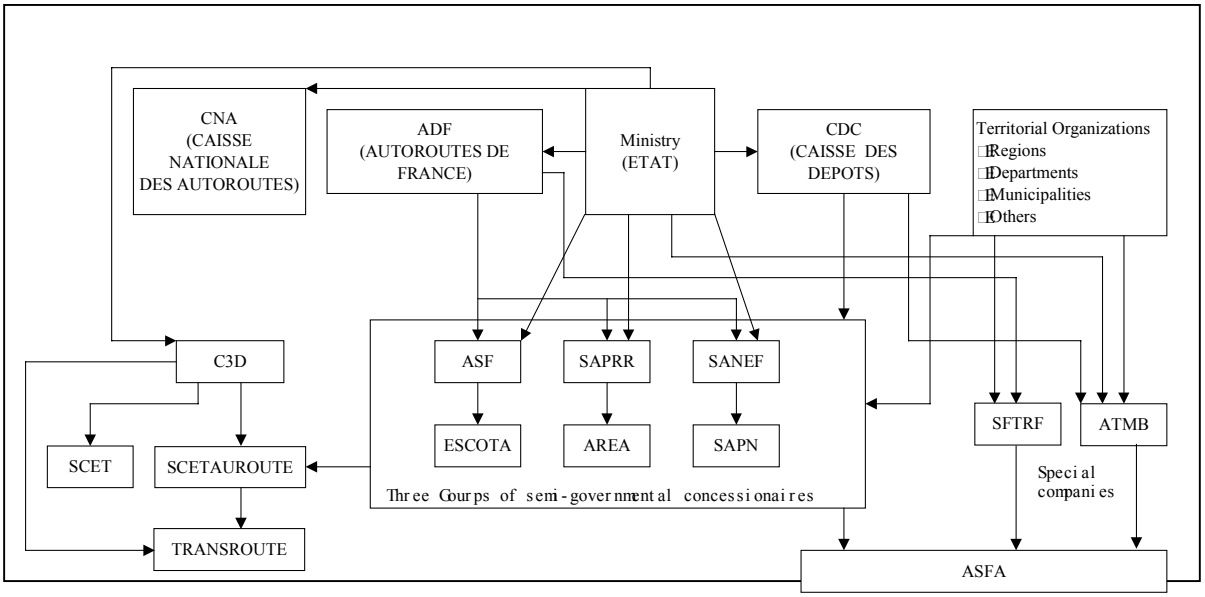
In Japan, road-related bonds have been purchased in great quantities by the government, (government acceptance bonds) moneys from the Fund Application Department and postal-savings and pension funds. This has been an important contribution to the development of the toll-road business. However, it appears that it would be difficult to adapt this system to the requirements of other countries. The French and Italian approaches follow.

(1) France

Figure 4.2 illustrates the organizations that financially support the semi-public SEMCA (Société d'Economie Mixte).

Figure 4.2 Organizations that Financially Support Semi-Public Concessionaires and Special Companies in France

(Chart does not include COFIROUTE, a 100% private company)



The CNA (Caisse Nationale des Autoroutes or "motorway financing corporation") is a government authority set up in 1963 to procure funds for toll motorways, and almost exclusively supports concessionaires other than the 100% private corporations. The length of toll motorways operated by SEMCA, the beneficiary of this system, reached 5,920 km by the end of 1997. The CNA procured 17.7 billion francs (about \350 billion) for 1997 alone, 3.4 billion francs

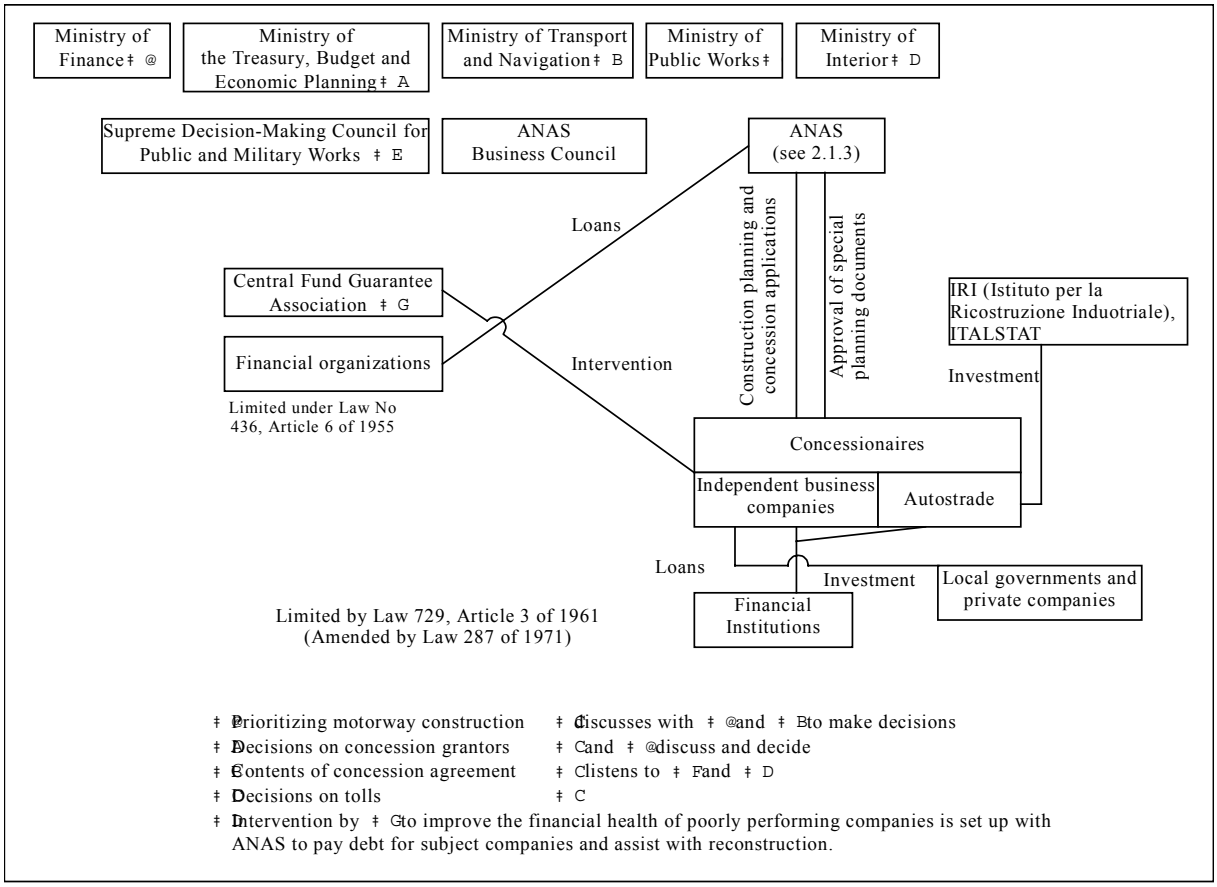
from investment banks in Europe. Its balance of loans to SEMCA at the end of 1997 was 127.4 billion francs.

The ADF, discussed in Section 4.3.2, was founded rather recently (1982), evidence of its key role in rescuing toll roads from economic difficulty, as it was stated in Section 4.3.1.

(2) Italy

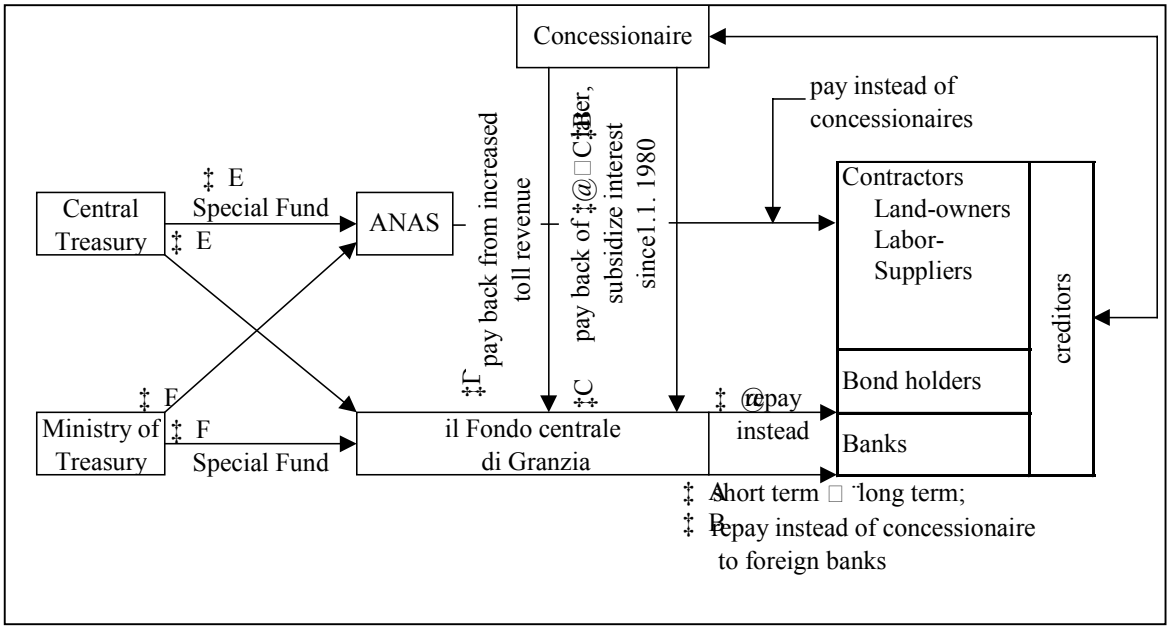
Figure 4.3 shows the relationships between organizations involved in motorway construction and management. Figure 4.4 lists organizations founded in 1980 and later to help rescue concessionaires from difficult financial straits. This illustrates how the government affords protection to road operations in crisis.

