TAXATION AND DEVELOPMENT: ELECTRICITY PRICING AS AN OPTIMAL TAX

by **Tawat Wichaidit***

Foreword

In the study of development in all developing countries, one should not neglect the fact that fiscal policy has a very important role to play. Fiscal policy, like other governmental policies, derives its meaning and direction from the aspirations and goals of the society within which it operates, of the people whom it serves. The aspirations are clear: economic betterment and stability to provide material soil within which human dignity and political freedom can grown.

How can we, therefore, have a better role for fiscal policy to play? Taxation is one of the available tools that can demonstrate this effect. There is no need to point out here the important relationship between economic development and national income. In this regard, experience shows some relationship with taxation. That, the less advance the economy of a country, the lower the ratio of tax payments to national income, and that through intensive administrative and legislative efforts, quite a few developing countries have considerably increased their ratios in the last decade.

Now, how can we try, as a development planner, to alleviate this problem? Public utilities seem to be one group of indicators that demonstrates the level of development any one country can achieve. Electricity is an important step towards that end. Thailand is no exception in this categorization. In 1963, the electricity generation peak load in Thailand was only 136,200 KW. Five years later, in 1968, it was 454,700 KW. The increase was 234%. The Thai Government enjoyed with earnings of 360,046,550 bahts. At this stage of rapid development, Thailand needs all sources of funds it can acquire to implement its development programs. In regard to public utilities, how can the government have more revenues from their pricing.

This paper is a small attempt to understand this problem. The writer has chosen electricity pricing as an optimal tax to illustrate his viewpoints.

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*Tawat Wichaidit, B.Ed., M.P.A. (Hons.), M.A. (Public Policy and Administration), M.A. (Pol. Sc.), Ph.D. (Political Science, Wisconsin); Lecturer, School of Public Administration, National Institute of Development Administration.

Electricity Pricing as an Optimal Tax

Once, when Rosenstein-Rodan studied the economic and social objectives of India's five year plan, he begins his introduction by saying that

> ...development is not only a technical but a social and economic problem. A technical problem considers a multiplicity of meansapt to achieve one given end. An economic problem considers a system (multiplicity) of meansapt to achieve a system (multiplicity) of ends. Where there is not one but a multiplicity of ends various ends may not be harmonious but may be in substantial or partial conflict with each other. To achieve more of one end may be possible only at the expense of achieving less of another end. An ethical (moral) valuation has to attach different weights of relative importance to various ends. In this way the national community will determine explicity or implicitly a hierarchy of ends. By contrasting a system of means (given human and natural resources and ways of using them made possible by a given technology) with a system (hierarchy) of ends the society expresses its choice of economic and social policy,...[1]

The above quotation seems to fit appropriately to the problem of taxation in developing countries. In recent years considerable thought and attention have been devoted to the fiscal policies best suited to the economic development of the areas of the free world. As a part of this search for desirable fiscal policies, considerable stress is being placed on the role of tax policy. The various kinds of taxes--income, excise, property, import, export, succession--are being deligently surveyed. The combinations and alternatives within each class are all under scrutiny. Thus in the income tax area, consideration is being given to individual and corporate taxes, to excess profits taxes, to taxes on increases in individual incomes, to taxes on dividends and other income payments, to the schedular and global forms of income taxes, and the like. In the excise area, there are sales taxes at the various levels of manufacture, wholesale or retail, taxes over the entire range of production and distribution, such as turnover and value added taxes; taxes on special pursuits such as mining or special products such as luxuries, and so on almost *ad infinitum*. Some countries are experimenting with an expenditure tax, which combines elements of income and excise taxation. The variety seems endless. Each must be considered in the light of particular fact situations and fiscal and economic goals. Each must be competitively analyzed against its rivals. And, when selected, the chosen tax must be imposed at the appropriate level of rates and

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[1]P.N. Rosenstein-Rodan (ed.), *Pricing and Fiscal Policies: A Study Method* (Cambridge, Massachusetts: The M.I.T. Press, 1964), p.11.

scope of application.[2] In other words, the proper nature and task of the fiscal system, or taxation, in any country, however, depends not only on the appropriate development strategy for that country but also on its peculiar economic and institutional structure and on the objectives other than economic growth which must be considered in formulating tax policy.

The problems of tax policy are difficult. Our knowledge of the effect and impact of various tax tools is not too impressive. We cannot talk with satisfactory confidence regarding such matters as tax incentives to economic development, the use of tax techniques to spur production, or consumption, or investment, or saving. But economists are deligently striving to increase their knowledge about these matters, to indicate their confidence in the predictions regarding the results of one or another policy or tax technique. The efforts being made on these fronts are necessary and encouraging. However, a warning note seems appropriate. The concentration on tax policy on the choice of taxes--may lead to insufficient consideration of the aspect of tax administration. This is beyond the discussion of this paper. In short, there may well be too much preoccupation with "what to do" and too little attention to "how to do it."

