Chapter 20

TAXATION FOR DEVELOPING COUNTRIES

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Contents

1. Introduction

1.1. Scope and structure of the chapter

Public economics is about the application of economic analysis to the problems of public policy. As such its scope is obviously vast, including, inter alia, the role and objectives of government, taxation, planning, project appraisal, control of demand and inflation, public enterprises, regulation of private activities and so on. One cannot hope to cover all these topics in one chapter, and our focus here will be on taxation. This is justified in part by the concentration of recent research in public economics, but also by the discussion of, for example, cost–benefit analysis and planning in other chapters in this Handbook. We shall, however, emphasise the close relationship between the many parts of public economics.

Division of the subject into topics, which is understandable in terms of a desire to keep analysis manageable, has often had unfortunate consequences in that basic underlying principles and themes have been neglected or overlooked. Hence, we place our discussion of taxation firmly in the context of public economics. The term public economics is now generally used in contrast to "public finance". This is to emphasise that the subject is much more than the way in which public expenditure is financed but concerns the effects of government actions on resource use and income distribution throughout the economy [and the attraction of the wider term has been stressed by many writers, e.g. Johansen (1965) and Musgrave (1959, Preface)].

Our concentration will be on methods and principles to bring out what can be done together with the basic ideas which should guide research and policy, rather than on providing an exhaustive survey of what has been done. Our emphasis on taxation has implied that a number of interesting topics on the expenditure side are not covered here, including the allocation of public expenditure between consumption and investment and the analysis of public goods. The reader who wishes to pursue the broad area of public economics in more detail should

consult the two-volume *Handbook of Public Economics* edited by Auerbach and Feldstein (1985, 1987).

Questions and issues in public economics in general, and taxation in particular, are both positive and normative. Examples of the former are: "What are the effects of tariffs on the prices of other goods?" "How does the corporation tax affect incomes and the allocation of investment?" "What features of the economy influence the potential and actual revenue from different sorts of taxes?" Amongst the normative questions are: "What should be the balance between direct and indirect taxation?" "Should indirect taxes be uniform?" "What is the appropriate price for electricity?" And so on. All of these will be discussed (at varying levels of detail) in this chapter but it should be immediately clear that the positive questions are logically prior. We cannot examine the normative questions until we know what taxes are available and what are their effects.

The issues we shall raise, for example those just mentioned, are relevant for both developed and developing countries and the application of many of the approaches and principles we shall examine is certainly not confined to developing countries. As with a number of other aspects of development economics conceptual advances motivated by the study of poor countries have been most fruitful for the analysis of the economies of more advanced countries. Nevertheless there are important features of the fiscal systems and economies of developing countries which require particular attention and make some of the analysis distinctive. Amongst these we would emphasise the enforcement costs or administrative difficulties which may limit the choice of tax instruments, partial coverage of various taxes in that certain sectors or types of firm may escape the tax net, legally or otherwise, the central role of the agricultural sector which is usually poor, fragmented and backward, the structure of the labour market, the poor quality of information, and the variety of objectives, structures and powers of governments.

The plan of the chapter is as follows. In the remainder of this section we explain the broad outlines of our approach and point to lines of enquiry which, whilst in many respects important and interesting, do not receive close attention in the rest of the chapter.

In Section 2 we examine the sources of government revenue in different countries, including which taxes are used and how much they provide, and the incidence of taxation on different groups. We discuss also the administrative problems with enforcement and evasion which often lie behind the choice of taxes and exercise strong influences on the revenue they raise. In Section 3 we consider the appraisal of different taxes, the central issues there being incentives, distribution and the structure of production. These are examined in relation to government objectives, which may be articulated in a range of concerns, such as growth and employment, together with the many constraints which the govern-

ment may face. We pay particular attention to indirect taxes (tariffs, excise taxes, sales taxes, VAT and the like) which provide a far higher fraction of revenue in developing than developed countries, although corporate income, personal income, land and other direct taxes are also examined. Agriculture is the subject of Section 4. A brief discussion of examples of tax reform in practice, which reflects the application of the principles we have described in relation to the particular difficulties and problems facing specific countries is in Section 5. Concluding remarks and directions for further research are offered in Section 6.

It should be clear from this description of the chapter that our emphasis is on microeconomics and the medium or longer run. Macroeconomic modelling and its use in economic policy are discussed in other chapters of this Handbook, although again we suspect that something is lost in the separation in that one should consider consistency of the models underlying different topics and the policies which emerge, as well as recognising the similarities of questions and techniques. Nevertheless our analytical capabilities are such that full and explicit integration of macro and micro and short-run and long-run analyses is not possible and, at present, we should look for the complementarities. Thus, one would not wish, if possible, short-run policies to run directly counter to medium-term directions of reform.

Even though this is a long chapter there are a number of important issues within taxation that are omitted or mentioned only briefly. Significant examples concern fiscal relations in a federal structure (a proper analysis would have to include a full discussion of expenditure) and the effects of taxation on risk-taking (see Subsection 1.5).

1.2. The role of government

An examination of the role of government will enter directly into both positive and normative analyses. Thus, in the former one may ask how the limitations on government affect the taxes which may be considered and their impact on the economy. For example, the constitution may rule out some taxes, the administration may not be willing or able to collect others, and certain tools may be politically unacceptable. On the normative side one must ask what the government objectives are. Indeed, logically prior is the question of whether it is reasonable to describe its actions in terms of consistent objectives. Thus, one must ask how government actions are determined.

The positive aspects of government powers and limitations appear implicitly throughout in terms of the taxes discussed and will in a number of cases be explicit as, for example, when we discuss enforcement. On the normative side we shall for the most part adopt one particular approach. We shall see the normative problem as choosing instruments to try to improve the welfare of the different

households in the population subject to whichever constraints on the economy and government action are present.

The normative analysis therefore proceeds by first pursuing the positive analysis in a particular direction, i.e. looking at the effects of a policy change, and then evaluating those consequences using explicit criteria. It should be obvious immediately that this approach does not involve the assertion that this is the way governments do in fact behave. One is using economic analysis to work out the consequences, for example, for different households or groups, in a systematic way so that informed and consistent normative judgements of governmental economic actions are possible. Those judgements themselves can then be made by commentators, governments, aid-givers, members of the community or whoever wishes to make them. The presentation of the consequences in a manner which allows the application of systematic values would seem to be an essential part of reasonable discussion of policy.

Our emphasis here, therefore, is on the analysis of judgements concerning possible public policies. This is in contrast to alternative approaches which see policies as determined within a system by the participating individuals or agents. Important and interesting examples concern voting models where public choices are determined by votes of individuals, models of bureaucracy where those who administer the organs of state determine outcomes, and models of interest groups where different classes compete against others for group gains and for control. A leading figure in this literature has been James Buchanan and many of these positive theories are included under the heading "public choice" [see Buchanan and Tollison (1972) and for a survey see Mueller (1976)]. It must be recognised, however, that a systematic analysis of policies in terms of their consequences is necessary for this approach also.

Recently there has been particular attention in the study of public policy in developing countries to "rent-seeking". Government policy, such as tariffs or quotas on particular goods, raises the incomes of certain individuals or groups. Those individuals or groups seek the rents which might be conferred by such policies by expending resources on trying to get them implemented. Those who decide or administer the policies can thereby gain substantially and favour systems which allow themselves to benefit from the exercise of their discretion. For further discussion of "rent-seeking" and "neoclassical political economy", see Krueger (1974), Buchanan, Tollison and Tullock (1980), Colander (1984), Srinivasan (1985) and Bhagwati (1987).

Most theories, however, whether or not policy is determined within the system, share the requirement that the effects of policy have to be calculated explicitly. This is the first, and often most difficult, part of any analysis of policy in terms of its consequences. Thus, for example, the normative approach to a change in the income tax should calculate who gains and who loses in a similar manner to a model where changes take place according to whether particular interest groups

would benefit. Insofar as constraints on government actions and the effects of changes for households are central to this chapter it has much in common with the positive theories of policy determination. We shall not, however, examine in detail the models of endogenous public choice. This is not because we believe these approaches to be misguided and neither do we think the results are unimportant. Nevertheless the applied literature is less extensive, particularly for developing countries, and it is often not easy to provide empirical hypotheses in a way that allows one to test between competing theories. And whether or not the policy is determined within the system it remains interesting to ask how external commentators with prescribed sets of values might judge between different policies in terms of their effects on different households or groups.

Given that the approach here is normative one must ask whether the criteria applied by governments in developing countries are likely to be or should be very different from those of developed countries. It would often seem that the differences in objectives are substantial and some writers [e.g. Prest (1972) and Musgrave and Musgrave (1984)] have emphasised this aspect as a main distinctive feature of public economics for developing countries. Thus, for example, governments in developing countries have often seen themselves as having particular responsibilities to promote growth and one finds that capital formation often forms a higher proportion of government budgets than for developed countries. Other commonly articulated concerns are the relief of poverty, the promotion of employment and the encouragement of self-sufficiency. One may see all of these, however, as relating in large part to the material well-being of households, present and future. As such they can to a substantial extent be analysed in terms of a model where the welfare of households is the central policy criterion. Other objectives, such as changing the values of participants in society (e.g. at times China and Tanzania) are less easily incorporated into the analysis.

1.3. Other public activities

Many government actions, other than those involving taxation, affect government revenue, prices, incomes, welfare and the allocation of resources. These include: subsidies, rations and transfer payments, which are usually classified under expenditure; expenditure on health, education, defence and so on; pricing and investment policies of publicly owned companies; and laws and regulations imposing constraints on the actions of private companies and households. Many of these can be analysed in a similar fashion to taxation. For example, subsidies and transfer payments (including subsidised rations) are negative taxes and the difference between price and social marginal cost of public enterprises are analogous to taxes. And the pricing of and expenditure on education and health raise similar problems to those involved in taxation as well as involving aspects of

social cost–benefit analysis. We shall argue both that the interdependence of these topics is crucial to policy for any one of them and that their analysis can be integrated in a systematic way using shadow prices. Furthermore, many of the principles which we shall describe for taxation can and should be applied to, for example, public-sector pricing, subsidies and transfer payments. Those government actions which are closely related to taxation are, in developing countries, often different from those in developed countries. An important example concerns transfer payments. In many developing countries transfer payments frequently take the form of subsidised rations whilst extensive social security systems rarely exist. Rations are less important in developed countries but public provisions for unemployment and social security benefits and pensions are common.

1.4. Stabilisation

Musgrave's third "branch of government activity", together with revenue and distribution, was stabilisation [see, for example, Musgrave (1959)]. By this he meant the design of fiscal policy to counter unemployment during downturns in the cycle and to help control inflation. Whilst revenue and distribution are now seen as inseparable issues in many models of public economics, the analysis of stabilisation in the sense described has tended to be split off and treated separately. Partly this is because the time scale for stabilisation discussions is much shorter but also because macro-economic models have often looked very different from those used for micro-economic analysis. Short-run macro-economic models are now, however, increasingly based on firmer micro-economic foundations so that it is possible that the incentive and distribution issues may play a more prominent role. There is also some integration in certain computable general equilibrium models [see, for example, Kehoe and Serra-Puche (1983)]. We shall not, however, focus on stabilisation in this chapter and for further discussion of macroeconomics and the shorter run the reader should consult other chapters in this Handbook.

Stabilisation in public policy analysis has also taken on a broader meaning than simply counter-cyclic policy of the Keynesian kind in that major problems in some developing countries have been associated with chronic government and balance of payments deficits and inflation which appear not to be temporary and which cannot easily be seen in terms of oscillating cycles. Stabilisation is sometimes viewed as the correction of a chronic deficit or an adjustment to a change that may seem non-cyclical, e.g. adverse changes in the dollar exchange rate, interest rates or export/import prices. The perennial feeling of the Finance Minister that he has too few sources of revenue and too many demands for expenditure may seem particularly acute in poor countries so that the temptation

to run deficits is very strong or that adjustment to a permanent adverse movement may be very difficult. It is important, therefore, that both the debtor and creditor countries come to a sober and balanced view of what is possible for a particular country in terms of revenue raising. In this context the discussion of "tax effort" in Section 2 can be useful. It should be recognised, however, that whilst the structure of the economy exerts an important influence on tax as a proportion of GNP it is not immutable and can be raised quite sharply over relatively short periods (see Section 2).

1.5. Other issues

It should be emphasised that our concentration on micro-economics in this chapter does not rule out the treatment of issues such as unemployment, savings and investment. They play a central role in the determination of shadow prices which in turn influence one's view of tax reform. Furthermore, the microeconomic models can be adapted to examine intertemporal tax issues, in particular the treatment of savings and investment.

The impact of alternative taxes on risk-taking and risk-sharing is discussed theoretically in Atkinson and Stiglitz (1980, lecture 4). This has not figured prominently in the applied literature relating to taxation in developing countries and is an area for further research.