Figure 4.3 Organization Related to Building and Managing Motorways in Italy



‡ Prioritizing motorway construction ‡ Discusses with ‡ @and ‡ Bto make decisions
‡ Decisions on concession grantors ‡ Cand ‡ @discuss and decide
‡ Contents of concession agreement ‡ Clistens to ‡ Fand ‡ D
‡ Decisions on tolls ‡ C
‡ Intervention by ‡ Gto improve the financial health of poorly performing companies is set up with ANAS to pay debt for subject companies and assist with reconstruction.

Figure 4.4 Italian Support System for Cases of Business Crises Related to Toll Motorways



Chapter 5 Operational Management and Toll Fees

Enterprises that operate toll roads need to have some kind of organizational structure to regularize the maintenance and repair of facilities, manage road traffic, and collect tolls.

The viability or profitability of toll road projects will depend heavily on the volume of traffic and the setting of tolls. The latter entails many factors. Sections 1 and 2 of this chapter focus on factors to be considered in toll setting at the beginning of toll road operation, as well as the methods and procedures for setting and amending tolls.

Accounting processes hold the key to accurate monitoring of the feasibility and profitability of projects. Transparency is an essential prerequisite for corporate accounting, but in the case of toll roads, it is even more important, since in many cases the projects receive public assistance, including government subsidies, and since in some cases cross-subsidies are conducted with other concessionaires.

In the second part of this chapter, after discussing the internal organization of toll road businesses, the maintenance and management of roads and facilities, traffic control, and income from tolls, we will outline the accounting system for toll roads.

5.1 Tolls (by Country)

Factors to be taken into consideration when setting toll levels include the following: volume of traffic by type of vehicle; ratio of toll by vehicle type; period for which tolls will be collected; construction, maintenance and management costs; long-term financing costs until the road is made toll-free or

turned over to the government (from procurement costs to interest payments), various government assistance measures including subsidies, and whether the road is required to be profitable. Other factors which influence the tolls on a particular toll road include whether there is a toll pool system among different projects within an enterprise or cross-subsidization between different toll road operators. Toll policies, whether they state that tolls should be uniform, or permit some degree of variation between projects, or impose no limitations, will also have some influence.

A project should only be launched where prior calculation of the redemption of loans and bonds indicates that it will be profitable. Once it is launched, the tolls and period of collection should be set in such a way that revenues and expenditures are balanced (for public organizations) or so that appropriate profits are attained (for private enterprises). After operations begin, the toll rates or toll collection period can be amended. As we explained in Section 2.2, one guideline for the setting of tolls can be found in the general principles set out in the World Bank's Report (to Vietnam).

In setting toll levels, it is important to take into consideration the level that users in that country can bear. In the case of Columbia, the policy was to set tolls at a level where there is no "excessive avoidance of usage." In Brazil, the toll per km was set at approximately $0.04, and in Chile, it ranged from $0.025 to $0.03. These levels were appropriate considering what most people in those countries could afford, but in Mexico, where per capita GDP is the same as Chile, tolls were set at $0.12 - $0.50 per km , and as a result people avoided the roll roads and many projects ended in failure.

In the U.S., sensitivity analysis is used in setting toll levels. This analysis looks at the relationship between toll income per trip and the number of vehicles that will use the road, with tolls being set at the point just before traffic volume

will begin to drop drastically. The material in Section 1.4, especially Figure 1.2, suggests that this approach is broadly appropriate. In addition, strict measures are instituted in bond issuance plans to ensure that annual revenues will be sufficient to repay the debt.

5.2 Principles of Toll Setting and Related Factors (by Country)

5.2.1 Principles of Toll Setting

The title of this section mentions the principles of toll setting, but there are few countries where those principles are set down by law or made clear in other ways. Consequently, this section should be understood as an examination of the principal factors to be considered in setting tolls.

First, the general criteria for price setting for public businesses can be put into the following three categories:

- Aim of resource distribution: Principle of price formation at marginal cost
- Aim of profitability: Total cost principle
- Public goals: Redistribution of income, avoidance of inflation etc.

(1) Principle of price formation at marginal cost

Under the principle of price formation at marginal cost, the toll is set at a level marking the intersection between the demand curve and marginal cost (in the case of a road, the cost increment required to allow one more vehicle to pass). In the short run (in the case of a road, this refers to the period in which the road structure does not need to be widened), it is generally recognized that this principle is superior to others, as the social surplus is maximized and therefore it permits the most appropriate use of GNP resources.

In situations where the marginal cost is constantly decreasing,for example, when there is no traffic congestion – tolls set under the principle of price formation at marginal cost will be lower than those set under the principle of total cost. However, guaranteeing the independence of enterprises (toll road operators in this case), demands application of the principle of total cost. Hence it is necessary to fill the gap either by relying on public funds, or by setting tolls in a discriminatory way, making them higher on high-load sections or for certain types of vehicles. Among discriminatory pricing systems, Ramsay pricing states that the discrepancy between marginal cost and price/cost should be set in inverse proportion to the elasticity of demand.

The reason why the principle of price formation at marginal cost is not used exclusively, in spite of the fact that it brings important information, and is recognized by scholars of economics, is that it is extremely difficult to measure marginal cost (price/expense). Moreover, traffic volume is not determined by cost alone, but is heavily influenced by time-related factors such as season, day of the week, and time of day.

(2) The principles of total cost and financial feasibility

The principle of total cost involves setting tolls so that total costs can be recouped in a set period of toll collection.

Total cost is the amount of debt to be repaid, (construction costs, plus maintenance and management costs in the broad sense) plus financial costs (interest, finance procurement costs etc.). However, it is not necessarily the entire amount, as was noted in Section 3.2.2 on Use of Public Funds, since there is sometimes financial assistance. In addition, even in cases of public/private joint ventures, if the toll road operator receives investment from the private sector, it is

natural to account for profit (in cases where interest is included, this is called "full cost").

Also in Section 3.2.3, we pointed out that in addition to toll revenues and revenues from related businesses, there are also sources of public assistance such as interest subsidies.

In other words, tolls (as well as the period of toll collection) are based on a calculation of cash flow between revenue and expenditure. The profit accounting for one toll road is influenced not only by the presence or absence, type and degree of public subsidies, but also by the period of toll collection as well as the level of tolls, so tolls cannot be set by simple formulae. Road tolls are a form of public utility charge, but must also reflect the above microeconomic principles. Hence the final decision will reflect the factors introduced in (3) below.

Countries where road tolls are mainly set through total cost accounting or profitability accounting, either through legislation or public declaration, include Japan, China, Thailand, the United States, France, Italy and Spain.

(3) Considerations of fairness and benefit

In Section 4.1.2, we explained that tolls for Japan’s inter-city expressways are set through a combination of total cost recoupment and the concepts of fairness and appropriateness. The terms “fairness” and “appropriateness” are linguistically ambiguous, however, and are normally used to denote balance with other means of transportation, consideration of the ability of users to pay, and fairness in the setting of tolls for different types of vehicles.

In countries that emphasize balance between different toll roads rather than

balance between fares of different means of transportation, measures are usually established to harmonize tolls among toll roads. We will discuss this issue in detail below.

When operating toll roads, one important aspect of fairness is setting the level at one where the users can pay. The cases of Colombia, Brazil, Chile and Mexico mentioned in Section 5.1 above are of obvious relevance here.

In considering the equilibrium between tolls and benefit, the toll should be set below benefit, as expressed in theoretical cash terms (average values). In Indonesia, it is specified that tolls may not exceed 70% of benefit. China, Thailand, the Philippines, and Italy also have set upper limits to toll/benefit ratios, which are published as one of the principles for toll setting. In Japan, too, the principle of setting the toll below benefit is used, in addition to the debt-redemption principle, on stand-alone toll roads.

There are wide variations within the average figure for benefit per vehicle/km or vehicle/hour, just as there are within per capita GDP. Consequently, setting the toll above the average level of benefit does not necessarily mean that traffic volume will be zero. However, it is difficult to run a toll road successfully if the toll is set so high that a majority of users will be dissatisfied. Bearing in mind that users' perception of benefit is often lower than theoretically calculated benefit, the 70% figure adopted by Indonesia may be in the right area.