Capacity for Tax Increase

The pressing need for large government outlays for economic development strongly influences the approach to the problem of determining the appropriate level of taxation in a developing countiy. In a highly developed economy, it tends to accept the level of expenditures as its revenue goals (modified by considerations relating to the levels of employment, prices, and economic activity). The sequence of decision tends to run from expenditures to taxes. But in developing countries the level of expenditures depends much more heavily on the ability of the tax system to place the required revenues at the disposal of the government. By the same token, the size of the government's development programme depends in large part on the economic and administrative capacity of its tax system to marshal the necessary resources. In this sense, the sequence of decision tends to run from taxation to expenditures.

Recognizing the strategic importance of an adequate flow of tax revenues—and the inadequacy of their own revenues—the governments of many developing countries have sought to increase the proportion of national income collected in taxes. Much of the increased demand for technical assistance in fiscal matters since World War II apparently grows out of this desire for more productive tax system. Once Walter W. Heller pointed out that developing countries are under no illusion that they can—or should—push their tax ratio of 10 to 15 per cent of national income to the 30 to 40 per cent levels reached in such advanced countries as Austria,

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[2] Stanley S. Surry, "Tax Administration in Underdeveloped Countries," in Richard M. Bird and Oliver Oldman (eds.), *Reading on Taxation in Developing Countries* (Baltimore: The John Hopkins Press, 1967), p, 497–498.

Belgium, France, Germany, the Netherlands, Norway, the United Kingdom, and the United States.[3] But they are aware that even a modest increase in taxation may be able to finance a large percentage increase in a government's contribution to the development programme. A country in which the share of the government sector in the gross national product is 12 per cent may be taken as fairly typical of low income countries.[4] If one assumes that not more than one—third of the government's share is devoted to economic development, an increase of only 2 percentage points in the ratio of taxes to national income (to 14 percent) would enable the government to increase its contribution to development expenditures by 50 per cent.

Does experience or informal judgement provide any reliable guide as to what level of taxation is appropriate for a developing economy? Experience shows, first, that the less advanced the economy of a country, generally, the lower the ratio of tax payments to national income. It shows, second, that through intensive administrative and legislative efforts (and in some cases, aided by favourable international market conditions or by foreign aids), quite a few less advanced countries have considerably increased their ratios in post–war years.

Furthermore, the judgement of technical assistance experts in public finance, as reflected in their mission reports and other writings, appears to be that most developing countries could increase the proportion of their national income taken by taxation wihout unduly disturbing the economy and perhaps even with positive gains in the face of inflationary pressures.[5] Yet where the optimum level lies permits of no doctrinaire answer. It will differ from country to country depending on the preferences of citizens, the administrative competence in government, the relative importance of existing tax levels on one hand and undeveloped external economies on the other as barriers to private investment, and many other factors. As regards taxation, one of the key factors is whether additional taxes can be so levied as to tap funds that otherwise would have gone into such channels as luxury consumption or socially unproductive investment or foreign exchange hoarding, or whether they would simply displace private productive investment and essential consumption. No categorical answer can be given then, to this question: How far and how fast can taxes be raised?Only through a careful enquiry into economic characteristics, social and cultural

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[3] Walter W. Heller, "Fiscal Policies for Underdeveloped Countries," in *ibid.*, p. ii.

[4] See the article by John H. Adler, "Fiscal Problems in Economic Development," *Rapports pour le Congres de Londres de L'Institut international de finances publiques* (Paris, 1951). In it he concludes that for a number of developing countries, particularly in Latin America, "The share of the government sector in the gross national product, varies between 10 and 16 per cent and in most countries not higher than 12 per cent."

[5] E. M. Bernstein and I. G. Patel, "Inflation in Relation to Economic Development," *International Monetary Fund Staff Papers*, Vol. II, No. 3 (Washington, November, 1952), p. 395.

institutions, and prevailing standards of tax administration and complicance can an intelligent approximation be provided for any given country.

Basic Understanding about Marginal Cost Pricing Principle

Marginal cost pricing had frequently been advocated in the past as the one system of pricing which will yield an optimum allocation of resources. This prominence of marginal cost pricing in recent economic literature springs partly from the political significance of using marginal cost as a basis of price policy, and partly from the nicety of the theoretical apparatus involved. As it is usually conceived, the essence of marginal cost pricing is that producers will price their products so that each consumer is permitted to purchase all products at the marginal cost of production, without regard to whether or not total costs are covered by receipts from sales. The system thus necessarily involves subsidising all producers who operate under conditions of decreasing costs. Proponents of marginal cost pricing almost universally couch their arguments in terms of the precepts of the welfare economics. To speak of any pricing principle outside of a welfare context is in the last analysis of doubtful meaning, since fundermentally methods of resource allocation can only be evaluated in welfare terms.