It is possible that the issue is of relatively greater importance for developing countries since the potential role of government in using the tax system to share risk is less the more the private market provides for risk-sharing and, for developing countries, risk and capital markets are considerably less sophisticated. Thus corporation tax, for example, can provide risk-sharing with the government taking a fraction of the positive profits and, with loss off-set, taking the same fraction of the losses. In many countries, however, the problems with the corporation tax lie less in fine tuning for risk than in collecting taxes in the face of effective concealment of profits. Similarly, there is substantial potential for influencing risk through price support policies and buffer stocks.

Issues of fiscal-federalism are important for some developing countries like India, as for other "federal" states such as Canada, Australia and the United States. In India the Constitution lays down a requirement for a Finance Commission to meet periodically to review the sharing of revenues between the States and the Federal Government, and a compromise is generally produced in terms of balancing revenue transfers according to needs (however defined) and collections. There are also different formulae regarding the division of some of the major taxes, and this often forms the subject of "revenue seeking" by the players concerned. Many countries are less fortunate than India in that the divisions of taxation and expenditure powers between different levels of government are

ill-defined. We do not treat this subject in any great detail in this chapter, although we show briefly in Section 3 and Ahmad and Stern (1987) how revenue from State and Central taxes may be evaluated if a clear distinction can be made between the tax instruments associated with different levels of government.

2. The choice of revenue instruments

Resources are needed by governments in developing countries, as in advanced nations, for a wide variety of expenditures, ranging from public administration and defence to the maintenance and provision of social services and infrastructure. While there is considerable debate in many Western countries concerning which services should be provided by the state (and these arguments are also reflected in some developing countries), raising the level of government expenditure and particularly of public investment in key areas of the economy has often been seen as a necessary ingredient of the development process.

The costs of these expenditures are usually only partly met through taxation and profits of government undertakings, and the discrepancy between revenues and expenditures is often substantial. In India the combined expenditures of central and state governments increased from 10 percent of GNP in 1950/51 to over 30 percent in 1980/81, and 35 percent in 1983/84 [see Ahmad and Stern (1987)]. The 1982 figures for other low-income countries such as Sri Lanka, Pakistan, Tanzania and Kenya were 34, 16, 32 and 30 percent, respectively; and for Latin American countries such as Mexico, Chile, Argentina and Brazil, 32, 38, 22 and 22 percent, respectively. In developed countries, government expenditure ranged from 18 percent of GNP for Japan to 25 percent of GNP for the United States, 42 percent for the United Kingdom, to 45 percent for Sweden and 58 percent for Belgium and the Netherlands [World Bank (1985)]. On the other hand, around 1982, tax revenues in poorer developing countries were generally under 20 percent of GNP: India 18 percent; Sri Lanka 20 percent; Pakistan 13 percent; Tanzania 18 percent; Kenya 21 percent; with Mexico 17 percent; Chile 25 percent; Argentina 20 percent; and Brazil 23 percent. The "shortfall" was thus often substantial.

It should be remembered that there are serious problems in defining the government deficit or borrowing requirement. Some of these arise from different classifications of profits and losses of public corporations. Others are associated with inflation when it is usual to classify *nominal* interest on outstanding public debt as government expenditure. Thus comparing two countries which were identical in every respect other than the inflation rate one would be forced to say that the one with the higher inflation rate (and thus nominal interest rate) had the bigger deficit.

One should also bear in mind that success in raising revenue may well increase expenditure [the Please (1971) hypothesis]. This tendency may be particularly

problematic if the effect works quickly since then short-run revenue increases may lead to rapid expenditure increases which can be cut back only slowly. Thus, public finance difficulties of countries such as Mexico and Nigeria can in part be traced to the expenditure expansions following revenue booms associated with the oil price increases of the 1970s.

In this section we examine the alternatives facing a government with a given revenue requirement, however this might arise. A major option is taxation where the tools adopted and the revenue obtained will be a function of the pattern and organisation of production activities and the administrative capabilities of the tax authorities as well as the bases defined for taxation and the selected rates. Here cross-country comparisons can suggest the sorts of taxes that are possible, particularly with respect to administration, and may provide guidance as to how revenue flows might change in the course of time.

Various "tax handles" are discussed in Subsection 2.1 along with the evolution of tax structure and the incidence of taxes. Non-tax issues and the financing of deficits are addressed in Subsection 2.2 with a consideration of domestic non-bank borrowing in Subsection 2.2.1 and money creation in Subsection 2.2.3. Although these tools may be outside the remit of tax reform, some discussion cannot be avoided since the extent to which they are available or desirable will influence directly total tax revenue requirements. The balance between tax and non-tax revenue is a central policy choice that faces most governments. Foreign resources have been treated extensively in chapters by Eaton (Chapter 25) and Cardoso and Dornbusch (Chapter 26) in this Handbook and are not examined here. Administrative considerations and implementation are considered in Subsection 2.3.

2.1. Taxation

2.1.1. Tax handles

Relationships between the "level of development" and the structure of taxation were examined by Hinrichs (1966) and Musgrave (1969). Since then there have been a large number of studies which have concentrated on cross-section international comparisons of "tax capacity" and "effort" carried out primarily by staff members of the IMF's Fiscal Affairs Department [see, for example, Lotz and Morss (1967), Bahl (1971), Chelliah, Baas and Kelly (1975), Tait, Gratz and Eichengreen (1979)]. These are discussed in Subsection 2.2.2.

Using international cross-section comparisons, both Hinrichs and Musgrave stress that the scarcity of simple ways of collecting revenue, or "tax handles", characterise early stages of development. Hinrichs uses an "ideal-type" classification to describe the pattern of change in tax structure during development. A

four-fold classification of stages is proposed: traditional; transitional – incorporating "breakaway" from old; "adoption" of new; and modern. Traditional societies appear to rely on a combination of direct taxes on agriculture (land, output, livestock, and water rates, for example), poll taxes and non-tax revenue. These sources become less prominent in "later stages". In the "breakaway" period, indirect taxation becomes more important, and in particular trade taxes dominate, depending on the degree of "openness" of the economy. The foreign trade sector provides a convenient handle, as it is possible to monitor flows of goods at a "bottleneck", and also because in a dualistic framework, the degree of monetization is likely to be high in such activities. The domestic indirect taxes – excises, sales and transaction taxes and profits of government enterprises – become important with the increase in domestic production capability, monetization and the volume of internal transactions. Older forms of direct taxation become less important relative to the taxation of *net* income of individuals and businesses. Thus the classification suggested is one where taxation varies from (i) agriculture, to (ii) foreign trade, to (iii) consumption, to (iv) income.

Hinrichs is careful to caution against determinism and the pattern described "does not necessarily mean that all countries have traced or will follow such a sequence at all times" (p. 106). Moreover, averaging over the tax structures of low-income countries might be misleading, since in some the ratio of direct to indirect taxation might be increasing whilst in others it might be decreasing. The simple averages might suggest a "generalised half truth that development brings with it a steady trend towards more direct taxation" (p. 108). The pattern of change in tax structure for India illustrates the danger of resorting to simple averages. The Indian tax revenue/GNP ratio averaged under 8 percent during the 1950s. By 1963/64 this had increased to over 14 percent and it fluctuated around that level to the mid-seventies. Since 1977, total tax revenue has averaged over 18 percent of GNP. Although "traditional" taxes (on property and property transactions) fell from 13 percent of total tax revenue in 1950/51 to under 4 percent by 1979/80, taxes on income also declined from 28 percent of total tax revenue to under 16 percent during the same period. On the other hand, indirect taxes increased from 58 percent of tax revenue during 1950/51 to around 80 percent thirty years later. With indirect taxes, the major structural change occurred during the 1950s with the increase in domestic productive capacity. In 1950/51 customs formed the most important indirect "tax handle" and accounted for 43 percent of commodity tax revenue; Union excises (on domestic production) were 18 percent, sales taxes 16 percent and state excises (largely on liquor) 14 percent of indirect tax revenue. By 1959/60, the Union excise had become the most important indirect tax (45 percent of commodity tax revenue), and customs had fallen to under 20 percent, ahead of sales taxes (18 percent) and state excises (6 percent). This pattern was maintained over the next twenty years, with sales taxes stabilising on a par with customs at around 20 percent of

commodity tax revenue, and the predominance of the Union excise tax being maintained [see Ahmad and Stern (forthcoming), for further details].

The Indian example highlights some of the major policy issues and paradoxes indicated above. First, the move to direct taxes may be associated with a desire to link taxation to ability to pay and it is often claimed that indirect taxes are inegalitarian. The validity of this claim depends on the context, and the Indian Indirect Taxation Enquiry Committee (1978) found the incidence of Indian indirect taxes during the mid-seventies to be quite progressive [see also Chelliah and Lal (1978)]. If such progression is desired there is the further question of how this might best be combined with simplicity and administrative feasibility.

Second, it might be more appropriate for less-developed countries to learn from the recent experiences of other low-income developing countries than to imitate more developed societies, leading, possibly, to an emphasis on indirect taxes at least in the medium term. This does not mean that direct taxes are unimportant, simply that to be effective they require proper design, administration and implementation, and need to be incorporated into a changing mix of taxes over time. Thus, with limited administrative capabilities, it may be unwise for many countries to expect them to provide substantial revenue in the short or medium term.

A third consideration arises concerning the possible policy conflict between ease of collection and administrative expediency on the one hand and disincentive effects on the other. Growing sectors provide convenient tax handles which are often eagerly grasped by governments, even though this might impair the long-run development of such sectors and consequently reduce the growth of revenue in the future. Argentina is an example of excessive taxation of the export sector "one can milk only so much out of the export sector without drying up the cow" (Hinrichs, p. 116). Similarly in Africa, export taxes have been used extensively, often as a means of taxing agricultural income, e.g. cocoa in Ghana and groundnuts in Malawi [World Bank (1981)]. In India, the very extensive reliance on taxation of domestic production causes distortion through the taxation of inputs and discrimination against exports (since rebating indirect taxes is difficult) and against the large-scale sector (small-scale production is often exempt and is difficult to tax). [See Section 3 below, Ahmad and Stern (1987) and Ahmad and Stern (1986a) for an example from Pakistan.] Influenced in part by these problems the Indian Indirect Taxation Enquiry Committee [Government of India (1978)] recommended a shift from excises to a system of value-added taxation restricted to the manufacturing sector. Eventually (in the 1986 Budget) a system of rebating excises on inputs was introduced, known as MODVAT. And a growing number of developing countries now have experience with variants of the VAT [Tanzi (1987)].

The personal income tax raises similar difficulties. It is least likely to be evaded by employees in the modern sector and the more productive whose success is difficult to conceal. It is most likely to be evaded by certain established groups

with influence, landlords and farmers, shopkeepers and small-scale businessmen or traders, speculators and the like. In the sub-continent despite an elaborate legal system very little is collected through the income tax.

In an analysis of the tax structure of 86 countries around 1981, Tanzi (1987) found a weak correlation of personal income taxes and GDP/head, and personal income taxes were on average less than 2 percent of GDP in developing countries, and less than 5 percent of GDP in all but three LDCs. Corporate income taxes were relatively more important than the personal income tax and accounted for some 3 percent of GDP on average. In many mineral-exporting countries, the corporate income tax appeared to be a useful tax handle in that production and export were carried out by a few large corporations. Thus, it provided a means of taxing the exportable good as well as the (usually foreign) corporation. However, production of agricultural commodities, carried out by many heterogeneous agriculturalists, is easier to tax through export taxes than through direct taxation. (See Section 4 below for a further discussion of agricultural taxation.)

More fruitful bases of direct taxation, that would require less administrative costs and bear less heavily on incentives, such as urban property, and land values may often not be politically acceptable. Indeed, the difficulties they raise for avoidance and evasion may be precisely the reason that those who might have to pay them create such powerful political objections to their introduction or successful administration.

2.1.2. Taxable capacity, elasticity and buoyancy

2.1.2.1. Taxable capacity. Goode (1984) defines taxable capacity as the ability of people to pay tax and the ability of the government to collect; the tax effort reflects the degree to which taxable capacity is used. The tax ratio (of total tax revenue to GNP, discussed above) reflects, however, both tax capacity and effort, the latter influenced by the level of government expenditure and availability and use of non-tax resources. The IMF studies mentioned above explore the cross-country relationships between identifiable tax handles and the tax ratio. These "handles" are taken as a proxy for taxable capacity, and the residual between *estimated* taxable capacity and the tax ratio is taken to measure tax effort. Thus, taxable capacity is given by the tax ratio which would arise if a country used its tax handles to the average extent used by countries in the sample (and we see that under this definition the tax ratio will be above capacity for many countries – a slightly curious use of language).