Note, incidentally, that there are various ways of calculating direct benefit, including timesaving benefit, driving benefit, and accident reduction benefit. In countries where free roads are generally kept in good repair and equipped with traffic safety facilities, the timesaving benefit becomes the overwhelming consideration. Various formulae, such as the income formula, balanced cost formula, waiting toll formula, and vehicle retention toll formula, have been

proposed for calculating the basic unit of time benefit (the price of saving one minute per vehicle). Today, , however, it is becoming more common to base calculations on average passengers per vehicle multiplied by the value of time saved per person. There are countries where the government regularly publishes the basic units of timesaving benefit, driving benefit, etc. for different types of vehicle, or for different types of vehicles and for weekdays, weekends and holidays. Furthermore, as we explained in Section 1.4 (Toll Road Evaluation), the benefit to diverted traffic is calculated using the basic unit of benefit at par, while benefits to induced traffic volume are based on one half of this figure.

(4) Peak load pricing

Under peak load pricing, tolls are set differently for peak and off-peak hours, or depending on the season. Peak load pricing is based on the philosophy of Traffic Demand Management, and strictly speaking is different from a congestion tax (a tax levied to make up for the gap between individual costs and social costs). Thus it is rational to publish in advance those peak hours and seasons when higher tolls are charged. Another approach, which has been tried in the U.S., is dynamic congestion pricing, which means fine-tuned variation of tolls in response to actual traffic volume at peak hours. In France, too, formulas are in place to set tolls higher at peak hours, and experiments are being conducted to set tolls higher in peak seasons. Many other countries are also conducting studies on various forms of peak load pricing.

(5) Policies for the harmonization of tolls

As seen above, the principle of setting tolls below benefit can be applied both to stand-alone toll roads and to networked toll roads. The idea of toll harmonization policies is to coordinate tolls on various toll roads.

In France there is a policy of limiting toll differentials between different toll motorways to less than 1:3, but this policy is not applied to stand-alone roads such as the Mont Blanc Tunnel and the Frejus Tunnel.

In Malaysia, there is a policy of setting per-km tolls at an even rate for all toll roads throughout the country, but there are in fact a few exceptions.

On Japan's intercity toll expressways, the toll per km is roughly the same throughout the country, thanks to the toll revenue pool system. However, there are exceptions: tolls are set 60% higher on sections of road which have required high construction costs, such as tunnels, and 20% higher in the suburbs of major cities. Conversely, there are temporary reductions by 25% on sections where higher usage is being promoted. Thus, one cannot strictly say that the tolls are identical throughout Japan, but the gaps are smaller than in France.

(6) Others

Malaysia has not articulated any of the above principles. Instead, tolls for each road are decided at the time when a concession contract is being negotiated.

(7) Factors to be taken into account in setting toll levels

Here we will return to the most fundamental principles of total cost and profitability, and consider factors that must be taken into account in setting tolls. In the U.S., various forms of sensitivity analysis are carried out when setting tolls, and in many cases the tolls are set with reference to their likely effect on traffic volume, as well as toll revenues. Another important form of sensitivity analysis looks at the relationship between toll levels and the period of repayment. This is because there are many cases where the government allows an extension to a concession in compensation for refusing to authorize a raise in toll rates.

 The toll level influences traffic volume: (See Section 1.3, Traffic Volume Forecasting for Toll Roads).

 Period of toll collection: The toll can be set lower if the period of collection is extended, but the change is much greater in cases where the collection period is extended from 20- 30 years than in cases of an extension from 40- 50 years. In the former case, extending the period by five years will allow a much greater reduction in toll levels (See Appendix 1).

 Profits: Where private enterprises are permitted to participate in the operation of toll roads, it is only natural that they be allowed to make profits. On the other hand, since roads constitute a form of public infrastructure, and in many cases receive assistance from the government whether tangible or intangible, the position that there should be a ceiling to profits is also natural.

In the Philippines, the financial internal rate of return (FIRR) is not supposed to rise above 12%. In Hong Kong FIRR is unofficially limited to 15%. In the state of California in the U.S., Price Waterhouse (a consulting firm) compared various methods of calculating and limiting profit on the SR91 project, and decided that the ceiling for inherent ROI (return on investment) should be 17%-23%.

The fact is that there is no established formula to calculate profit figures.

 Others: Other all-too-evident factors include financial costs (interest payments etc.) the mode and amount of public financial assistance, construction costs, maintenance and operation costs, and traffic volume.

Here we would like to conclude our discussion of the principles and factors

related to the setting of tolls, and move on to two further issues, namely the ratio of tolls between different categories of vehicles, and the toll collection system (whether by distance or by trip).

(8) Toll ratio by vehicle type

There are two issues here, namely how many types of vehicle categories to use, and how to set the tolls for the different categories.

The more categories one has, the more fairly one can set tolls, but on the other hand, it is advantageous from the viewpoint of toll collecting technology to have fewer categories, since there are fewer mistakes, and processing is accelerated. However, the limitations of toll collection technologies have to some extent been lessened by technical advances over the years.

There are various principles for setting tolls for different vehicle categories, and different ones are used according to country and/or project. Tolls can be set in response to the amount of damage to the road caused by a certain vehicle category, or by calculating the cost of constructing and maintaining the road if all the vehicles using it were of the category in question. One approach is to calculate tolls on the principle of marginal cost increase, whereby construction and maintenance costs for the smallest vehicle category are spread among all categories, the marginal increase in costs caused by the next smallest category is borne by all the categories above that, and so on. Alternatively tolls can be set in relation to the amount of benefit, or to the amount of burden, for each category. In the case of Ramsay pricing, tolls are set in reverse relationship to elasticity of demand.

Table 5.1 is a compilation of specific examples of vehicle categories and relative tolls.

Table 5.1 Number of Vehicle Toll Categories and Ratio of Tolls between Vehicle Categories

Number of vehicle toll categories	Country and toll road		Inter-category toll ratio (based on passenger car set as 1)
2	Japan's urban expressways		1.00 : 2.00
	Some of China's toll roads		1.00 : (1.25-1.50)
3	Indonesia's toll roads		1.00 : 1.50 : 2.00
	Thailand's urban expressways		1.00 : (1.50-1.70) : (2.30-2.50)
	13 toll road operators in Spain	Mean	1.00 : 1.70 : 2.04
		Range	1.00 : (1.00-2.36) : (1.00-2.66)
	Hungary, M1		1.00 : 3.50 : 4.00
4	Hungary, M5		1.00 : 1.10 : 1.70 : 4.00
5	Japan's intercity expressways		0.80 : 1.00 : 1.20 : 1.60 : 2.75
	Motorways in the Philippines		1.00 : 2.00 : 2.60 : 1.80 : 3.30
	Motorways in France		0.60 : 1.00 : 1.55 : 1.64 : 2.12
	Motorways operated by Autostrade of Italy		1.00 : 1.02 : 1.25 : 1.99 : 2.38:
9	New Jersey Turnpike, U.S.		0.79 : 1.00 : 1.75 : 2.17 : 2.29 : 2.83 : 3.42 : 4.00 : 4.54

Vehicle classifications usually include such categories as mortorcycles, light vehicles, small freight vehicles, large freight vehicles, and extra-large vehicles, with these definitions differing depending on the country and the project.

(9) Toll collection systems

Toll collection systems can be loosely divided into two categories: those which are based on distance (where tolls rise with distance – though not necessarily proportionally) and those which are flat fees (a single toll is charged within a specified area regardless of distance traveled).

The traditional form of distance-based collection is for the driver to receive a ticket at the entrance to the toll road, stating the interchange name and vehicle

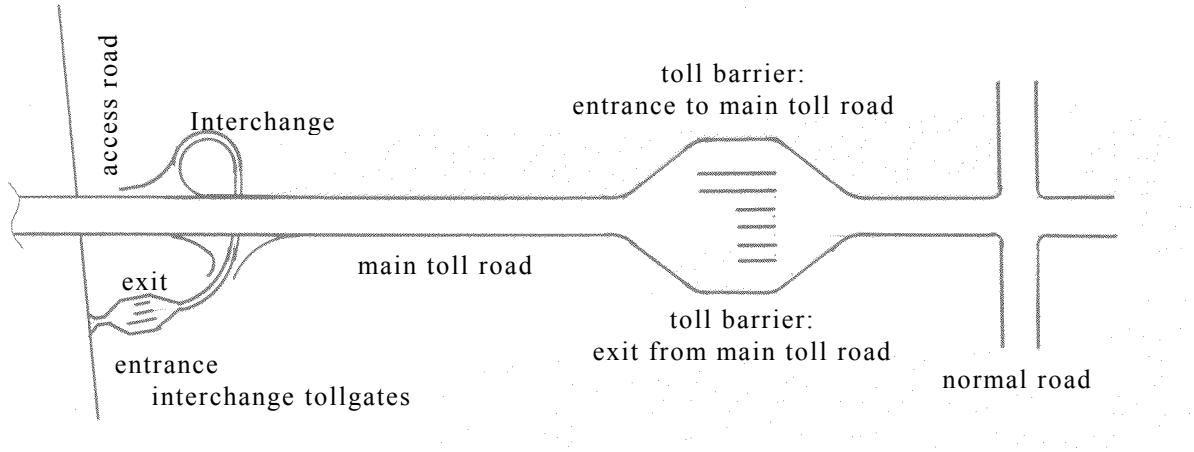
category, and to pay a sum at the exit based on distance traveled and vehicle category, after presenting the ticket.