But marginal cost pricing has not always been advocated on welfare grounds.[6] Welfare considerations provide all the tools which are necessary to make an abstract analysis of the statement of the marginal cost pricing principle, but their history alone does not show how and why the marginal cost pricing principle evolved, or what its implications for practical policy are.

To gain more acquaintance about the concept of marginal cost pricing principle, and as a conclusion, one should associate himself with an argument due essentially to the French engineer Jules Dupuit, to the effect that the optimum of the general welfare corresponds to the sale of everything at marginal cost. This means that all taxes on commodities, including sales taxes, are more objectionable than taxes on incomes, inheritances, and the site value of land; and that the latter taxes might well be applied to cover the fixed cost of electric power plants, waterworks, railroads, and other public utilities in which the fixed costs are large, so as to reduce to the level of maginal cost the prices charged for the services and products of these industries. The common assumption, so often accepted uncritically as a basis of arguments on important public questions, that "*every tub must stand on its own bottom*", and that therefore the product of every industry must be sold at prices so high as to cover not only marginal costs but also all the fixed costs,

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[6] Nancy Ruggles, "The Welfare Basis of the Marginal Cost Pricing Principle," *The Review of Economic Studies*, Vol. XVII, No. 42, p. 29.

including interest on irrevocable and often hypothetical investments, will thus be seen to be inconsistent with the maximum of social efficiency.[7]

From an administrative point of view, electricity rate is of essentially the same nature as a tax. Authorized and enforced by the government, it shares with taxes a considerable degree of arbitrariness. Rate differentials have, like other taxes, been used for purposes other than to raise revenue. While it has not generally been perceived that problems of taxation and those of electricity rate making are closely connected, so that two independent bodies of economic literature have grown up, nevertheless the underlying unity is such that the considerations applicable to taxation are very nearly identical with those involved in proper rate making. This essential unity extends itself also to other public utilities rates, such as those charged by railways, gas, and water concerns, and to the prices of the products of all industries having large fixed costs independent of the volume of output.

Electricity Pricing as an Optimal Tax

Given in mind that the analysis of electricity pricing as an optimal tax is one example of the comparison of the results that follow directly from the theory of social cost with those that are the outcomes of the complicated legislative rules and procedures that have grown up in connection with the pricing of services of natural monopolies. From an economic point of view the salient features of such pricing flow from the fact that a natural monopoly has a continuously decreasing long run average cost curve. Thus marginal cost is less than average cost at all outputs, and any single price charged to all users necessarily will yield a total revenue which is less than the total expenses. Yet, to charge different prices to different users can be shown to be discriminatory, and to produce less than the welfare maximum.

This fact is recognized, perhaps not explicitly, in the rules and procedure that have grown up in the regulation of public utility services and prices offered. By a general practice, a rate structure that covers all of the costs of the utility is constructed. But at the same time there is an elaborate structure of rates tailored to the various class of users and also to the quantities that the individual user consumes. These discriminatory rates are often constrasted unfavorably by economists to an alternative procedure where-by the rates would be set equal to the marginal costs of production for all users, and any deficit covered from the general revenue of the government.[8] This solution to the problem can be viewed as an abandonment of the effort to find a method of financing which is consistent with an optimal result as defined by welfare economists.

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[7] Harold Hotelling, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates," *Econometrica*, Vol. VI, No.3 (July, 1938).

[8] See, D.A. Worcester, *Public Utility Pricing as an Optimal Tax* (mimeographed).

Along this line of analysis, one should accommodate himself by two contentions. They are: (1) that the set of discriminatory rates can properly be regarded as a set of tax rates, and (2) that such rates are, or can be made to be more consistent with the general principles of welfare econimics than can any system whereby the deficit is made up out of the general revenues of the government.

The reasoning runs as follows: the revenues that accrue to the firm from the higher prices charged for some of infra-marginal purchases can be regarded as tax revenues. While they are suggested by the utility, they are in effect imposed by a public body which pays some regard to the benefits received by the rates they set, but which, nevertheless amount to a compulsory payment, the fairness of which is determined by sector other than economy. Hence they may be considered taxes, or quasi-taxes added to the price, rather than discriminatory prices.

In this analysis, there are many difficulties to be solved when there are many users, some in competition with each other, some who are not, some who can be supplied cheaply and some who can-not, and some who can contract to be consistent users of the service and some who cannot. This paper does not expand its discussion to these difficulties, but rather to the determination of an optimal discriminatory price-tax structure in the simplest case, where there is only one consumer.