The procedure is to specify a single-equation model with tax as a proportion of GNP being the dependent variable and to include as explanatory variables measures of factors which might be seen as representing elements of taxable capacity. Examples of the latter include the share of mining, which is often found

to have a positive contribution, and that of agriculture which generally has a negative one; see, for example, Chelliah, Baas and Kelly (1975) who found that the equation that gave the "best fit" was one which included only these variables [see also Chelliah (1971)]. Tait, Gratz and Eichengreen (1979) carried out "international tax comparisons" rather than tax effort estimates for developed countries and less developed countries considered together and separately, over 1972–76.

The cross-country comparisons have been subjected to a number of criticisms. Bird (1976) pointed out that one of the most damaging is that there is inadequate a priori justification for the use of the selected variables as measures of taxable capacity. For instance, the omission of the share of agriculture on the grounds that it reflects not only capacity but "willingness" to tax [a step eventually taken by Chelliah, Baas and Kelly (1975)] should also lead to the exclusion of the mining share "on equally firm (or infirm) grounds". The distinction between "capacity" and "willingness" is a very fuzzy one: indeed, one might say that "capacity" without "willingness" is not really "capacity" – or "effective capacity" – at all. Similarly, per capita income "is presumably included because it is a proxy for a potentially higher tax base, or a larger 'taxable surplus'. But in fact income is surely as much a 'demand' as it is a 'supply' factor: the identification problem seems insuperable in this respect" [Bird (1976, p. 43)]. Furthermore, the errors in variables problem may be serious and the approach obscures the complex interrelationship between government revenue and other factors such as expenditures.

A major danger with the international tax comparisons is that they are often used (or misused) for normative policy issues. Even if the question of taxable capacity could be correctly identified, taxable effort, or the residual between fitted and actual tax ratios, may indicate little of value for policy since the "average" may have no relevance at all for a given country. A tax effort ratio less than 1.0 may mean that a country has a preference for a lower than "average" level of taxation, or that a higher ratio is, for some reason, unnecessary. However, one should not view this analysis with excessive rigidity and one may simply view a low index as suggestive of the feasibility of raising additional taxes.

A rigidly deterministic interpretation of cross-country studies is made still less attractive by the patchy quality of data. Quite often national aggregates, such as per capita incomes are crude guesses and tax information is often suspect with sharply differing definitions and practices across countries which cannot satisfactorily be placed on a comparable basis. And there are the usual objections to using results from international cross-sections as a guide to policy-making for a particular country over time (one must ask whether the underlying model is really the same). Bird (1976, pp. 49–50) concludes that "the effort which has gone into 'effort studies' would contribute more to both knowledge and policy formulation if it were redirected to perhaps less glamorous but surely more rewarding studies

of particular problems in particular countries", although most protagonists would probably agree that such "effort studies" should be seen as suggestive only and not as a substitute for the detailed analysis of individual countries.

2.1.2.2. Tax elasticity and buoyancy. The "built-in tax elasticity" relates to the ability of the tax structure to generate growth in revenue through changes in gross income or output levels – one contemplates the growth of revenue in the absence of "discretionary actions" which might affect the tax base or rates. Thus, revenue series are put together which have discretionary changes "netted out", to separate the "automatic" from the "discretionary" elements in taxation. This modified time series for revenue is regressed on income or output, to yield the built-in tax elasticity.

The overall elasticity of the tax system may be decomposed into elasticities for the various taxes constituting the system, and each may be written as an elasticity of the base with respect to income together with the elasticity of the yield with respect to the base [see, for example, Goode (1984, pp. 93–95)]. A major problem in this type of analysis is to put together data on the bases of the major taxes and on "estimated" yields at constant rates. And it is not clear whether applying rates to the base is a particularly good way of forecasting, assuming of course that information on "bases" is known. In practice the elasticity of a tax will depend not only on its design, including exemptions and "hypothetical" coverage, but also on its administration, enforcement and evasion. It is also difficult to correct for inflation. There is no reason to suspect that the latter set of factors will remain constant over time and it would not be easy to disentangle in a series separate effects of changes in policy, income, compliance, administration and so on particularly where enforcement and administration are in part matters of policy.

"Tax buoyancy" studies, on the other hand, simply relate total revenue to income or output, without making any such adjustment to revenue. This is "analogous to separating 'capacity' from residual (in tax effort studies) and consequently subject to the same objections" [Bird (1976, p. 52)]. However, overall measures of elasticity and buoyancy may be useful as a descriptive tool, and may lead to further questions (particularly concerning future financing difficulties) and point to a more detailed examination of particular taxes in certain countries.

There have been many tax elasticity and buoyancy studies, for various individual countries [see, for instance, Mansfield (1972), Levin (1968) and Wilford and Wilford (1978) for studies of Latin American countries; and Dwivedi (1981a), Purohit (1981) and Bagchi and Govinda Rao (1982) for examples from India] and some broad conclusions appear to emerge. First, general sales taxes, excises and consumption taxes seem to have elasticities in excess of unity. Second, whilst in several cases income taxes are found to be an elastic source of revenue other

studies point in the opposite direction. Customs duties and stamp duties seem to be relatively inelastic [see Goode (1984)].

Although these studies, which are often carefully conducted, provide a useful commentary on particular taxes, they do not provide a very sound basis for policy, despite the presumption in "resource mobilisation" studies that there should be a greater reliance on "more elastic" taxes. The low elasticity of a particular tax relates only to the actual revenue collections during the period under consideration. Elasticities can change and in any case do not tell us whether it is desirable or undesirable to increase yields from that tax in the future. For example, the Indian income tax was apparently inelastic during earlier periods, but was seen to have an elasticity of 1.1 between 1965/66 and 1978/79 [Bagchi and Govinda Rao (1982)]. There may also be arguments for a greater reliance on a "better designed" land tax (see Section below), although estimates may show that such taxes have been the most inelastic [e.g. Purohit (1981) on India]. In some poor countries, the majority of government revenues come from (inelastic) customs duties and (hypothetically elastic) income taxes may exist only in spirit and provide only a small fraction of government revenue [see Tanzi (1987)]. An attempted switch from customs (through lower rates or more exemptions) to income taxes (higher rates, greater coverage and enforcement) may not be advisable on revenue grounds and could be administratively infeasible.

The conclusion is that estimates of tax elasticity and buoyancy do not provide direct guidance for policy and are not a substitute for a careful analysis of the consequences of particular policy changes. They may nevertheless be of assistance in anticipating revenue problems and suggesting areas of focus for specific studies.

2.1.3. Tax incidence

A common and voluminous strand in the literature relating to taxation and development concerns the "incidence" of particular taxes on various household groups (for example on deciles of the income distribution, with respect to rural and urban sectors, regions and so on). The concept is intended to reflect the degree to which the real income of households is reduced by taxation and how this varies across households. It should be clear that a thorough implementation of the idea requires the modelling of the full general equilibrium impact of taxes and a measure or measures of how household welfare is affected by price, tax and other changes (taking into account behavioural responses). There is no doubt that the modelling problems are severe [see, for example, Shoven (1983)] but the assumptions and definitions lying behind an incidence calculation should be carefully scrutinized since usually crude short cuts are taken. Sometimes "benefits" of government expenditure are included and quite often incidence refers

to the taxes and benefits taken together. Explicit criteria are then applied, for instance to discuss the equity of "tax burdens" and to comment on the "degree of progression". These studies are used, then, in arguments for or against certain types of taxes or policies.

Goode (1984) reflects a common sentiment that "indirect taxes, which are a major revenue source in developing countries, tend to be regressive with respect to income ... however, careful selection of objects of indirect taxation and tax rates can result in a distribution of indirect taxes that is broadly proportional or progressive with respect to income or total consumption" (p. 79). Contrast this with the review of tax incidence studies until the mid-seventies by de Wulf (1975, p. 71): "the general impression ... is that the tax systems in developing countries tend to burden the incomes of rich families relatively more than the incomes of the poor ... this finding is interesting in the light of the prevailing view that the tax structures are regressive in developing countries, since they rely heavily on indirect taxes". A study prepared for the Indian Indirect Taxation Enquiry Committee [Government of India (1978)] in the late seventies remarked on the progressivity of Indian indirect taxes [also see Chelliah and Lal (1978)]. It has been argued that in practice the degree of progression that could be achieved through the sales tax, for example, is at the expense of complicated rate structures and exemptions, leading to revenue losses with little impact on "progressivity". Gandhi (1979) argues for a low, uniform rate sales tax for revenue purposes, supplemented by other indirect taxes for equity considerations. In practice, we would suggest, an important degree of progression can be achieved whilst retaining simplicity, with a system which exempts many foods, has a low uniform rate for most goods and a luxury rate for certain other goods (see Section 5 below).

Similarly, the relative burden of taxation on the rural or agricultural sector vis-à-vis the urban sector is an emotive issue that has been fuelled (inconclusively) by tax incidence analyses. Gandhi (1966), for instance, found that the rural sector in India paid "too small a share of tax". Lipton (1978, pp. 201–203) criticised some of Gandhi's assumptions and argued that the taxation of Indian agriculture *exceeds the ability to pay* (as measured by mean income levels and estimates of minimum subsistence) of agriculturalists, although agricultural incomes in most Indian states and Pakistan do not attract the personal income tax. The analysis of price levels for inputs and outputs and the implicit taxes they embody should play a crucial role in such comparisons and the results are likely to vary both with the method by which these are treated and across countries. Furthermore, one should not forget that ultimately one's distributional values relate to individuals and households rather than to sectors and that within sectors there are generally very large variations in individual incomes.

Following Musgrave et al. (1951) a distinction has been made between "absolute incidence" and "differential incidence". The purpose of incidence is to compare distributions of tax burdens under two different systems. The absolute

incidence approach compares the actual with the "hypothetical" situation in which there are assumed to be no taxes (or expenditures). However, with differential incidence one assumes that a specific tax (or expenditure) is replaced by a different tax (or expenditure) of the same revenue magnitude. When absolute incidence estimates are invoked, the implication is that the extent to which a given sub-group could be made better off (worse off) by the removal of a tax or all taxes (expenditures) has been shown. The relevance of the no-tax base line is obscure and this is what motivates the analysis of differential incidence. However, whichever approach is used, a basic assumption usually remains that the *existing* pre-tax income distribution would *continue to exist*, under an alternative tax system in the case of differential incidence, and in the absence of a tax system in the case of absolute incidence [see de Wulf (1975) and Bird and de Wulf (1983)].

A variant of incidence analysis has also been used in recent years to work through the consequences of various policy changes for households in different circumstances. This involves an identification of gainers and losers and a measure of the money loss or gain associated with given policy changes. If small changes are considered, actual expenditures or incomes provide an accurate first approximation. However, for larger policy changes, demand and labour supply responses become important. These issues are discussed further in Section 3 [and for empirical estimations see, for example, Ahmad and Stern (1987) for India, and Ahmad and Stern (1986a) for Pakistan].

There are many further problems associated with incidence studies, several of which may generate considerable additional work. One set of questions concerns the shifting of taxes. This is, in part, an issue of market structure [see Seade (forthcoming) and Stern (1987b) for a theoretical analysis]. The solution generally adopted in applied work has been to assume the full forward shifting of indirect taxes, and complete non-shifting of personal income taxes. When the effects of different taxes are spliced together for overall incidence calculations one should check for consistency of models although this consistency may be difficult to achieve whilst retaining the relevant empirical detail. Additional problems are created with the taxation of intermediate goods and raw materials [see Ahmad and Stern (1987) and Section 3 below], the analysis of which in principle requires full information on the input–output structure of the economy. Other problems relate to the lumping together of disparate households with varying characteristics into aggregated income categories. For example, a single-person household with Rs. 1000 per month is not "equivalent" in welfare terms to a ten-person household with the same income, though they may be classified in the same group. Some data sources might allow correction for this aspect but many others, such as age, housing and health would usually remain. Aggregating into income or other classes may be inappropriate for the tax questions at issue, and one might miss the result that there would be many gainers of a certain type simply

because the particular features of gainers and losers are not closely related to the categories used for incidence analysis. In the Indian context, income tax laws apply to individuals except for Hindu undivided families (HUFs) where the taxable unit is the family. Mappings from HUFs and individuals to households can be quite difficult [but see Chelliah and Lal (1978)]. A household survey with data at the household level is invaluable in this respect although many problems remain. For example, the particular concept of income used could greatly influence results and transitory but large factors, e.g. poor harvests, may affect different households to varying extents. Furthermore, as in several African countries, nomadic or transitory populations add further constraints to the efficacy of household surveys.

2.2. The financing of deficits

In this subsection we discuss, briefly, possible non-tax measures used to finance the gap between government revenues and expenditures. Three main sources are commonly used, to varying degrees in different countries: non-bank borrowing, money creation, and external borrowing or aid. Each alternative has an attendant profile of costs and benefits that must be considered by the government, in relation to raising additional revenue through taxation. In Subsection 2.2.1 we examine non-bank domestic borrowing, the constraints on this option and possibility of equivalence with taxation. In Subsection 2.2.2 we discuss borrowing from the banking system or money creation. The inflation tax is also discussed in that subsection.