Generally, the preference has been for the "trumpet-type" interchange, where exits and entrances are concentrated on one site, as they make it easier to manage toll collecting staff and facilities, and contribute to crime prevention. However, with the automation of entrance ticket machines and the diffusion of non-stop automated collection, the merits of this approach have decreased.

The toll barriers on the main carriageway are usually located at the boundary between the toll road and the normal road, namely at the point on the terminal closest to the toll road.

Figure 5.1 Location of Tollgates in a Distance-Related Toll-Collection System

(This figure assumes right-side driving)



On flat-fee toll roads, a flat fee is paid according to vehicle type when entering the toll road, either at an entrance or at toll barriers on the main carriageway. It is possible in principle to collect the toll at exits, but in practice payment on entrance is generally preferred. This makes the user aware that the road is a toll road before entering, and although queues may develop at the entrances, payment on entrance helps to achieve the overriding objective of avoiding congestion on the toll road itself.

Table 5.2 compares the features of distance-related tolls *versus* flat tolls.

Table 5.2 Distinctive Features of Distance-Related Tolls and Flat-Rate Tolls

Toll Collection System	Distance-based tolls	Flat tolls
Outline of the system	The driver receives a ticket at the entrance booth, and pays a toll at the exit in accordance with distance traveled and vehicle type.	Generally, a toll is paid at the entrance or to the toll road, based on vehicle type. The toll does not vary with distance.
Non-stop toll collecting	Entrances and exits are automated, with vehicle-type recognition. Since human beings have a very low processing capacity in this area, the merits of automated toll collection are very large.	In principle, the same. But toll-collecting is much easier for human beings, especially when tear-off coupons are used, so the benefits of non-stop payment are not as great as with distance-based systems.
Fairness toward users	There is fairness with regard to distance.	Within the set area, there is unfairness in the relationship between distance used and toll.
Convenience to users	The driver must stop twice. There is sometimes congestion at tollgates.	Drivers are only required to stop once. However, in some loose systems (e.g. example 3 below), long-distance travelers must use several roads and the number of stops greatly increases.
Traffic control	The amount of traffic volume between different pairs of interchanges is added up each day. This is a powerful tool for projecting traffic volumes.	It is more expensive to use short distances, so that even when the distances between interchanges are small, local congestion between interchanges is rare.
Tollgates	Time required to process one vehicle is 5-7 seconds at the entrance, and 14-20 seconds at the exit. Hence much space is required for toll collection areas, making them difficult to construct within major cities. However, increased use of non-stop automated collection may mitigate this problem.	Processing capacity is large, with the time required to process one vehicle being 5-8 seconds. If tokens are used, each vehicle can be processed in 3-4 seconds.
Other factors	Two vehicles of the same type which are traveling in opposite directions can cheat by stopping along the way and exchanging tickets, thus underpaying their fares. To prevent this, measures such as the construction of checking barriers in the middle of long routes are required.	It is possible to convert distance-based toll roads to flat toll systems. However, because of space limitations, the converse is nearly impossible.
Applicability	Appropriate for intercity toll highway networks.	Appropriate for stand-alone toll roads, urban expressway networks.

Note: In Italy, distance-based systems are legally required. However, this system is actually used on motorways in many other countries too.

Distance-based toll collection is fairer for users, but because the

processing capacity of toll collection is low, the system requires large amounts of space for toll collecting facilities. Consequently, flat toll systems are generally preferred for urban expressways and stand-alone toll roads.

If non-stop automated toll collection comes into widespread use in the future, the distinctions, benefits and drawbacks outlined in Table 5.2 above, which assumes the use of human operators, will lose some of their importance. If automation hits 100%, it will become possible to calculate tolls using sensors installed along the road on each section between neighboring interchanges.

Both the distance-based system and the flat toll system are based on the principle of collecting tolls from all users, though there may be discounts or exemptions for disabled or other specified users. By contrast, some toll collection systems are much looser in application.

Example 1: There are no tolls at night – in cases, for example, where the amount of toll revenue would not be sufficient to cover personnel costs for toll collection.

Example 2: In the case of bridges and tunnels etc., round-trip tolls are sometimes collected in one direction – the rationale for this being that the majority of users travel in both directions, with few users travelling routes that do not require the return trip.

Example 3: Tolls are sometimes collected only at toll barriers on the main carriageway, which cover far less than half the total number of interchanges. This reduces collection costs, although some users may be able to exit the road before reaching a tollgate and hence avoid paying.

In Example 1, it is easy to change the system by staffing the tollgates at

night if the amount of night traffic increases.

Example 2 may present problems in that it may not always be possible to increase the number of tollbooths if there is a change such as the construction of a bridge or tunnel that provides an alternative route.

Example 3 is used by the toll road authorities in the U.S., in places like Hungary where previously free motorways have been converted to carry tolls, and in cases where there is a desire to minimize construction and operating costs.

There is no serious problem with systems falling under Example 3 so long as the number of free users is small. However, unfairness arises between payers and non-payers, and if changes in the network raise the number of free users to the point where they can no longer be ignored, a problem may arise since it is very difficult to construct new toll collecting facilities.

Let us now take a look at the global distribution of distance-based and flat toll systems, including the loose systems described above:

(a) Countries or operators which use pure distance-based and flat toll systems:
Japan (urban expressways and expressways), Malaysia, Indonesia, France (intercity routes), Italy (intercity routes)

(b) Countries or operators which use the distance-based and flat toll systems in combination with loose toll collection systems:
Japan (standalone toll roads), China, Thailand, the Philippines, the United States, France (urban routes), Italy (urban routes), U.K., Hungary

(c) Unclear:
Brazil, Colombia, Chile, Mexico, Argentina, Hong Kong, Spain

Besides the toll collection systems mentioned above, some systems include discounts for long-distance travel, for multiple trips, for disabled persons, or for major customers. However, there are great differences between countries in this area, so these details are excluded from Level 2 of the KDB.

5.2.2 Means and Procedures for Setting Tolls

Road tolls are a form of public utility charge, so it is usual for governments to give permission for tolls, based not only on the principles discussed in previous sections, but also in consideration of their function as public institutions and of the opinions of the general public.

In this section, we will give a brief introduction to the systems in various countries, leaving more detailed information for Level 3.

(1) Japan's intercity expressways

The principal operator (the Japan Highway Public Corporation) receives a commission from the Ministry of Construction, which is in charge of orders for the construction and management of expressways. The JHPC formulates a request for toll rates designed to recoup budgeted costs, and after receiving the opinions of academics and other experts, files a toll rate request (amended where necessary) to the Ministry of Construction and the Ministry of Transportation.

The two Ministries gauge public opinion at venues such as public hearings and the Council on Policies for Stable Consumer Prices. They then set the toll rates after discussing them with government officials concerned with the cost of living.

Since the introduction of the toll pool system, revenue requirements have

been recalculated if necessary when orders have been issued for additional routes or segments. If it is found that a rise in tolls or an extension of the period of toll collection is required, a request for an adjustment of toll rates is proposed, and a similar process ensues.

There are cases where the Ministries of Construction and of Transportation do not approve these requests *in toto*. However, the principle of total costs is set in legislation, so the books are usually balanced by a combination of a smaller rate increase and an extension of the toll collection period.

(2) China

Applications from operators require the permission of the Bureau of Transportation of the Province or City government, which is the grantor. Permission is granted based on necessity and appropriateness.

(3) Indonesia

According to the Road Law, decisions on the setting of tolls rest with the President.

Proposal by operator → Application to Roads Bureau →
Agreement of Minister of Public Works → Minister of Finance →
Confirmation by Chief Cabinet Secretary that contents are legitimate →
Signature of President

(4) United States

In principle tolls are set in accordance with total cost, but in reality priority is put on ensuring that revenues exceed the amount that needs to be repaid during any given year. There is extremely little government intervention compared with

other countries.

(5) France's public/private operators

The French public/private firm ASF (see Section 4.3.1, Figure 4.1) is generally entitled to set its own tolls for new motorway segments. It sets the rates based on the per-km rates of its existing roads. The tolls are sometimes modified if the construction or operating costs are high for the new segment. However, if the amount is higher than 120% of existing tolls, it is necessary to gain the approval of the Minister in Charge of Economic Affairs and the Minister of Equipment, Housing, Facilities and Territories of Transport.