Any public utility, electricity included, which is generally regulated to charge discriminating rates, will, if it follows principles that can be derived from modern welfare economics, come to the same result that a publicly owned enterprise would which is also managed according to the same principles. The relevant principles that come out of modern welfare economics are twofolds: (1) that price equals marginal cost for each user, so as to achieve the optimal allocation of resources, and (2) that the taxes paid to overcome the operating deficit be such that no tax payer be benefitted at the expense of another.

The key observation in connection with the latter is that the *tax* (the amount raised by the prices which are higher than the marginal cost) makes an increase of output possible at the lower marginal cost so that each buyer is better off than he would be if he had escaped the *tax* but had to pay a higher price, equal to average cost of the utility when the demand curve is equal to long run average cost. This suffices to show that the optimal set of discriminatory prices is equivalent to a system of taxes that is consistent with welfare economics, for the tax payer is himself the recipient of benefits of greater value to him than the cost of his taxes. This observation also suffices to show that this choice is better than the alternative system of having the deficit made up from general revenues, for in that case it is unthinkable that some of the general tax payers would not have had to pay taxes for which they received no benefit in return, and consequently it is inconceivable that other tax payers, and in particular those who secure the additional supply of electricity not benefit from the subsidy paid by those who do not benefit.

The Two-Part Tariff as a Tax

The essence of two-part charging is that the consumer is called on to pay two charges, one which varies directly with the amount of the commodity that he consumes, and another which does not.[9] For instance, the Post Office or any agency that is responsible for telephone, charges for the use of the telephone: (1) an exact amount for rental, payable whether any calls are made or not, plus (2) a charge for each call. Similarly for electricity one may be asked to pay a fixed charge depending on, e.g., the size of rateable value of one's house or industry, plus a charge per unit of actual consumption.,

Let us now turn the discussion to the two-price system as a tax. As mentioned earlier the matter of subsidy which paid by those who do not benefit can create the problem of who should pay the subsidy. The standard answer has been that the subsidy should come from general revenues of the government, presumably becuase they are collected with due regard to ability to pay, and various other social objectives properly weighted by the responsible authority.

This is represented in the preceding analysis by the alternative of having the necessary subsidy paid by others. If the fund come from general taxation, it might be that electricity consumers will be among them, and that their demand curves for all goods, including electricity, will be shifted somewhat to the left because of the additional taxes paid. If this is considered to be negligible, the purchases of electricity will be benefitted by the reduction of the price on the quantity otherwise taken, plus the difference between their demand curves and the marginal cost price, for the additional amount purchased. On the other hand, the general tax payer who is not consumer of electricity (or who uses it in small amount, but happens to have to pay rather heavy taxes) will not be benefitted at all, but rather will be injured. Thus some gain and others are injured so the welfare criteria are violated.

An alternative tax system will try to assess the taxes against those who benefit from the expenditure that the increased taxes make possible. If the tax is assessed as a sales tax on the initial units sold, the exact amount necessary to finance the utility's loss from selling at the marginal cost is covered. In this case, the tax is levied fully against the beneficiaries of the tax, and the benefits that they gain as a result of the subsidy made possible by the tax is greater than their costs as tax payer.

The tax, although a compulsory payment, one that would not be made voluntarily except in unrealistic cases such as the one buyer-one seller situation used in this paper for illustrative conveniences, is nevertheless, entirely consistent with welfare economics, and does not

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[9] W. Arthur Lewis, "The Two-Part Tariff," *Economica* (August, 1941), pp. 249–270.

represent an arbitrarily imposed burden based upon some vague notion to the effect that the government necessarily represents the *public interest*.

It is evident that the type of rate structure commonly used by the public service authority is similar to the benefit tax system outlined in the previous paragraph. The rules that have grown up over the years are designed to yield returns just sufficient to cover all the costs of the regulated firms This has been accomplished by complicated rate structures that have the effect of recognizing, on one hand, the fact that the marginal cost of supplying different consumers, and that a flat rate at the marginal cost will not suffice to cover the total cost of the utility, on the other hand. This deficit is made up by higher charges for a portion of the purchases made by the buyers. The excess of this over the marginal cost is in fact closely analogous to a tax from an economic point of view.

It is also analogous administratively because it is imposed by public authority and usually subject to review via administrative procedures as well as legislative. Properly administered, it amounts to a way whereby the power of government is brought to bear to rectify the misallocation of the resources that would exist in the presence of an external economy and in the absence of some device to lower the cost of inputs sufficiently to permit marginal cost pricing. In any event, in the final analysis in the many-buyer case, the distribution of the burden among various buyers is somewhat arbitrary. Because we can simply understand that the more the tax is imposed on one buyer, the less need to be collected from another. Here interpersonal comparisons are inevitable and the power of government to impose a compulsory payment is necessary if marginal cost pricing is to be possible.

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