Some of the principles that govern the choice of financing deficits through external capital mirror the discussion relating to domestic borrowing. However, foreign capital flows are treated in detail elsewhere in this Handbook: foreign private flows in Chapter 26 and foreign public capital flows in Chapter 25, and will not be discussed in detail here.

2.2.1. Domestic non-bank borrowing

In this subsection we are concerned primarily with borrowing from domestic sources other than central banks. Domestic borrowing often arises with an unexpected shortfall in revenues, or to cover emergencies such as floods or defence requirements. Thus, borrowing often substitutes for increases in taxation which would otherwise have to be of considerable magnitude to meet the "one-off" requirements [see Goode (1984, p. 197)]. Unlike taxation borrowing is usually voluntary (although there are examples of compulsory borrowing). The differences between, and possible "equivalence" of, domestic borrowing and taxation are discussed below.

A major constraint to the overall level of domestic borrowing is the degree of monetisation in the economy and the sophistication of the financial markets. However, the experience of low-income countries in South Asia has shown that relatively complex financial markets have developed within a short period and that this has had an impact on the composition and generation of savings. In India, the rate of gross saving has increased from 10 percent of GDP in 1950/51 to over 20 percent in 1975/76 and has been maintained above that level since. The household sector has provided around 75 percent of total gross savings and around 90 percent of total private sector savings throughout the period. However, the composition of household savings has changed dramatically: physical assets provided over 96 percent of household savings in 1951/52 and financial assets 3.9 percent but since the mid-1970s on, financial assets have accounted for around 50 percent on average of household savings [see Government of India (1982), Raj Committee]. There has been a corresponding change in the pattern of financing of total government expenditure in India; tax revenues declined from 70 percent of expenditure in 1950/51 to 61 percent in 1979/80, and domestic borrowing (in terms of net market loans and small savings increased from 4 percent of expenditure in 1950/51 to over 10 percent in 1979/80 [see Ahmad and Stern (forthcoming)]. Thus, provided financial markets exist, as they do to an increasing extent, "tapping" the resources of the "household" sector through domestic borrowing may be seen as a "supplement" or an alternative to tax revenues. Given that tax revenue involves collection costs and generates consumer resistance, which may be substantial in developing countries, and that the purchase of government securities is more or less voluntary, governments may well be tempted to make more use of the latter if financial markets and institutions permit.

There is a contention that the impact of domestic borrowing is equivalent in terms of behaviour and welfare to that of taxation, since individuals would realise that debt servicing and repayment entails taxation in the future. Rational individuals with perfect foresight would then adjust their behaviour accordingly and under certain assumptions borrowing would have exactly the same effect on consumption and savings decisions as taxation [see Barro (1974)]. It should be clear that key assumptions in addition to perfect foresight are perfect capital markets, proportional taxation and that bequests, in present value terms are positive and valued at par with current consumption. This "equivalence theorem" has been attributed to Ricardo. Musgrave (1985) suggests that though Ricardo accepted the possibility of equivalence, he rejected it as unrealistic. Tax finance has an immediate impact on consumption and saving behaviour, whilst "loan finance is a system which tends to make us less thrifty – to blind us to our real situation" [Ricardo (1817, p. 247)]. Thus, on the Ricardian view loan and tax finance differ with respect to their impact on capital formation; saving and capital formulation being reduced by a switch towards domestic borrowing.

The assumptions required for "equivalence" involving not only the correct perception of future tax liabilities from debt creation but also that present generations see the present value of the future liabilities in the same terms as a tax liability now, are unlikely to be acceptable in the context of developing countries. The theoretical literature shows that complete "Ricardian" equivalence could prevail under very special circumstances. Thus, liquidity constraints, imperfect capital markets with divergence of personal and government interest rates, myopic consumers and distortionary effects of taxation inter alia could cause divergence from Ricardian equivalence. Since it could be argued that although the stringent theoretical conditions required do not hold, the actual behaviour of economies nonetheless approximately follows the predictions of Ricardian equivalence, a final evaluation is essentially an empirical matter [see Poterba and Summers (1987)].

There are few satisfactory tests for Ricardian equivalence for developing countries. The most forceful confirmation of the proposition is for the United States, by Kormendi (1983), who shows that over the period 1930–76 increases in government spending on goods and services depress consumer spending, while changes in taxation have no effect on private sector consumption. However, Feldstein and Elmendorf (1987) using alternative functional forms and with more recent data show that Kormendi's result is reversed if the period of the Second World War (with its appeal for self-restraint, rationing and shortages) is excluded. Poterba and Summers (1987) argue that recent U.S. deficits present a natural experiment for testing equivalence, since the increasing deficits have not been caused by wars or natural emergencies. They show that increasing deficits have been accompanied by a decline in national savings and unprecedentedly high levels of real interest rates, in contrast to Ricardian theory. Furthermore, the evidence that pre-announced tax policies have affected private consumption provides a refutation of the equivalence proposition in the U.S. context.

The comparison between debt and tax finance will also depend on whether or not there are underemployed resources. Thus, a fiscal expansion through debt creation (rather than taxation) may lead to greater effective demand and higher incomes in the short run if Ricardian equivalence does not apply. In less-developed countries debt finance could be a mechanism for activating unproductively used funds in that government borrowing may lead to better developed capital markets (e.g. by introducing new "instruments" for savings) so that there might also be some beneficial long-term effects.

Simple rules of thumb in relation to domestic borrowing have occasionally been used to guide policy, and some have various shortcomings [see Goode (1984, pp. 197–198)]. One view is that it is appropriate to use borrowing to finance investment outlays on the grounds that returns to finance the debt service and repayment will be generated. This rule fails to distinguish between the relative costs and benefits that accrue from financing "the project" from alternative

sources. Another related maxim is to "avoid borrowing to pay for government consumption expenditures", on the grounds that such borrowing would reduce aggregate savings, and thus government investment. However, as well as making the previous mistake, this further ignores the possibility that some government consumption may in fact be more conducive to growth than particular forms of government investment.

Whether or not to use loan finance, could be treated as a particular project or programme and subject to the same principles of social cost–benefit analysis as enunciated in Section 3 and other chapters of this Handbook. A government, in deciding on the question of loan versus other finance for a given activity, would need to compare the present value of the loan, given the time pattern of resultant government revenues and the accounting rate of interest, with the costs of servicing the debt. The latter would be a function of the maturity of the loan and the interest paid, and would include considerations such as whether or not the debt is index linked. The decision whether the activity ought to be loan financed can be treated formally as follows in such a way that the comparison with tax finance is integrated into the analysis.

As a simple example we suppose that the government is considering raising a loan of one unit this year (year 0) from consumers and repaying $(1 + j)$ next year. We suppose that the shadow value of a unit of income to consumers this year and next year is μ_0 and μ_1 (this should take full account of the way in which consumers dispose of their income) and for the government ν_0 and ν_1, all items being expressed as present values (i.e. in terms of a given unit of account this year). The net benefit of the loan (NPV) is then

$$NPV = -\mu_0 + \nu_0 - \nu_1(1 + j) + \mu_1(1 + j). \tag{1}$$

This is positive where ρ is the accounting rate of interest, if

$$\lambda_0 \equiv \frac{\nu_0}{\mu_0} > \frac{1 + \rho}{1 + r} \frac{r - j}{\rho - j}, \tag{2}$$

where r is the consumption rate of discount, defined as $r \equiv (\mu_0 - \mu_1)/\mu_1$ the rate at which the present value of consumption is falling, and by definition when government revenue is numeraire for each period, $\rho \equiv (\nu_0 - \nu_1)/\nu_1$; we have assumed $\rho > j$. The quantity λ_0 is the value of a unit of public funds relative to a unit of private funds or the social marginal cost of public funds that we shall examine in Section 3. Hence, if the alternative to loan finance is indirect taxation of a particular good, then λ_0 would be measured through the social marginal cost for that particular good (see Section 3 for a discussion of its measurement). Thus, the comparison with tax finance is built into the analysis and we would prefer

loan to tax finance if condition (2) holds. One could define the r.h.s. of (2) as the social marginal cost, $\hat{\lambda}$, of raising a current unit of revenue by loan finance and say that loan finance is preferred if $\hat{\lambda} < \lambda_0$.

The interpretation of the condition is aided by the consideration of a special case. Suppose that ρ is equal to r so that λ_0 is equal to λ_1, and the social marginal cost of funds is constant over time (where λ_1 is ν_1/μ_1). This is a possibility that has been stressed by Arrow (1966) – it amounts to the assertion that, loosely speaking, the costs and difficulties of raising revenue will not increase or decrease over time. Condition (2) then becomes $\lambda_0 > 1$, where $\rho > j$ (with $\lambda_0 < 1$ for $\rho < j$). This is intuitively very obvious since the gain from the loan in the first period is simply $(\nu_0 - \mu_0)$ the difference between the value of a unit to the government and that to the individual; the present value of the next period's loss is $[(\nu_0 - \mu_0)/(1 + \rho)](1 + j)$ and then $\nu_0 > \mu_0$ tells us that the net gain is positive. Clearly, if $\rho > r$ so that λ falls over time ($\lambda_0 > \lambda_1$), then the argument is reinforced since the loan is repaid out of government funds next period which are less costly to raise. So the rule tells us that if revenue-raising is expected to become easier and the loan is at an interest rate below the accounting rate of interest, then it will be attractive relative to tax finance.

A note of caution is in order lest this is treated as an argument which it is always in favour of a loan relative to tax finance. It is very tempting for a short-sighted government to believe that difficulties in raising revenue will be less next year and thus to borrow. Following the principles embodied in (1) and (2) the optimum balance between loan and tax finance is when we have equality in those expressions. It is quite possible that a government with a limited time horizon may push borrowing beyond this point making revenue-raising in future that much more difficult on the margin and implying that tax finance is preferable. Furthermore, once a tax system is in place it will generate a stream of revenues in the future, whereas loans have to be raised on a year-by-year basis.

The same type of analysis can be extended to foreign borrowing where the shadow prices would have to take account of movements of the shadow value of foreign exchange over time. Similarly, the shadow prices should take full account of the shadow value of factors and any associated multiplier effects within the economy. The argument shows that the same principles as used for the analysis of investment projects and tax reform can be used for the question of borrowing versus taxation. Again it is quite possible that the short-sighted government will see tax-raising in the future as easier than now and borrow excessively. The procedure described would require fairly extensive further development to be applied to a particular economy. The integration of macro and micro analyses to provide more unified principles is a promising and important topic for both theoretical and applied work.

As we have just seen, foreign resource flows could be treated as a marginal "project" and the relative social costs and benefits evaluated using the methods described in this chapter. Rather than pursuing this formally, in this subsection

we examine some of the distinguishing features of "foreign borrowing". Foreign public capital flows have been treated by Eaton in Chapter 25 and foreign private capital flows by Cardoso and Dornbusch in Chapter 26 of this Handbook.

Foreign borrowing differs from domestic in that it enables a country to command current goods and services in addition to those arising from domestic resources. Furthermore, the possible displacement of finance for private investment may be less likely to be a serious problem (although public foreign indebtedness may make finance more difficult for private borrowers). Over time, debt servicing and repayment entail a reverse transfer of resources abroad. The principal methods for dealing with debt servicing or repayment include new loans or grants, domestic production in excess of consumption or investment (which would be converted into foreign exchange through international trade), or repudiation. Despite the severe debt crises for developing countries in recent years which have led to "rescheduling of debt" there has been no widespread formal repudiation of debt since the 1930s.

2.2.2. Money creation

Money creation is another instrument that governments often use to pay for expenditures. This generally takes the form of borrowing from the central banks which leads to an addition to deposits and currency. Government borrowing from commercial banks also has the effect of money creation if the commercial banks are not fully "loaned up" and have excess reserves. If loans to commercial banks' customers are not affected, there is a net addition to money stock. The immediate impact of the deficit financing of government expenditure (as opposed to loan or tax finance) is to increase aggregate spending. In this subsection we examine some of the implications of such expenditures on output, balance of payments, inflation and other government revenues.

Central bank borrowing which generates output expansion may or may not be accompanied by inflation – this would depend on the specifics of the model, for example the structure of the labour market, the extent of underutilised capacity and resources, the foreign exchange regime, the demand for money and so on. Balance of payments difficulties could result if output expansion leads to an increase in imports.

If government spending through money creation leads to inflation, holders of money face a reduction in their purchasing power, thus involuntarily transferring resources to the government through the *inflation tax* [see Bailey (1956)]. The impact of this tax depends on the effects of changing prices on real incomes, money holdings and the velocity of money circulation. A decline in real cash balances resulting from inflation may decrease the resource transfer that governments might expect with further deficit financing. However, even with hyperinflation, demand for money persists to a small degree. With steady inflation, individuals are more easily able to adjust their expectations of price changes to

reduce real cash balances, hence limiting the usefulness of the inflation tax as a tool at the disposal of the government. Thus, Johnson (1977) argued that "revenue" from the inflation tax arising from irregular doses of (continuing) inflation would be greater than that from inflation at a constant rate.