(6) Italy

Article 6 of Law No. 729 of 1961 provides that: "The tolls for toll motorways will be decided after discussions between the Minister of Public Works and the Minister of the Treasury, followed by listening to the opinion of the board of directors of ANAS (at the time the Agency in charge of public roads), on the basis of unified criteria for reductions in transport costs, and based on the geographical conditions of the road in question." Thus benefit is established as the main principle in decisions on new toll motorways.

However, Article 37 of Law No. 49 of 1961, which reorganized ANAS and prescribed its role, states that "Tolls on motorways shall be decided on the basis of construction and operating costs of the motorway. Of course, distance of travel will also be taken into account." Thus the principles of per-distance tolls and total cost are both clearly established.

Later, Law No. 385 of 1968 stated that "New additional motorways will be adopted on the condition that the revenues through the period of concession over

the entire route will either equal or exceed costs."

The same law also contains a provision whereby: "A decision can be made to raise tolls if this is deemed necessary to the overall management of all the motorways of which Autostrade is the concessionaire." Recouping of costs is to be based on the pool system, establishing the principle that users pay the necessary costs in the form of tolls.

Under this principle, tolls have been raised nearly every year since 1968. The 1961 principle of using toll rates as a tool to promote transport policies has weakened, while the principle of recouping costs (the total cost principle) has strengthened. At present, this trend is continuing to gain strength, with a few exceptions.

In practice, rates are set through agreements between ANAS and the concessionaire. These agreements take account of the construction and operating costs of motorways, and set standards for future adjustments.

(7) In many countries the initial tolls are set at the time of the concession contract

Examples include Malaysia, the Philippines, France, and Spain. There is a tendency for tolls to be set low in such cases, as the will of the grantor is inevitably heavily reflected. Spain is an extreme example of this. One cannot deny that there are other cases where, on the contrary, the rates are set high because the government wants to convert uneconomical roads into toll roads.

(8) Tolls on temporary two-lane motorways (so-called "staged construction")

In many countries a process known as staged construction is used, where a

motorway that will eventually have four lanes is initially built with just two.

In France, tolls on temporary two-lane motorways are set at 75% of the tolls to be used upon completion. However, in most other countries there are no clear regulations like those in France.

5.2.3 Methods and Procedures for Toll Adjustment

Methods for adjusting toll levels on toll roads show even more variety than those for establishing initial tolls. The reason for this is that in addition to the total cost principle, there are often price cap systems which set upper limits on price rises in components of the cost of living. As we will see later in the case of Italy, management efforts are sometimes encouraged by the government allowing tolls to be raised if management has succeeded in improving quality of service.

With regard to procedures for adjusting tolls, there is a global tendency to move away from decisions made at the free discretion of the government, toward methods based on some formula (such as relating toll increases to inflation). In any case, what is important is for the procedures for toll adjustments to be spelled out clearly, and for changes to be implemented in accordance with these procedures. If there are many unclear factors, a variety of problems crop up for toll road operators, such as difficulty in persuading private investors to put money into the project.

In the early period in France, decisions were made at the discretion of the Ministry of Finance. The advantage of the French method was that it ensured that investors did not receive inordinate returns on their investment, but it also carried the risk of lowering incentives to cut costs and improve productivity. In the background to this was the fact that at the time there was no purely private involvement, as the only concessionaire was SEMCA, a public-private

corporation.

In Spain, toll rates have been modified in accordance with a formula that takes inflation into account. The advantage of this system is that it encourages new investment and efficiency. In addition, is also includes a system to appropriate extra profits into the national treasury, thus reducing the risk of letting investors get away with overly high profits.

In Indonesia, according to Law No. 130 of 1980, decisions on defining toll road segments and toll rates require the approval of the President, following a proposal by the Minister of Public Works. Concessionaires file requests for toll adjustments every two or three years, using a formula based on the consumer price index, but there is no guarantee of government approval. There are concerns that the lack of transparency in the toll adjustment procedures has chilled investor interest in toll roads. Since the currency crisis, the government has been considering revising the related regulations in order to increase the transparency of decision-making on tolls.

In Hong Kong, when traffic volume and toll revenues fall below initial projections, the regulatory authority can give the toll road operator permission to raise tolls earlier than initially agreed. Conversely, if toll revenues exceed projections, increases can be delayed where they would lead to profits in excess of the specified profit/capital ratio.

Along with the direction and scale of changes to price levels, timing of implementation is a key factor in toll adjustments. It is common in any country for adjustment schedules to be delayed for political reasons, but there are countries where appropriate compensation is paid when delays are due to the government’s will.

The following is a compilation of concrete procedures.

(1) Recalculations of repayment plans and profitability

Japan is the only country that publicly states that toll revisions must be based on recalculations of repayment plans. However, one doubts whether toll rates are modified anywhere without some kind of calculation of financial feasibility.

(2) Involvement of socioeconomic changes in toll rate adjustments

There are a relatively large number of countries where socioeconomic changes, mainly meaning increases in the cost of living, are taken into account in toll rate revisions. Among developing as well as developed countries, there are cases where revision formulae are set into concession contracts.

□ ASF in France (public/private) since 1995

Toll increase rates for passenger cars are set at 85% of the rise in final household consumption (excluding cigarettes) for the year before. For most toll segments, which have similar characteristics within the road network, the average change is usually fixed within a limit of 15%. In cases where the level of traffic volume is very different from the conditions projected in the contract, the parties seek a compromise.

□ Italy, since January 1998

Rate changes in Italy have been carried out according to a variety of formulae, but the one adopted since 1998 is particularly forward-looking, so we will explain it in dome detail.

The formula for the rate of change is:

$T = \square P - X + \beta \square Q$

$\square P$ is the projected inflation rate. X is the targeted rise in productivity, and differs in accordance with the toll road concessionaire's state of progress in recouping costs, along with future construction plans, plans for increasing productivity, projected traffic volume, and competition from other companies. Concretely, the figure for X is decided by agreement between ANAS (see Section 2.1.3) and the concessionaire for the coming five-year period. X is usually revised every five years, but this period can be shortened if the need should arise. When X = 0, this indicates that even if productivity does increase, the entire increase will be absorbed by future investment, so that the benefits cannot be returned to users, or retained internally.

$\square Q$ is an attempt to numerically express the quality of service provided by the toll road. It is derived from indices of accident rate, road-surface skid resistance, hardness of the roadsurface at specified temperatures, etc.

Just like $\square P$, $\square Q$ is revised every five years. β is a coefficient, but is positive, meaning that the higher the quality of the service, the higher the toll rates can be set.

□ Spain in recent years

The upper limit for toll-rate increases is set at 95% of the rise in the consumer price index.

In situations where the government refuses permission for an increase

below this level, compensatory measures are taken, such as lowering the value-added tax on the tolls raised from 16% to 7%, or allowing an extension of the concession period.

□ China

Tolls are adjusted at least every three years, with the rate of adjustment calculated to take into account the inflation rate over the previous three years.

□ Indonesia

Permissible toll increases are calculated on the following formula:

$$T_b < 70\% \text{ of benefit (including time-saving benefit)},$$

and

$$T_b = T_1 (1 + [\{I_1 - I_0\}/I_0]),$$

where

T_b = Adjusted toll;

T_1 = Previous toll;

I_1 = Consumer price index at the time of the application for toll adjustment; and

I_0 = Consumer price index at the time of the granting of permission for the previous toll.

□ Thailand

Toll increases are based on the rise in the consumer price index.

On the Don Muan Tollway, other factors are considered, such as average daily traffic volume, interest rates, maintenance and management costs, changes

in the exchange rate of the baht against the German Mark, and changes in taxes.

There are also provisions for tolls to be modified in response to riots, delays in opening, impediments to efficient operation, impediments to the business of collecting tolls, changes in related regulations, and the construction of other roads which would have the effect of reducing traffic on the Don Muan Tollway.

□ Philippines

Concession contracts are based on the BOT method and include, in addition to initial toll rates, formulae for rate adjustments and conditions for the schedule of rate adjustments.

Modified toll rate =

Initial toll x ([{Ratio of peso portion of construction costs x Rate of change of consumer prices in the Philippines} + Ratio of foreign currency portion of construction costs] x {Rate of change of consumer prices in foreign countries x Changes in foreign exchange rates} + a fixed ratio])

Note: The fixed ratio is determined thus: ratio of peso portion in construction costs + ratio of foreign currency portion in construction costs + fixed ratio = 1.0.
Source: Spoken interview with TRB (Toll Road Bureau)

In other words, the rate of adjustment of the tolls is basically derived from the initial construction costs (assumed to be in the form of loans) as affected by inflation and changes in foreign exchange rates, and the toll adjustment is calculated as a ratio of these factors.

In this section, we have seen that the consumer price index is an important factor in many cases when socioeconomic changes are incorporated into toll

adjustment formulae. However, only in a few cases are adjustments directly proportional to the consumer price index. This is because the cost of maintaining and operating toll roads is not directly related to the cost of living, and in addition there are fixed costs such as the original construction costs prior to interest on borrowing.

(3) Modifying toll rates through changes in conditions of repayment

 China: Toll rates can be modified in response to changes in the repayment conditions such as the toll-collection period specified.

 United States: There are cases where the concession period is extended through the issuance of new bonds in order to procure funds necessary for the extension of toll roads, etc. In such cases, a consultant will perform a calculation of the business costs, projecting traffic flow and toll revenues and proposing a toll rate scheme necessary to repay the loans. The operator then makes the decision.

In countries other than China and the United States, there is an implicit understanding that toll rates or concession periods can be modified in cases where changes in the repayment conditions have a profound effect on repayment plans. In France, concessions are set on a route-by-route package, so that when new segments are opened on existing toll roads, the occasion is often used to check the need for toll adjustments.

(4) The setting of tolls to promote use

Table 5.3 shows the main cases we have found of special toll systems to encourage greater use, or particular kinds of use, of toll roads. No doubt there are other systems that are not recorded here, as well as other countries utilizing such systems.

Table 5.3 Tolls Used to Promote Use and Countries Where They are Used

System of tolls used to encourage use	Country where used
Prepaid coupons, multiple trip tickets, etc.	Japan, Indonesia
Campaign periods (discounts, free passes)	Thailand
High occupancy vehicles (HOVs) get free use of lanes where single-passenger cars must pay	U.S.
Sales policy discounts (for long-distance users, frequent users etc.)	Japan, France
Non-stop discounts*	U.S., France
Commuting discounts	France, COFIROUTE (purely private)
Encouraging carpools (discounts or toll-free access on weekdays for passenger cars and light vehicles)	France
Free passage within limited areas, etc.	Japan
Discounts for low-traffic segments or routes	Japan
Discounts for long-distance buses (e.g. buses which make more than 80% of stops at motorway bus-stops)	Japan, Philippines

Note: These are designed to promote the use of automatic toll collection, either by offering a discount for electronic tags, or by discounting the tolls at automated booths.

(5) Procedures for toll rate adjustment

□ Japan

Procedures for adjustment are the same as those described in the section on setting initial tolls (see Section 5.2.2 [1])

□ China

Request by operator → Reply/approval by provincial government

□ Malaysia

Procedures are clarified in the concession contract. However, Cabinet approval is required regarding the pricing and scheduling of adjustments.

□ Indonesia

Same as for initial toll setting (see Section 5.2.2 [3]).

□ Thailand's urban highways

Approval from the Ministry of the Interior is required.

□ United States

The United States is unique not only in the fact that the power to change the tolls lies with the operator, but also in that where specified net profits are not gained, the operator *must* raise the tolls.

Operator contracts out survey → Consultant calculates viability → Public hearings → Request to state governor → Governor replies after approval of treasurer and auditors

Here, the consultant formulates revised tolls, giving consideration to maintenance and management costs, interest payments, the plan to recoup initial investment, traffic management costs, the elasticity of tolls, etc.

5.2.4 The Present Situation of Tolls

Figure 5.2 presents a picture of the tolls for passenger vehicles in various

countries and in various states in the U.S., based on a 1998 toll survey by IBTTA (International Bridge, Tunnels and Tollways Association).

The number in parentheses following the name of each country or state indicates the number of roads that were included in the survey. Naturally, this does not include data from projects that declined to respond, so it does not cover all toll roads in each country or state. Also the per-km toll rate is indicated in U.S. dollars at 1997 exchange rates, and consequently the figures would change if current rates were used.

Thus Figure 5.2 inevitably contains some inaccuracies, but it does show that vast differences in road tolls exist not only among countries, but also among projects within a single country.

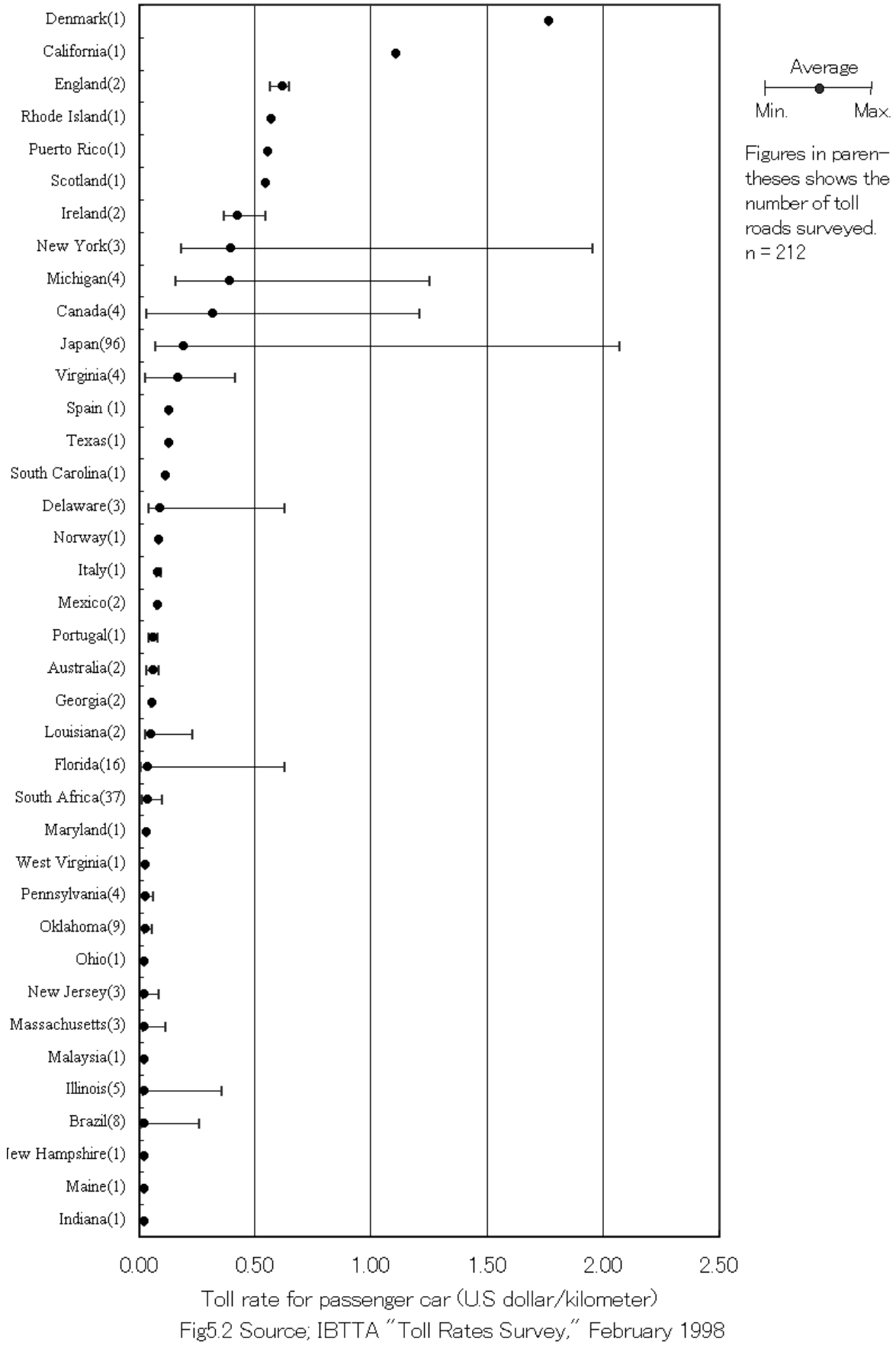


Fig5.2 Source; IBTTA "Toll Rates Survey," February 1998

5.3 Management and Operation Systems (by Country)

5.3.1 Organization

This section deals only with the organizational structure of the bodies that run toll roads. For details on mode of management see Section 2.1.3, and for relevant legal frameworks see Section 4.1.3.

Organizational forms vary from one enterprise to another, and from one concessionaire to another, so here we will limit ourselves to outlining the minimum level of organization required for an enterprise of this kind.

(1) General affairs section -- Also handles administrative processes necessary to acquire licenses and permits.
(2) Personnel section
(3) Financial section
(4) Accounts section -- See Section 5.3.3.
(5) Design and construction section -- In many cases this part of the work is entrusted or subcontracted to outsiders. The construction section may also be independent from the rest of the organization.
(6) Maintenance and traffic control section -- Generally handles three functions: maintaining facilities, controlling traffic flow, and collecting tolls. In big organizations, these functions may be divided into three different sections, each of them equal in status to the other sections.
(7) Public relations section -- Handles the promotion of toll roads.

If the enterprise acquires the land for the road itself, it may also have a land acquisition section. Again, there may be a need for a section to handle incidental enterprises, where roadside developments etc. are part of the concession. Where the toll road is very long, there may also be a need to add regional branches to the

organizational structure.

5.3.2 Maintenance and Repairs, Traffic Control and Toll Collection

Basically the maintenance and repair work required for toll roads is no different to that required for toll-free roads, though there is a tendency for users to expect a higher level of service when they are being made to pay, and this does tend to raise standards to some degree.