The effects of inflation on real government revenues (excluding the inflation tax) depend on collection lags and the elasticity of tax revenue with respect to income changes [see Tanzi (1977, 1978)]. In general, the longer the collection lags, the lower the real revenue. Furthermore, revenue from specific taxes – which require frequent rate changes to adjust to inflation – tends to lag behind price changes. Aghevli and Khan (1978) express a similar idea in terms of a "two-way causality" between money and prices in the inflationary context: inflation causes government expenditure to rise, but revenues do not rise proportionately because of collection lags. Financing the inflation-induced deficits would increase money supply and thus inflation would be boosted further. Aghevli and Khan recommend the reduction of inflation through indexing taxes with long collection lags – and in particular income, corporation and property taxes. Without such indexing there may be some tendency for deficit finance to be self-perpetuating.

The financing of a government deficit through money creation (either borrowing directly from the central bank or indirectly through commercial banks as described above) for 64 developing countries [see Tanzi (1986)] suggests that in the early 1980s only five countries raised more than 10 percent of GDP in this fashion [Zambia 13 percent, Trinidad and Tobago 12 percent, Portugal and Sierra Leone 11 percent and Zaire 10 percent]. A further ten countries raised between 5 percent and 10 percent of GDP [Brazil 9.5 percent, Greece 8 percent, Nigeria 7.5 percent, Tanzania 7.2 percent, Mauritius 6.5 percent, Uruguay 6.4 percent, W. Samoa 5.6 percent, Mexico 5.7 percent, Israel 5.5 percent and Argentina 5 percent].

The effects of inflation on real balances, the base of the inflation tax, were illustrated by Tanzi (1986) with reference to Argentina. In 1970, a 14 percent inflation rate (with reference to the wholesale price index) was associated with ratios of M1/GDP of 0.15 percent. In 1983, with 430 percent inflation, the M1/GDP ratio had fallen to 0.038. Tanzi with a number of simulations suggested that there was a maximum level of financing that could be generated by central bank borrowing, given the ratio, a, of money to GDP (at zero expected inflation) and an estimate of the sensitivity, b, of the demand for money with respect to the rate of inflation, π. Thus, if $a = 0.10$ and $b = 0.5$ the ratio of money to GDP is $a \exp(-b\pi)$, a maximum of 7.4 percent of GDP could be achieved through central bank borrowing at 200 percent inflation (given by the maximum of $a\pi \exp(-b\pi)$) [see Tanzi (1986, p. 145)].

A full analysis of the costs of inflation is beyond the scope of this chapter, but the interested reader is referred to Fischer and Modigliani (1978) for a general discussion in the U.S. context, and Fischer (1982) for a discussion of the use of a foreign currency and the inflation tax.

2.3. Administration and evasion

2.3.1. Administration

The choice of tax-tools in a particular country should be strongly influenced by the government's perception of the costs of collection relative to the revenue yield. Thus, we have an emphasis on convenient "tax handles" in low-income countries, usually indirect taxes, such as trade taxes, or production excises in countries with substantial domestic manufacturing bases. In this section we point to examples of some of the common administrative problems that may arise in developing countries with respect to the operation of existing taxes and proposed reforms. Of course there is considerable diversity and some countries may be more successful in overcoming particular problems than others. The problems we shall consider are (i) obscurities and complexities of the tax laws; (ii) definitions of income; and (iii) corruption or incompetence of staff. These problems are set in the context of the structure of the economy and the monetization, accounting practices, literacy and so on of the potential tax payers.

An indication of the potential severity of the first problem is that quite often it is not clear what law the "administrators" are supposed to administer, even in countries with a fairly sophisticated system of laws and a highly developed bar, judiciary and administration, such as in South Asia. The tax structure has evolved as a result of an ad hoc series of legislations in response to varying problems and government circumstances over the years. For instance, a Government of India Committee on Controls and Subsidies [Government of India (1979)] found over a hundred notifications with respect to the textile industry, some of them dormant, and that even the Office of the Textile Commissioner did not have a full version of the control laws. The result was a "framework which is perhaps being violated unwittingly almost daily by most people in the textile industry and trade, which is in theory punishable" [Government of India (1979, p. 193)]. There is thus a need for a periodic review of the legal stipulations to weed out laws that are no longer applicable and discover those that are contradictory to others or to their stated intentions.

An attempt to obtain greater precision can help in reducing the scope for misinterpretation (deliberate or otherwise), corruption and evasion. Often, however, the attempt at greater precision results in contortions which conflict with the aim of greater simplicity and clarity and may add to rather than reduce difficulties of administration and evasion. For example, one can find a differential, complex and very tightly defined rate structure on goods that are close substitutes, or sold through the same outlets or produced in the same enterprise. This provides considerable scope for "interpretation" as to which rates should be applicable (since detailed verification is difficult), encourages evasion, and can lead to an excessive call on the resources of the tax administrators and the

book-keeping of the manufacturers or sellers. Consequently, it becomes difficult or impractical to extend coverage to the small-scale sector. A case in point is cloth in India. For distributional and political reasons, hand-made cotton and silk fabrics received a nominal subsidy in 1979 (on the grounds, for example, that handloom cloth is an item of mass consumption – though much to the taste of the well-heeled in India and other countries – and is produced by relatively poor, often rural, artisans). On the other hand, mill-made cloth was subject to excises, the rates of which were an increasing function of the "count" of the cloth, and the extent of man-made fibres used. Small-scale producers were exempt, partly because of the difficulty in implementation and partly because it was deliberate policy to encourage them.

In some countries there is a curious admixture of excises, various surcharges levied for different emergencies in the past and not removed (no one knowing why or the present rationale), and cesses, with often a combination of specific and ad valorem rates on a particular commodity. Such structures are needlessly complex and often restrict the base to large-scale manufacturers who keep accountants (who usually devote considerable wit and ingenuity to grappling with the provisions and often maintain alternative sets of accounts).

A second major problem in administration is the definition of "income" used, particularly with reference to the income tax as it relates to those with independent sources such as professionals, agriculturalists, and small-scale producers. For instance, in agriculture income is a fairly nebulous concept. Typically only a proportion of the produce (of food crops in particular) is marketed, and the prices received are subject to considerable variability. This causes difficulties with the determination of gross sale receipts, in addition to those associated with the valuation of consumption out of home-grown stock, and lost output due, for instance, to rodents and the weather. If a "gross" value of output could be arrived at, costs of production would have to be calculated to derive "taxable income". This would involve payments for capital and material inputs, land rental and labour. The last two items are particularly difficult to evaluate, given that different land tenure and labour-use systems coexist in poor countries.

One way to tax incomes that are ill-defined or for which there are few records is to use *forfait* [Goode (1981, 1984)] or the presumptive tax [Musgrave (1987)] which determines income by external or indirect indicators. A fairly elaborate *forfait* system exists in France and has also been adapted to a number of francophone countries in Africa. In France, *forfaits* are used to assess taxes on farmers' incomes, unincorporated business incomes and professional incomes. For other activities, manuals are prepared in consultation with representatives of professions or business organisations which provide information on gross profit margins for various products or activities. In addition, the tax administration has the statutory power to assess income with reference to indicators of the tax

payer's lifestyle, each being assigned a specific value including rental values of homes, ownership of cars, racehorses, etc. and employment of servants. Such powers are common (although often defined in less detail) to a number of countries. Land revenue assessed on the basis of a cadastral survey is a particularly simple form of *forfait* that used to be an important source of revenue in the sub-continent. For a further discussion of the taxation of agriculture, see Section 4 below.

Ambiguity in valuations could be reduced by using *forfait*. Systematic indicators of activity levels such as consumption of electricity or floor space may be available. Coupled with estimated profit margins they could form the basis of income taxation. Similar indicators may also be used for the sales tax. Similar or further forms may be devised to circumvent the problem of transfer-pricing by multinationals. The availability of computers in most developing countries now permits the extensive collection and processing of information that would help in cross-checking records and returns in support of such a system. On the introduction of *forfait* the assessee might, in certain circumstances, be given the option of being assessed under the existing law provided appropriate information is supplied. Whilst the ingenious evader will no doubt find some ways of reducing liability, the *forfait* system can provide a considerable expansion in the effective base.

A third major problem in administration is the corruption or incompetence of revenue staff. Often such officials are poorly paid, and being in a position to monitor very large sums of money are subject to monetary inducements and temptations. Whilst "adequate" salary structures and a close watch on the life-style of revenue officials and their families would help, it may be somewhat more difficult to root out corruption once it has become an accepted way of life. Quite often, as in South Asia, tax cases for the administration are prepared and argued by ill-paid, over-worked and, at best, mediocre officials, while the really big fish are represented by the best legal brains and chartered accountants. In major cases, governments may well be advised to turn the tables on "evaders", and avoid stress on administrative personnel by hiring the best legal and financial help for the prosecution. Substantial penalties may provide a deterrent although they can provide their own incentives for further corruption.

It is important in empirical investigations of reform to work as far as possible with actual revenue collections [see, for example, Ahmad and Stern (forthcoming)] rather than some notional expected revenue on the basis of statutory rates. Whilst this method circumvents some of the problems of analysing systems where there is inefficiency of collection and significant evasion, it does require considerable work to translate data on tax collection into implicit rates on different types of goods and incomes. Tax authorities should be encouraged to keep data in a form which is designed to facilitate the economic analysis of possible reforms as well as meeting statutory requirements and the organisational and management needs of the administration.

2.3.2. Evasion

Evasion is a major preoccupation of tax designers, administrators, tax payers and the general public and the term "black economy" has been coined to describe those economic activities which are illegally concealed from the tax authorities. It is a subject which is important and universal but where there is a great deal in the way of anecdotes and little in terms of hard information.

Legally the distinction between evasion and avoidance is that the former activity "breaks the law" in some sense and the latter does not. From the point of view of positive economic analysis, if the legal position is clear and the tax authorities are reliable, "avoidance" implies certainty on the part of the tax payer with respect to tax payments (if any) and his consequent decisions concerning his activities, whereas evasion involves uncertainty as to punishment and liabilities. Models of evasion and estimations of its importance have been used for both developing and developed countries. For an excellent recent survey of the theory and applications to developed countries see Cowell (1985).

One simple model of behaviour is that of "portfolio selection" and the results are often based on the assumption of a risk-averse individual who maximises expected utility and makes a free choice of evasion activities subject to an exogenous linear budget constraint (thus marginal penalties are constant). The major results are that increasing the penalty must reduce tax evasion, as does increasing the probability of detection [Allingham and Sandmo (1972)]. Mean-preserving increases in risk, so that the expected returns per unit of tax evasion remain constant, also lead to less evasion – for instance reduced tax rates with increased penalty but unchanged probability of detection. Restrictions on the structure of preferences lead to additional results. With decreasing absolute risk aversion, increases in income (caused for instance by a cut in tax rates., with a given probability of detection and unchanged penalty) will increase the absolute amount of tax evasion [Yitzhaki (1974)] but evasion as a proportion of taxable income may go either way. Decreasing, constant or increasing relative risk aversion will lead to an increasing, constant or decreasing evasion as a proportion of income with a tax cut.

The simple model has been refined in a number of ways. Srinivasan (1973) considers a progressive tax system and progressive penalties. Although the model becomes more complicated than the linear case, increases in the marginal penalty and probability of detection are shown to reduce evasion. Koskela (1983) shows, with decreasing absolute risk aversion, that increases in marginal tax rates together with the minimum income guarantee will reduce evasion (assuming a given probability of detection and surcharge, such that either expected revenue or expected utility are constant). Other potential, useful extensions in the models include (a) making investigation rules dependent on the "signal" provided by the returns; (b) introducing a game-theoretic framework to discuss the tax payer–revenue authority interrelationships: (c) incorporating the interactions between the

tax payer and the rest of the community (introducing the prevalent degree of tax evasion by others in the community); (d) making income endogenous [see Cowell (1985) for further references]. The models have made a beginning towards the analysis of a complex and difficult phenomenon. Cowell (1985) is of the view they show how "intelligent use of information can play a central role" in combatting evasion.

Optimum policy towards evasion has been considered by a number of authors where the criterion, for example, is the maximisation of expected social welfare for given expected revenue. It is common to find extreme results of the kind that penalties should be infinite together with zero probability of application – essentially in the model such policies can eliminate evasion. There are a number of reasons one can advance which would, if included in the model, avoid this extreme solution. An example might be perceived social loss from punishing the innocent. The precise status of such arguments needs careful thought and if they are examined closely it is difficult to avoid the conclusion that the simple economic calculus leaves out central elements of what is commonly understood as justice [see, for example, Hart (1968) and Stern (1978)]. This is not an argument in favour of "irrationality" but simply an acknowledgement that there is more to the philosophical basis of punishment than is generally captured in standard economic models.