Traffic control, likewise, is basically the same as for toll-free roads. However, information systems tend to be somewhat more advanced, and there is the advantage that real-time acquisition of information tends to be easier, since tollgates generally collect information as well as payments. The existence of tollgates also makes it easier to control the flow of traffic than on a toll-free road.

With the exception of the shadow toll system, the collection of payments on a toll road is of course quite different from the situation on toll-free roads.

(1) Toll road operation systems

Increases in road network construction and traffic volume may necessitate a strengthening of the traffic control system, entailing larger personnel structures and organizational frameworks. If due account is taken of the deterioration of roads with age, and of the need for anti-earthquake measures, then attention must also be paid to the costs of maintaining, improving and reconstructing roads.

In the first phase of development of France's toll motorways, the concessionaires were semi-governmental companies called SEMCAs. Later, when some of the concessions were handed over to a purely private sector enterprise, COFIROUTE, the move was planned as part of a government policy of harnessing

private-sector vitality in order to increase management efficiency.

The case, however, remains unproven. COFIROUTE's efficiency, measured in terms of the volume of traffic divided by number of employees, is 10,300 vehicles/km per employee. France has seven SEMCAs, of which three are more efficient than COFIROUTE by this measure and four are less efficient. Another measure of business efficiency is staff per operating km , and here COFIROUTE's figure of 2.2 staff per business km puts it behind four of the SEMCAs and ahead of three. Hence there is no solid proof here that the private sector is more efficient. However, it should also be said that comparisons like this need to be treated with extreme caution. There is variation in the methods by which companies decide how many staff they need to maintain their roads, and the degree to which work is outsourced to other companies can also make a big difference.

(2) Toll road maintenance systems

Maintenance and repair systems vary according to the structure of the road being maintained -- a bridge will have very different requirements from a tunnel, for instance. It is also important to strengthen the system with the passage of years after initial construction. Increases in traffic volume, especially of large-scale vehicles, may cause a corresponding increase in the amount of maintenance work required. This may include corrective work on the expansion joints of roads that have bridges and viaducts, repair and/or overlay of pavements, lane control during repair work etc. Much of the work may have to be done at night to avoid the need for lane closures.

Nor is the increase in maintenance requirements limited to the road itself. Electricity, communications and drainage systems will also need a growing amount of attention, and traffic signs etc. may need refurbishing too. Recently a series of earthquakes in different parts of the world has also necessitated

construction work to improve earthquake resistance. When earthquakes, hurricanes or floods do hit the road, rapid-response traffic control systems and prompt repair work are of course essential. In some climes and seasons, ice and snow must also be taken into account in locating and designing maintenance control bases for toll roads.

Most of the above items are part of the everyday running of a toll road, which is why they come under the general heading of "maintenance." It is common practice to establish maintenance offices at certain intervals along the road. In Malaysia, however, a franchise system is used whereby even everyday maintenance is farmed out to sub-contractors. The current trend is toward the gradual disappearance of the orthodox approach, whereby the road operator handles maintenance itself while contracting out repair and improvement work.

(3) Toll road traffic control and management systems

Access-controlled toll roads must work in cooperation with emergency services like the police and fire brigade to deal with traffic accidents, breakdowns, assistance to stranded road users, etc. Still, prevention of accidents and quicker handling of those that do happen are important issues.

Items of great importance to maintaining the structure of the road include strict measures against vehicles that exceed weight limits, and surveillance systems to prevent the passage of vehicles with dangerous loads. This is especially important in tunnels where such vehicles are prohibited -- generally long tunnels and those that go under the seabed or beneath other stretches of water.

In some networks of urban motorways, it is quite common for traffic jams to become a problem on the through traffic lanes. In such cases it is important to

supply users with traffic jam information. Some operators also institute flow controls to avoid excessive jamming in bottleneck locations. In the field of information supply, much research and development work has been done in various countries around the world on automating and enhancing traffic control systems, leading in recent years to the development of the Intelligent Transportation System (ITS).

(4) Toll collection systems

It is necessary to adopt the most efficient and accurate toll collection system for the toll schedule selected on any given road. In particular, if the queue of cars waiting at tollgates is allowed to get too long, the result is a man-made traffic jam, which will naturally cause dissatisfaction among users.

□ Manual collecting *versus* automated collecting

Traditionally most toll collecting has been done manually, and this is still the case today. However, automated systems whereby a coin or token is put in a slot allow spectacular improvements in efficiency. As we saw in Section 5.1, the level of efficiency where tolls are collected by hand is not high. Improvements are being pursued in three directions: speeding up manual collection processes; developing "non-stop" automatic collection systems; and improving "touch-and-go" collection systems.

In the Philippines, tollgates at the Skyway are heavily staffed, with four or five collectors servicing each lane of traffic. They handle all necessary transactions, from giving change to taking the toll payment. The aim is to drastically improve the capacity of each lane. In an economic environment where personnel costs are low this is one possible approach, though it does make it more difficult to prevent dishonest behavior by staff.

In Japan, one approach used in situations where it would be extremely difficult to increase the number of lanes is to place two tollbooths on each lane, so that each lane can process two vehicles at a time. This has been found to increase per-lane processing capacity by a factor of just under 1.5.

However, the most revolutionary advance in toll collecting is non-stop automatic collection, which is starting to spread around the world. It involves an electronically reading a meter kept on the vehicle's dashboard**.** The developed countries of Europe and North America led the way in this field, and nowadays Hong Kong, Malaysia and Singapore are also among world leaders in this field. Having said that, there is great variation between toll roads in the degree to which non-stop automatic collection systems are actually used, and these differences may be attributed largely to the priority attached to their introduction in each country.

The third method mentioned, touch-and-go, or "touch 'n go" as it is sometimes nicknamed, works by placing a magnetic prepaid card over a sensor at the tollgate, which registers payment and raises a barrier. The process takes 5 or 6 seconds, so although it is an intermediate system between manual and non-stop systems, its level of efficiency puts it closer to the latter.

In Malaysia, where both non-stop and touch-and-go systems are in use, some users find the latter easier to use and predict that it will win swifter acceptance than non-stop.

 Payment methods

There is great variety in payment methods, which include cash, carnets of multi-use tickets, pre-paid cards, monthly payment by charge plates issued to

frequent users, credit card etc. Dedicated coins or tokens are the most efficient methods, followed by ticket carnets. Cash is the least efficient method. Improvements in payment method can improve the capacity of tollgates, and can also result in reducing staffing levels.

□ Use of transit tickets in distance-based toll systems

On toll roads where the toll varies with distance traveled, drivers receive a transit ticket at the entrance to the toll road, handing it in together with payment (in whichever form it may be -- see above) as they exit. These tickets are gradually being replaced with magnetic cards around the world, a development that has not only improved capacity but also speeded up the processing of various kinds of statistical data.

□ Preventing dishonest acts by toll-collectors

In order to prevent dishonest acts by toll-collectors, automatic surveillance systems may be placed in each traffic lane (vehicle detectors, ITV etc.), or passage-counting platforms may be installed. Such measures can go a considerable way toward preventing dishonest acts, and sensors that can measure the height of vehicles and thereby distinguish different types of vehicle, subject to different tolls, can further reduce instances of pilfering.

□ Crime prevention

While no cases of theft from tollgates serious enough to attract worldwide attention have been recorded to date, the fact is that there *have* been cases of robbers targeting tollgates, and it is therefore essential to have preventative measures in place on all toll roads. One relatively common precaution is to have a bank send an armored car with guards to transfer the takings every day, or even

twice a day. Another important measure is to step up the use of pre-paid cards, credit cards etc., thereby reducing the amount of cash on the premises.

In the Japanese distance-related toll system, it is a matter of principle to locate exits that collect tolls close to operation offices.

5.3.3 Toll Road Accounting Systems

Toll road accounting systems vary from country to country and from state to state. We have been able to gather only a small number of examples, so we include almost all of them here.

(1) Japan

The Japan Highway Public Corporation (JHPC; *Nihon Dôro Kôdan*) operates Japan's network of toll motorways and 65 other stand-alone toll roads, known in Japan as "general toll roads" (figures as of November 1999). The structure of the JHPC's balance sheet is shown in Table 5.4. Other public toll road operators, such as the Metropolitan Expressway Public Corporation, use the same accounting system.

Table 5.4 Accounting Items on the Balance Sheet of the Japan Highway Public Corporation

Assets	
Accounting item	**Contents**
Liquid assets	Cash, deposits etc.
Fixed assets	
Business assets	
Roads	Value of roads in operation
(motorways)	The Chuo Motorway etc.
(general toll roads)	The Manazuru Road etc.
Other business [assets]	Post-depreciation value of car parks, incidental facilities, and motorway related facilities
Temporary items for construction of business assets	
Road construction temporary item	Value of roads under construction
(motorways)	The Kan'etsu Expressway etc.
(general toll roads)	The Ken'ô Road etc.
Tangible assets	Office buildings, machinery etc.
Others	Investment in the Tokyo Bay Crossing Road Co., etc.
Deferred assets	Balance of outstanding road construction bonds etc.