The models discussed above indicate an a priori possibility of increasing evasion by a cut in tax rate with given expected revenue. On the other hand there is a general belief, as shown in several tax commission reports and rate changes in various countries, that high tax rates are the main cause of tax evasion. For instance, Kaldor (1956) argued this case for India, and found very substantial evasion of income tax[1] for the year 1953/54. The Indian Central Board of Revenue disputed this figure and estimated evasion to be a tenth of that calculated by Kaldor. The Direct Taxes Enquiry Committee [Government of India (1971)] recommended a reduction of marginal income tax rates (which effectively exceeded 100 percent when income and wealth taxes were considered together in some cases) from 97.75 percent for the highest bracket to 75 percent. During the period 1971 to 1978 marginal tax rates were reduced as recommended, and there were no substantial increases in the proportion of income tax collections in GNP. Marginal income tax rates have been reduced again in the recent past, along with other measures designed to reduce evasion and the laundering of "black" money, and there has been some increase in income tax revenue. This may be construed as lending support for the conclusion that reduction in marginal tax rates can lead to a decrease in evasion. However, this increase may also be due to more efficient administration, more severe penalties

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[1] Kaldor estimated that income tax evaded in 1953/54 was of the order of Rs. 200–Rs. 300 crore [Kaldor (1956, p. 105)]. Collections for that year were Rs. 123 crore.

for default or evasion, and amnesties for past concealments if declarations are made before a deadline. It would be very difficult empirically to disentangle these effects from the adjustment in the marginal rate.

Whilst high tax rates might well be one of the causes for the existence of a "black" or underground sector, they are probably not the only reason. There is first an overlap between evasion and the existence of criminal activities, such as narcotics, extortion and bootlegging (in countries with prohibition) and other illicit trades. It is unlikely that a reduction in income tax rates would have much of an impact on these activities. Moreover, as noted in the previous section, developing countries are likely to have considerable small-scale or cottage production and services in the informal sector which are difficult to monitor and consequently to tax, as are household production and barter, particularly in agriculture. The cost of enforcing tax laws in less formal sectors can be high. Tanzi (1983) listed, in addition to taxes, regulation, prohibition and bureaucratic corruption as likely causes of the "black" economy [see also Tanzi (1982)].

There have been a number of methods proposed for the measurement of the size of the black economy or the extent of evasion: although some (or most) of them are rather dubious.

(a) The *expenditure–income gap approach* assumes that whilst incomes may be concealed, expenditures will show up say, in National Accounts data, and since the two should be of equal magnitude, the gap represents the "black" economy. This was the method used by Kaldor (1956) (see above), and the Direct Taxes Enquiry Committee [see Government of India (1971, p. 8)] which estimated income tax evasion in 1968/69 to be Rs. 470 crores (as against collections of Rs. 378 crore in that year). The major limitation of this approach is that the measurement of both income and expenditure is subject to error, and the "gap" may be more reflective of this "noise" than evasion.

(b) The *labour-market approach*, which originated in Italy [Contini (1981)] compares crude employment projections from labour force participation rates with reported employment; it also surveys firms and workers on secondary employment or moonlighting. The black economy is given by the difference between projected and reported employment; the surveys also reveal concealed secondary employment. Problems with employment projections are that these are also liable to be subject to errors, which may be large relative to the difference between projected and reported magnitudes. The survey estimates are discussed below (see direct methods).

(c) The *monetary-aggregate approach*, in one of its forms, assumes that increases in the number of large denomination banknotes reflects increases in the underground economy, or its change over time. It is generally impossible to disentangle the effects on the demand and supply of large banknotes of factors such as inflation, interest rates, money substitutes, expectations, policies of central and commercial banks and so on. In such circumstances the practice of

ascribing the unexplained residual in the calculations to the "black economy" (rather than inadequacies of theory, of statistical technique, of data, and of the researcher) is unattractive. This criticism applies also to other variants of the monetary-aggregates approach. Guttmann (1977) assumes a stable relationship between cash held by the private sector and the total monetary base, and provided one could fix a base-year when the underground economy is assumed not to exist, or be negligible, this yields an "estimate" of the underground economy – 10 percent of GNP for the United States in 1976. Feige (1979) relies on the quantity theory to project the total transactions or true GNP, assuming that money stock is known and the velocity of circulation is understood. The difference between the predicted and measured GNP then reflects the under-ground economy – 13 percent of GNP for the United States in 1976. The base year is of crucial importance in this exercise, as are the assumption of constancy of the velocity estimates and the measures of stock. Gupta and Gupta (1982) estimate the underground economy to be 49 percent of the Indian GNP for 1978/79. Acharya (1983) has criticised this approach since there are good reasons to believe (i) that the ratio of transactions to income would change over time in a developing country like India – because of increasing monetisation, increasing density of input–output transactions, and the disproportionate growth of purely financial transactions from the growing sophistication of the financial and capital market; (ii) the proxy values for the life-time transactions of currency notes – borrowed from U.S. estimates – might not be appropriate for India; (iii) constant currency turnover rates are inappropriate, and (iv) the results are implausible – since over half of measured GNP was in sectors such as agriculture, banking and insurance, railways, public administration and defence, for which there would be little under-reporting, with the implication that if the estimates are correct, official figures would measure less than half of the value-added in the remaining sectors.

(d) The "soft-modelling" approach seeks indicators (other than GDP) of general activity levels. Gupta and Mehta (1982) assume a stable relationship between the use of electricity and GDP, and estimate the black economy at over 19 percent of GDP in India in 1978/79 [for a detailed critique see Acharya (1983)]. The specification of such models is likely to be the main problem with this approach, as are the correspondence between the economy under considera-tion and that for which the parameters were estimated.

(e) An intensive audit of a sample of tax payers by the tax authority is one of the main direct methods of estimating under-reporting, and requires the "gross-ing-up" of the results from the survey to get to aggregate figures for the economy as a whole. This method has been used by the U.S. Internal Revenue Service (IRS) since 1961 [see U.S. IRS (1979)] and gives conservative estimates in the sense that non-filers are excluded altogether.

(f) A survey of economic activities and attitudes is another direct form of investigating underground activities independently of tax returns, and we can

compare results with the actual returns. This method is likely to have severe problems of non-response, evasiveness and misrepresentation, which may be mitigated somewhat if the main focus of the survey is on other activities and evasion is estimated by inference. This method was used by the Musgrave Reform Commission for Columbia in 1971 and estimates of non-reporting ranged from 22 percent for clothing manufacturers, to 36 percent for restaurants. Under-reporting of income ranged from 95 percent for lawyers, 76 percent for dentists and 28 percent for physicians [see Herschel (1971)].

Notwithstanding the problems associated with a particular method for the measurement of the underground economy, it is apparent that such activities exist and should be taken seriously in both theoretical and empirical research. And a central question for any proposed reform must be how far the proposed taxes can be collected.

3. The appraisal of taxes

3.1. Introduction

If one asks how the tax system could be improved, or how extra revenue should be raised, then one must consider, in relation to objectives, the effects of possible tax changes on revenue, on incentives, on the distribution of welfare, and on the pattern of production. These effects will be closely linked through the behaviour and objectives of participants in the economy. One should also ask how the changes are to be enforced and at what cost. Thus, any proposal under study should be examined systematically in relation to criteria which embody these considerations. The links between the four issues described are illustrated, for example, if one considers the effects of a tax change on the incentive to save. One is then concerned with the distribution of consumption across individuals at different points of time, and must ask what happens to revenue in each period (which will depend on behaviour). One must also examine how the pattern of production will change to meet the changed demands. Similarly, a discussion on the progressivity of the income tax will involve possible effects on incentives to work, and thus revenue and production, together with concern for the distribution of disposable income. The main body of the theory in this section will be directed towards developing principles and methods for the simultaneous treatment of these issues. Administration has been treated (less formally) above and plays an important role in the theory in terms of the taxes to be examined, their relative prominence and their coverage, i.e. it usually enters through the constraints rather than in terms of explicit cost calculations, although as we shall see such costs can be made explicit in the theory of reform. Our main concern is with the medium or long term and the concentration is on indirect taxes, excises,

tariffs, sales taxes, VAT and the like, although personal and corporate income taxes will also be considered.

The theory plays two related roles. First, we can use it without numbers to develop principles, train our intuition, sort out coherent from incoherent arguments, and to help identify the important assumptions or parameters. In this attempt to aid our understanding it is important to keep the models as simple as possible consistent with capturing the essentials of the problem in hand. Subsection 3.2 contains this type of theoretical discussion. The second role of theory is in the organisation and direction of empirical analysis and it is important to develop theory in such a way that it can be integrated explicitly into methods for applied work. Thus, it should tell us what data are required and provide an analytic basis for the empirical calculations. The development of the theory in this way involves not only analytical skills but an appreciation of the demands and difficulties of empirical work; it provides part of the subject matter of Subsection 3.3 in which we discuss applied policy models. An important element in that analysis will be the calculation of the effect of tax changes on price, or tax shifting.

There are difficulties and dangers associated with each role for theory. In the first role clear results are an advantage in showing where different assumptions lead but we should not let their definiteness cloud our judgement of the relevance of the assumptions. This danger is particularly severe where there are strong preconceived views on what policy should be (e.g. the uniformity of indirect taxation, see below). And we should not be deluded into thinking that the presence of numbers indicates a serious applied study. For example, in models which are too complicated to yield clear results the numbers may be used simply to illustrate possible theoretical outcomes.

In Subsection 3.4 we set the methods in context by showing how they form part of the general theory of tax reform using shadow prices. This not only provides a considerable extension of their applicability but also provides a link with other chapters on policy, particularly cost–benefit analysis, in that we see how policy problems of different kinds have a similar underlying structure. Extensions of the models to deal explicitly with dynamic issues are described in Subsection 3.5. Taxes and production are discussed in Subsection 3.6.

The final three parts of this section move closer to practical policy. In Subsection 3.7 we look at the taxation of income and profits and in Subsection 3.8 some problems of indirect taxation. In the final subsection we summarise by formulating some simple practical guidelines from the theory.

3.2. Theory

The development of basic principles requires an analytical foundation so that we can understand the circumstances in which they apply and the critical assump-

tions in their justification. In this subsection we shall, therefore, sketch the outline of the standard models of normative tax theory and then ask what lessons they offer for taxation in developing countries. Those who wish to avoid the technical detail can examine the principles themselves set out in Subsection 3.8 where we draw together the main lessons in the form of simple and intuitive rules.

As a benchmark and to keep things simple at the beginning we take two of the standard frameworks in the theory of taxation, first where revenue can be raised in a lump-sum manner directly from households, and second where revenue has to be raised by the taxation of transactions between consumers and producers. In the former case if there are no externalities, and indifference curves and isoquants have the usual convex shape, then any Pareto efficient outcome can be achieved as a competitive equilibrium in which the government raises revenue and redistributes purchasing power using the appropriate set of lump-sum taxes. The policy is clear: there are no taxes of any kind (neither on commodities nor income) except those which are lump sum. Whilst the model is presented mainly as a benchmark it does immediately generate a general principle which is of value in guiding policy: revenue should be raised and redistributed in ways, which as far as possible, are lump sum. There are examples such as land or poll taxes which are relevant but generally governments will also have to consider taxes which are not lump sum.

In the second case we retain the competitive framework and the assumption of no externalities but now revenue has to be raised by the taxation of commodities bought and services supplied. The standard theory in the tradition of Pigou, Ramsey, Samuelson, Boiteux, and Diamond and Mirrlees is to formulate the problem as one of the choice of the indirect taxes to maximise a Bergson–Samuelson social welfare function whilst raising a given revenue. The use of a Bergson–Samuelson welfare function is not per se restrictive since it simply says that our judgements of welfare are conducted basically in terms of the living standards of the households in the community (current and future). Neither does it presuppose a benevolent all-knowing government. We ask simply how a commentator interested in raising living standards and in the distribution of welfare would evaluate policy in this simple framework. An absence of understanding of the logic of policy in this simple example would preclude us from generalising to more complicated worlds. The problem is to raise a given level of revenue using commodity taxes whilst lowering the welfare of households as little as possible. Formally we choose a tax vector t to

$$\text{maximise } V(q) \tag{3}$$

subject to

$$R(t) = t \cdot X(q) \geqq \bar{R}, \tag{4}$$

where p are the prices faced by producers; q, equal to ($p + t$), are the consumer prices; the level of household welfare corresponding to q is $v^h(q)$ and household demands are $x(q)$; $X(q)$ is the aggregate demand vector, and $V(q)$ is social welfare arising from those prices; $R(t)$ is indirect tax revenue and $\bar{R}$ the required revenue. Notice that we are assuming that there are no lump-sum incomes so that the demands and welfare of households (and thus social welfare) depend only on the prices which they face for the goods and services which they buy and sell. The assumptions on production are essentially that all production is either by the government or by competitive private firms, with constant returns to scale, all trading at the same prices. We are assuming that there is no taxation on transactions between producers but that all final sales to the consumer can be taxed. One can show that these assumptions allow us to conduct the analysis as if producer prices are fixed.

The formulation of the problem should make it clear that the same model applies to public-sector pricing of good i where we interpret p_i as the marginal cost (assumed constant for simplicity although this is not essential) and t_i as the excess over marginal cost. Thus, it is immediately obvious that the final price of a good sold directly to the final consumer by the public sector should *not* be marginal cost since optimal t_i would only exceptionally be zero. Public-sector prices should include an element of taxation for goods sold to the final consumer, i.e. there should be a contribution to resource mobilisation or revenue-raising.

The solution to problem (3)–(4) gives us the many-person Ramsey rule for optimal commodity taxation. It is useful to have this in front of us since it is the simplest embodiment of the basic trade-off between equity and efficiency in taxation. The rule is derived straightforwardly from the first-order conditions for the Lagrangian, $V + \lambda R$, for the above maximisation problem; λ is the Lagrange multiplier on the revenue constraint, i.e. the social marginal utility of government income. We have:

$$\frac{\partial V}{\partial t_i} + \lambda \frac{\partial R}{\partial t_i} = 0. \tag{5}$$

We then substitute

$$\partial V/\partial t_i = -\sum_h \beta^h x_i^h \quad \text{and} \quad \partial R/\partial t_i = X_i + t \cdot \partial X/\partial t_i,$$

and we use the Slutsky decomposition of demand derivatives to yield:

$$\frac{\sum_k t_k \sum_h s_{ik}^h}{X_i} = -\sigma_i \tag{6}$$

$$\sigma_i = 1 - \sum_h \frac{x_i^h}{X_i} \frac{b^h}{\bar{b}}, \tag{7}$$

where s_{ik}^h is the compensated (Slutsky) demand derivative for household h (the relevant utility level is at the post-tax equilibrium) and σ_i is negatively related to the covariance between the (net) social marginal utility of income, b^h, of household h (where the "net" means there is an adjustment to the social marginal utility, β^h, for the marginal propensity to spend on taxes out of extra income, and $\bar{b}$ is the average of b^h) and the consumption of good i by household h, (x_i^h). Thus, σ_i is higher the more the good is consumed by those who have a low social marginal utility of income (e.g. the rich).

We may now interpret (5) in terms of a trade-off between efficiency and equity. If there is a single household, then we may think of the problem as one of efficiency – raising a given revenue from the household at minimum cost. Of course in that case a poll-tax might well be an option and, if it is, it provides the best way of raising revenue. If, however, we are confined to commodity taxes, then the equality of the r.h.s. of (6) for all i gives us the familiar Ramsey rule that the l.h.s. is independent of i: this is often interpreted as saying that (for small taxes) the proportional reduction in compensated demand arising from taxes should be the same for all goods (t_k measures the price change and the Slutsky terms the compensated response in demand to the price change). The same result holds if we are not concerned with distribution in the sense that b^h is independent of h. Crudely speaking, the efficiency result is to tax goods which are in inelastic demand, although as we have seen the correct expression is in terms of quantity reductions and compensated demands. This may seem inegalitarian in that it would lead to taxation of necessities but then we have explicitly ignored distribution.

Where we *are* concerned with distribution, then (5), (6) and (7) tell us that the reduction in compensated demand should be more for goods consumed relatively more by those with low net social marginal utility of income (b^h). We might think of those with low b^h as the rich and it is in this sense that we orient taxes towards the consumption of the better-off. Thus, (5)–(7) capture the essential elements of the trade-off between equity and efficiency in the standard analysis of optimal commodity taxation.

The expression (6) is known as the many-person Ramsey rule and also allows us to investigate the relationship between indirect taxation and other tax or subsidy instruments and the appropriate balance between them. Suppose, for example, we can make lump-sum transfers which depend on the demographic characteristics of the household. An example would be a subsidised rice ration where the amount depends on household composition. The model of (3) and (4) is then augmented to include the influence of the grants on household welfare and demands and we take off their costs from $t \cdot X$ in (4). The optimality condition for the transfers can then be combined with (5)–(7) to analyse the appropriate construction of policies. One can then show [see Deaton and Stern (1986)] that if the Engel curves are linear and parallel but where the intercepts can vary with household composition, factors supplied are separable in the utility

function from consumption goods, and if the grants are set optimally then commodity taxes should be at the same proportional rate. Intuitively, all the redistribution that is desirable is carried out through the lump-sum grants which are financed by uniform commodity taxation, and there is no justification for further redistribution through differentiation of commodity taxes since everyone has the same marginal propensity to spend on each good. To put it another way, efficiency points us to taxing necessities and distribution towards luxuries; under special assumptions about the shape of preferences and the setting of direct taxes the two effects cancel and the role of indirect taxes is simply to raise revenue for the grants which act as a basic income guarantee related to household composition.

The above uniformity result was first stated by Atkinson (1977) for the linear expenditure system and then generalised by Deaton (1979, 1981) to linear Engel curves although in these models households are identical except for differences in wages. Atkinson and Stiglitz (1976) analysed the case of non-linear income taxation (again where individuals differ only in the wage) and one finds that the more subtle form of income taxation allows one to dispose of the assumption concerning the linearity of the Engel curves (whilst retaining separability). We have focused on the Deaton and Stern (1986) treatment since it allows demands to vary with household composition and deals with direct tax tools of some empirical relevance for developing countries – we do see transfers related to household composition but not workable sophisticated non-linear income taxes.

The formal results of the last few years have allowed a better understanding of both indirect taxation and of the balance between direct and indirect taxation than was possible from previous discussions which simply listed some of the things to be borne in mind. Having seen the assumptions which are used in establishing the results we are in a position to see how far they help in analysing the problems of developing countries. In our judgement they are valuable in three ways. First, they train the intuition to understand what is important in an argument about the structure of taxes and thus help in organising practical enquiry and in using empirical results. Second, they help in further research because in modifying the models to be more appropriate for developing countries one has a baseline for building new models and judging results. Third, they lead rather naturally to the theory of reform which allows one to devise practical checks on optimality conditions and on desirable directions of movement. There is no suggestion, here, that formula (5) provides a practical basis for calculating what taxes should be. The model is a benchmark, not a workable description, and the amount of information on the demand structure which would be required could not be available [see Deaton (1987)].

An example of the first concerns the level of the lump-sum grant which emerged in the special model considered by Deaton and Stern as the central redistributive tool. This leads us to ask whether a system of lump-sum grants

related to household structure is possible. In many developing countries one does find some transfers through rationing systems (particularly for food) which are rather like lump-sum grants, the rations being often related to family structure. Where rations are re-saleable, then from the formal point of view they are just like lump-sum transfers (and even if they are not re-saleable they are like lump-sum transfers if the level is lower than total purchases of the commodity). Thus, a prominent feature of an argument concerning whether indirect taxes should be uniform is a judgement concerning the optimality or otherwise of the rations. This judgement can itself be structured since we have an explicit condition for their optimality in terms of the net social marginal utilities of income, the b^h; the average value of these net social marginal utilities in terms of public income should be one (if the average value were greater, for example, the transfer should be increased). With explicit value judgements (the welfare weights β^h), a knowledge of taxes t, and an estimate of the demand system this can be checked [see, for example, the Ahmad and Stern analysis of reform in India, Subsection 3.3]. More generally the results tell us that the inter-relations between different parts of a tax system will be crucial in that the design of one part depends sensitively on the existence of options and the choice of policy elsewhere. Thus, it is of special importance in developing countries to scrutinise carefully the availability of a wide range of instruments and to ask whether those that are used have been appropriately adjusted.

The second class of lessons involves the relaxation of some of the assumptions of the simple model to better describe developing countries. There should be no delusion that one can specify a single model for all developing countries – see Newbery and Stern (1987a) for a collection of models. There are, however, at least two common features of poor countries which should be accommodated. Production often takes place in units which cannot be described adequately by (competitive) firms facing prices distinct from those of consumers and producing under constant returns to scale. Peasant agriculture is an obvious and central example. Furthermore, one cannot reasonably assume that all goods can be taxed. Whilst models which deal with these features in a direct way can be, and have been constructed, it is important to recognise that they do not require us to jettison immediately all of the standard model and its lessons. Thus, for example, if production goes on in the peasant household which faces consumer prices for its purchases and sales then the model is formally unaffected and one simply interprets demands and demand responses as being net of household production. And the optimal tax rules (5), (6) and (7) are first-order conditions for those taxes which can be chosen and thus apply for the subset of taxes which are set optimally.

What does change if either production takes place in households, or there is a restriction on those goods which can be taxed, are the production efficiency theorems. Diamond and Mirrlees (1971) showed that if private production takes

place under perfect competition and constant returns to scale (one need not assume that producer prices are fixed) then aggregate production should be efficient so that marginal rates of transformation should be the same for public and private sectors and public sector shadow prices and private market prices should coincide. One can allow diminishing returns to scale if profits are optimally taxed. If some production is conducted by households facing consumer prices q, whilst firms transact at prices p, then clearly overall production will not be efficient, although the Diamond–Mirrlees analysis shows that production in the public sector and private firms taken together should be efficient. When some goods cannot be taxed then one would want to consider taxing inputs into those goods as a surrogate for taxing final goods [see Stern (1984) and Newbery (1986)]. This would violate efficiency. Where aggregate efficiency is desirable, then goods sold by the public to the private sector should be priced at marginal cost. Notice the difference here between private producers and consumers; for the latter the appropriate price will generally include a tax element over and above marginal cost.

There has been some analysis of restricted taxation in models of the Arrow–Debreu and Diamond–Mirrlees variety, with n goods which are numbered $1, 2, \ldots, n$ and not immediately associated with certain commodities such as corn or manufactures [see, for example, Stiglitz and Dasgupta (1971), or Drèze and Stern (1987) who, in addition, consider rationing and non-market clearing]. However, for the most part studies which attempt to take account of peasant production and restricted taxation deal with models which have an explicit distinction between agricultural and other sectors. Then particular relative prices such as the terms of trade between agriculture and industry and the structure of certain markets, especially that for labour, take a central place. Examples of public policy analysis in such models (often of the dual economy variety) include Dixit (1971), Dixit and Stern (1974), Newbery (1974), Srinivasan and Bhagwati (1975), and a number of chapters in the 1987 volume edited by Newbery and Stern (e.g. Chapters 7 and 13, Newbery; Chapter 15, Heady and Mitra; and Chapter 16, Sah and Stiglitz) which may also be consulted for further references.

The main results from these models continue to have the general form of a trade-off between efficiency and equity [such as (5), (6) and (7)]. For example, the appropriate price for an agricultural input will depend on its marginal social cost of production, the elasticity of net demand and the pattern of use by different types of farmer. Broadly speaking the higher the social cost, the less elastic the demand and the richer the users, the higher should be the price. There are two further specific features which often play a role: the structure of labour markets and any premium on government revenue. Thus, if a tax reduces the rural demand for labour it may have the deleterious effect of increasing migration, where urban wages are fixed. Or it may reduce both urban and rural wages where these are endogenous. Clearly, the calculation of the effects and their welfare

consequences are going to depend on the precise structure of the labour market (see Chapter 11 by Williamson in this Handbook, for some discussion of the evidence).

The shadow value, λ, of government revenue is endogenous in the model of (3) and (4) and does not need separate specification. It will depend, however, inter alia on the revenue requirement $\bar{R}$. In terms of the Lagrangian for the problem $\bar{R}$ plays no explicit role (it comes into the solution, of course, since the constraint must be satisfied) but we can think of a desire for extra revenue being reflected in a higher λ. Thus, one can write government objectives to include a term for government revenue, suppress the constraint containing $\bar{R}$, specify λ and then think of the eventual revenue as being endogenous. Then the weight on revenue can be discussed in terms of λ, and, for example, a government that attached a high value to public investment would have a high λ. In the dynamic context the value of investment is itself endogenous and this is discussed in Subsection 3.5. Generally, as should be obvious, the higher is λ the higher are taxes and the lower subsidies.