Liabilities and capital	
Accounting item	Contents
Liquid liabilities	Unpaid costs etc.
Fixed liabilities	
Road bonds	Value of outstanding road bonds
Long-term borrowings	Outstanding loans from private-sector financial institutions etc.
Outstanding installment payments	Remainder of installment payments on principle for Tokyo Bay Aqualine
Others	Reserve fund for retirement payments, asset collateral subsidies etc.
Special Law reserve funds	
Redemption reserve funds	Cumulative total of funds set aside to repay loans used to construct roads now in operation
(motorways)	
(general toll roads)	
Others	Reserves against losses from the operation of general toll roads
Capital	Government investment capital
Surplus fund	Cumulative balance from operation of car parks, incidental facilities, motorway facilities, and the Kanmon toll tunnel

The foremost characteristic of the JHPC's accounting system is that instead

of accounting for its road assets on a depreciation basis, it uses a redemption reserve fund. What this means is that interest subsidies and other forms of income are added to toll revenue, and then maintenance costs, interest payments and other debit items are subtracted from the total. (Note: the JHPC is not legally permitted to include profit as an accounting item).

Redemption reserve funds are used to pay off debts incurred in the construction of road assets. Hence a comparison between this figure and the value of business assets will reveal how far the redemption process has got.

As shown in the material on Japan in level three of this KDB, management of toll roads is an exceedingly long-term business. Calculations for the retrieving of investment capital are predicated on assumptions such as that traffic volume will generally show continuous growth after roads are opened to traffic. These conditions dictate that interest payments will be large during the initial stages, gradually lessening thereafter as the principle is paid back. It follows that depreciation accounting would show losses in the initial stages and profits thereafter. The appearance of a lot of red ink or black ink on the accounts for a particular financial year would make it difficult to get a clear picture of real business conditions. This is why the accounting device of the redemption reserve fund has been adopted.

A second feature unique to the JHPC is that "temporary items for construction of business assets" -- a heading which covers assets in new toll-road extensions still under construction -- tend to add up to a relatively high figure (some 12% of total business assets at the March 1999 settlement). These temporary items are a somewhat artificial accounting device, and as such it is important to monitor the financial viability of the projects to which they refer with some care.

(2) United States: thinking on account processing

Depreciation accounting is not applied to road assets. Instead of calculating a cumulative depreciation figure, the actual amount of money used in the past to pay off principle from the commencement of repayments to the present accounting year is entered in the balance sheet. That figure, plus the total of outstanding bonds awaiting redemption, is set against the figure for road assets on the other side of the balance.

In the case of the Massachusetts Turnpike Authority, depreciation of roads and related facilities is not included in operating expenditure. Instead, the expenditure seen as necessary to defray the cost of maintaining these assets is accounted for in a swap reserve fund under operating expenditure. The swap reserve fund is set aside to cover repairs, rebuilding, and replacement work, the cost of which exceeds conventional maintenance and operation cost. The trustees appoint a consultant engineer, who estimates the scale of funding necessary, and the Authority sets aside reserve funds in line with his recommendation. (Asset holdings appear as an item on the asset side of the balance, while the swap reserve fund appears on the liability side; see the balance sheet in Table 5.5).

Table 5.5 Balance-Sheet Structure of the Massachusetts Turnpike

	Income fund	Bond interest account	General reserve fund	Redemption account	Swap reserve fund	Total
Cash, accounts receivable, investments, bond holdings etc. Road assets (construction cost total)						
Total Assets						
Accounts payable, accounts unpaid, advances received, other short-term debts, outstanding road bonds						
Balance of funds						
Sum of redeemed road bonds Funds set aside for use in operations based on agreement with trustees						
Total liabilities and fund balances						

(3) France: thinking on account processing

The semi-public SEMCA corporations changed their accounting system in 1995. Until then the total sum invested in a road (the asset total) would be depreciated on a fixed percentage basis during the loan repayment term. Nowadays, however, straight-line depreciation during the concession period is permitted. Compared with the service life of road facilities -- something in the region of 50 years -- this depreciation period is decidedly short, meaning that the annual depreciation figure is considerably higher than if repayments were spread across the whole service life of the road. Consequently the balance sheet looks even worse during the difficult early and middle years of the enterprise, with

major losses quite common.

In order to ease this excessive repayment burden, the SEMCA corporations have taken an accounting measure to defer depreciation. On the income side of the profit and loss accounts they include a deferred depreciation item in which part of the repayment total -- sometimes all of it -- is entered, in order to offset all or part of the outstanding repayment figure, and thereby balance the books. At the same time this figure is entered on the asset side of the overall balance sheet under cumulative deferred repayments, being adjusted year by year. When the profit and loss accounts are sufficiently in credit to permit it, the deferred payment figure is gradually whittled down.

In addition to depreciation items, funds set aside for major repair work are also entered simultaneously as costs on the profit and loss accounts and as liabilities on the balance sheet, and are adjusted year by year. This is a provision against the large-scale repair projects that tend to become necessary toward the end of the concession period.

France's only purely private-sector toll-road operator, COFIROUTE, draws up its financial statements in accordance with the Motorway Concession Company Accounting Standards, which were still awaiting formal authorization as of January 1999. The concession assets listed on the balance sheet are owned by the national government and listed at cost price, and are composed of the following items in real monetary terms:

Land, survey costs, construction costs, improvement costs

Bond-related costs: issuance costs, issuance margin, repayment margin and interest.

Among assets, the concession assets listed above represent a part of the

construction investment that does not need to be reconstructed during the concession period and transferred to the government at the end of the concession period. Such investment is repaid at the end of the concession period or when the bonds mature. Because there is no need to reconstruct these items, they do not depreciate. It is, however, necessary to include items for repairs and maintenance each year, in order to ensure that the road is in good condition at the end of the concession period.

In the case of construction capital on the asset list that *does* need to be reconstructed, this is repaid at the end of the concession period, and is depreciated during the period of the concession.

All investment needed to meet operational costs of the concession is depreciated on a straight-line basis during the concession period. Miscellaneous bond issuance expenses are depreciated during the remaining period of the bonds.

There is no allowance made in the accounts for the difference between acquisition price and the exchange costs of exchangeable assets. The basic figure used to calculate the repayment sum for construction investment is adjusted every year to take account of the marginal value of substitutable reconstructable assets.

The depreciation figure is calculated in accordance with Article 39A of France's General Taxation Law, either on a straight-line basis or on the basis of outstanding balance diminution. The difference between the depreciation figure used in financial reporting and the depreciation figure used for taxation purposes is accounted for as a non-taxable reserve.

The depreciation period for buildings is 30 years, while machinery, equipment and vehicles carry a depreciation period of three to ten years.

The reserve fund for large-scale repairs is adjusted every six months, on the basis of estimates calculated by the technical department. It is also adjusted annually to take account of changes in material and labor costs, and expenditure plans.

(4) Italy: road depreciation methods

Italy's Autostrade company has separate redemption systems for "transferable" and "non-transferable" assets. Here, "transferable" means that the asset has to be handed back to the government at the end of the concession period, while "non-transferable" means that the asset carries no such obligation.

In the case of transferable assets, an amortization fund is established, within which the assets are divided between financial and technical items and amortized separately.

□ Financial amortization

As the name suggests, financial amortization signifies the repayment of the principle. Every year some 3.2% to 3.3% of the construction cost of roads in service is repaid. (This is the historic cost. Additional sums reflecting revaluation are not included, and subsidies are deducted.) Where the concession period is 30 years, this corresponds to paying back 1/30 of construction costs every year on a straight-line basis.

□ Technical amortization

Technical amortization applies to the depreciation of fixed property, and entails depreciating road assets as amortizable assets. In this case, calculations are based on post-revaluation figures. According to Autostrade, these are costs

necessitated by the company's obligation to modernize roads and hand them over to the government as perfectly functioning facilities at the end of the concession period. Funding for the amortization of these items is limited by law, and each year the amount to be repaid is decided at a meeting of the board of directors. At present the annual figure is in the region of 2%.

Depreciation of non-transferable assets is handled on the usual straight-line basis.

(Note: This depreciation method can be applied to toll-free roads as well as toll roads. Nor does this apply only to France and Spain.)

(5) Spain: thinking on depreciation

Assets, both land and facilities, are the property of the government. The necessary land is bought at the company's expense, but ownership rests with the government. However, depreciation is applied to road facilities.

The depreciation method employed works as follows. First a depreciation plan is drawn up, and then the total value of assets is amortized each year, using a percentage of the anticipated pre-tax income during the concession period. In other words, depreciation is carried out as a proportion of the value of production.

* * *

It was thought appropriate to describe the accounting methods of some concessionaires in some detail above, since accounting methods are a crucial aspect of toll road management.

It goes without saying that all companies must conform to the accounting rules laid down in their particular country. However, toll roads do have certain

special characteristics, such as the extremely long lifetime of each project, and the very large initial investment required. The case of France, outlined above, is a good example of how the authorities can establish accounting rules for toll-road operators that give due consideration to those special features.