The third class of lessons from the standard optimisation models concern their extension to reform. Suppose we start from a given status quo which is not an optimum and try to identify improving directions of reform. We show how such an investigation may be usefully structured. We retain the notation and model of (3) and (4) but no longer assume optimisation. We define:

$$\lambda_i = -\frac{\partial V}{\partial t_i} \bigg/ \frac{\partial R}{\partial t_i} . \tag{8}$$

We can interpret λ_i as the marginal cost in terms of social welfare of raising an extra unit of revenue from increasing the taxation of good i; $-\partial V/\partial t_i$ represents the welfare cost of a unit change, and the inverse of $\partial R/\partial t_i$ tells us the magnitude of the change in t_i required to raise one rupee. What matters for policy then is the relative size of the λ_i, i.e. if $\lambda_i > \lambda_j$, then we increase welfare at constant revenue by increasing the tax on good i and decreasing it on good j (optimality would require λ_i to be independent of i). The analysis places the status quo in a central position and asks: "Given where we are, in what direction should we move?" It seems quite likely (and it is confirmed by our experience) that the type of language involved is more easily understood by the policy-maker than the notion of a large move towards some optimum which may emerge from a model of which he is suspicious. This may be an advantage for the applied worker who is collecting data, although much of his underlying model is the same (but he can assume rather less, see next subsection). We assume here that producer prices are fixed. The assumptions are examined further in Subsection 3.4.

As we shall see (Subsection 3.3) an advantage of this approach is that it uses less information than is required for optimality – essentially we need only "local" information (demand responses around the status quo), rather than the "global" information (a full description of demand functions for all price vectors) required for the analysis of optimality. Furthermore, it allows considerations which are not captured in the model to be set alongside the calculated welfare increase in an appraisal of the costs and benefits of change. This type of discussion is less straightforward when the full optimum is computed since they are not easily integrated into a calculation whose output is a specific set of optimal rates. A disadvantage is that directions only and not step-size are identified. And there will usually be a choice between many welfare-improving directions which, like that for step size, must be taken using criteria outside the model. Examples of relevant considerations might be (i) administrative convenience, e.g. which directions are easily achievable using existing tools or (ii) political acceptability which may limit how far one can go, or (iii) confidence in estimates of the critical parameters working in favour of a particular direction. Such questions are typically ignored in the optimality calculation. The use of expression (8) requires the simple assumptions about production used in the model of (3) and (4) and is discussed further in Subsections 3.4 and 3.6.

The potential from using the simple λ_i notation is illustrated in Ahmad and Stern (1984). We show, for example, how it can be related in practice to Pareto improvements and the calculation of welfare weights, β^h. Thus, either a Pareto improvement is possible or there exists a non-negative set of welfare weights with respect to which the current state of affairs is optimal [see also Guesnerie (1977)]. One can use these welfare weights as a commentary on the status quo (e.g. it could only be considered optimal with respect to an unattractive set of weights), or for use in other policy problems.

The basic theories of public economics can then take us quite a long way in thinking about the problems of developing countries. In the remainder of this section we shall discuss some of the complications and difficulties of extending and applying the theory, before putting together some simple principles and lessons.

3.3. Applied policy models

Applied policy models can have many sectors or just a few and they can be used to study both marginal and non-marginal reform. Each of the four possible cases which arise has its uses and examples are available in the literature. We discuss them briefly in turn.

Policy models with many sectors and for the study of non-marginal changes are often grouped under the heading of computable general equilibrium models (CGEs). It is unnecessary to review these in detail because there are excellent surveys [see, for instance, Shoven (1983) and Shoven and Whalley (1984)], and Chapter 18 by Robinson in this Handbook is devoted to this type of model [for applications see, for example, Dervis, de Melo and Robinson (1982), or for a country case study, Mexico, Kehoe and Serra-Puche (1983)]. Typically production functions are constant elasticity of substitution (CES), factor markets are perfect and preferences are of a fairly standard type (often also CES). The free parameters in the model are chosen so that the national accounts structure fits for a particular base year. Policy variables are then changed and the new equilibrium is re-computed. Household utilities can be compared before and after the change to come to a judgement as to whether the change is beneficial.

This is not the place to discuss these models at length and we shall confine ourselves to some brief comments concerning their use in policy discussion. First, they require a very large number of parameters many or most of which are essentially imposed exogenously. Second, the scope for sensitivity analysis is rather narrow. Thus, one can vary an elasticity of substitution fairly easily but it would generally require a great deal of work to change the structure of a market. Third, and related to the first two points, it is not easy to make an intuitive assessment of the role of crucial assumptions in determining the answers. Thus, they often have a tendency to be used as black boxes with few questions asked as to where answers are coming from. Fourth, the detail they provide on the consumption side is generally rather less than would be required in coming to a judgement about the different types of gainers and losers – typically there may be twenty or so household groups compared with a household survey of five or ten thousand households. Frequently it is the fate of different types of households which is crucial in determining the attractiveness or otherwise of a reform and one cannot characterise in advance just who those households will be. Increasingly the appraisal of taxes is being influenced by analyses utilising the detail at the household level [see Atkinson and Sutherland (1987)].

On the more positive side the models are explicit and they do allow some flexibility. The greater detail in production may pick up important points which might be missed in a more aggregated framework. And the models allow estimation of changes in factor prices. However, some of the detail in the results is spurious in the sense that it is the consequence of fairly arbitrary assumptions and the calculations for a particular industry would be unlikely to substitute for an industry study if some special sectors were at issue.

There are two main advantages of using more aggregated computable applied models. First, it is often possible to gain a good intuitive understanding of how the model works. Second, they can allow optimisation. There are a number of

recent examples of the study of non-marginal changes in such policy models [e.g. Braverman, Hammer and Ahn (1987)]. Heady and Mitra (1987) provide in addition some optimisation. They also show how the model's simple structure can be used to discuss the analytical framework before embarking on computations.

The marginal approach, as described briefly at the end of Subsection 3.2 can be followed in both multi-sectoral and more aggregated models. Its first detailed application was by Ahmad and Stern [e.g. (1984), (1987), and (forthcoming)] in the study of Indian indirect taxes. In order to see what is involved we write out (8), the expression for the marginal social cost of revenue arising from an adjustment of the ith tax (8), more fully:

$$\lambda_i = \frac{\sum_h \beta^h x_i^h}{X_i + t \cdot \dfrac{\partial X}{\partial q_i}}. \tag{9}$$

Intuitively the numerator represents the money cost (x_i^h) to households of a unit price change weighted by the welfare weight β^h and aggregated across households. The denominator measures the response of revenue to the tax change and involves the vector of demand responses $\partial X / \partial q_i$. Note that only the *aggregate* demands and demand responses appear in the denominator. An alternative way of writing (9) is as the distributional characteristic D_i divided by a tax elasticity:

$$\lambda_i = \frac{\rho_i D_i}{\eta_i}, \tag{10}$$

where

$$D_i = \frac{\sum_i \beta^h x_i^h}{X_i}, \quad \rho_i = \frac{t_i X_i}{R} \quad \text{and} \quad \eta_i = \frac{t_i}{R} \frac{\partial R}{\partial t_i}. \tag{11}$$

The distributional characteristic is the sum of the x_i^h weighted by the β^h divided by the unweighted sum, ρ_i is the share of the ith good in tax revenue and η_i is the elasticity of tax revenue w.r.t. the ith specific tax. One may see λ_i therefore as the product of a distributional term and an "efficiency" term since distributional judgements do not enter ρ_i and η_i.

Expression (9) tells us about the data requirements: we need the welfare weights β^h, the consumptions x_i^h, the tax rates t, and the aggregate demand responses. The β^h are the value judgements which can be discussed directly and can be varied to allow for more or less egalitarian viewpoints. The x_i^h come from

household surveys, the demand responses from estimates of consumer demand systems and t is the vector of taxes on final goods (effective taxes). Where the tax data are scattered, classified differently from national accounts commodity categories, and there are many taxes on inputs, then the calculation of the tax rates t can be a major task. For calculations of λ_i see Ahmad and Stern (1984, 1987) on India, and Section 5 below for a discussion of Pakistan.

We now discuss briefly some of the problems of applying and extending the method focusing on demand responses, administration and tax rates. Usually it will be very difficult to estimate cross-price elasticities in any detail in demand analysis. The number of cross-price terms goes up as the square of the number of goods and the number of observations on each price is often small (for example one per year or quarter). Thus, many of the cross-price effects may be imposed by the demand structure selected for estimation. We saw that this can have an important effect in optimality calculations and similar considerations apply to the analysis of reform [see Deaton (1987)]. In the case of reform, sensitivity may be qualitatively less since if we use observed (rather than fitted) values in the numerator of (9) (and for X_i in the denominator) the demand system comes only into the aggregate response terms in the denominator. On the other hand, estimated demand responses for each separate household come into optimising methods since we have to work out consumer demands at a position different from the status quo.

The costs of administration may be formally incorporated into the reform analysis as follows. Suppose that an extra rupee collected via the ith good costs γ_i in administration so that, net $1 - \gamma_i$ is raised. Then to raise one rupee net we have to collect $1/(1 - \gamma_i)$ gross so that the marginal social loss from one rupee net is $\lambda_i/(1 - \gamma_i)$. We would switch a net rupee on the margin from tax i to tax j if

$$\frac{1}{(1 - \gamma_i)}\lambda_i > \frac{1}{(1 - \gamma_j)}\lambda_j \tag{12}$$

or

$$\frac{\lambda_i}{\lambda_j} > \frac{1 - \gamma_i}{1 - \gamma_j}. \tag{13}$$

Although estimates of γ_i and γ_j may not be easy (for example allocation of tax authority expenditures is not straightforward), it may be possible once estimates of λ_i and λ_j have been obtained to come to a judgement as to which side of (13) is the larger. For example, if λ_i/λ_j is 1.5, then if we guess that γ_i is around 0.25 rupees per rupee of gross revenue, then provided γ_j is less than 0.50 we would want to switch on the margin from i to j.

The calculation of the tax element in the price of final goods involves the modelling of tax shifting. This will depend on the detailed structure of the model and we merely indicate some of the considerations which arise. To keep things simple we examine a model with no joint production and constant returns to scale. We suppose now that factors are not subject to indirect taxes and denote their price vector by w. Consider first a closed-economy model. Then under competitive conditions, where $c(\cdot)$ is the unit cost of production,

$$p = c(p, w), \tag{14}$$

where we suppose producers have taxes on inputs rebated (as with VAT). Differentiating we find:

$$\frac{\partial p}{\partial t} = \frac{\partial w}{\partial t} B (I - A)^{-1}, \tag{15}$$

where $\partial p / \partial t$ and $\partial w / \partial t$ are the matrices of price and wage responses to taxes, B is the matrix of factor requirements and A the input–output matrix for goods. Where taxes are not rebated on inputs, so that producers buy at q, then (14) and (15) become:

$$p = c(q, w), \tag{16}$$

$$\frac{\partial p}{\partial t} = A (I - A)^{-1} + \frac{\partial w}{\partial t} B (I - A)^{-1}, \tag{17}$$

$$\frac{\partial q}{\partial t} = (I - A)^{-1} + \frac{\partial w}{\partial t} B (I - A)^{-1}. \tag{18}$$

These equations may readily be extended to the open economy where we have to consider both the matrix of domestic inputs into domestic production, and the matrix of foreign inputs, in the calculation of the effects on domestic prices of a tax change.

Hence, in the competitive model, crucial elements are the rebating or otherwise of taxes on inputs, the openness of the economy and the relations between domestic and foreign commodities (e.g. the patterns of substitutes and complements in production and consumption) and the general equilibrium effects operating through factor prices. For this last aspect CGEs may be useful. For examples of calculations of the tax element in price in simple input–output models for India and Pakistan, see Ahmad and Stern (1986a, 1987).

In the non-competitive model a very broad range of outcomes is possible. This has been studied in the conjectural variations model by Seade (forthcoming) and

Stern (1987b). The results depend critically on the elasticity (F) of the elasticity of demand. If this is high, then tax-shifting is low because a price increase resulting from a cost increase gives a big increase in the elasticity thus dampening the effect of the cost increase. It is easy to produce examples (the case of linear demand) where tax-shifting is less than 100 percent and examples where it is greater (isoelastic demand) – it is above or below 100 percent as F is below or above one. Whilst it may not be practicable, or desirable, to use the conjectural variations model in direct applications, it does illustrate that the range of possibilities can be very wide.

The marginal method is now being applied to some of the more aggregated models [see, for example, Newbery (1987b)]. This allows one to avoid some of the more unsatisfactory assumptions about production and factor markets made in the more detailed framework (although it allows less detail on the consumption side). These assumptions can also be relaxed by using shadow prices, the subject of the next subsection.

3.4. The general theory of reform and shadow prices

The reform analysis discussed in the previous subsection forms part of the more general theory of shadow prices. This has been examined at length in Drèze and Stern (1987) and a detailed discussion will not be provided here (and there is a separate chapter in this Handbook on cost–benefit analysis). Our aim here is to bring out the general principles and show how they provide a unifying framework for much of policy analysis. The treatment is based on Drèze and Stern (1987).

The government is concerned with the selection of certain policy variables, for example, taxes, quotas, or rations. At the initial position some are chosen optimally and the remainder are fixed at predetermined positions – the vector describing the former group is s and the latter group ω. The choice of the (s) for given ω may then be described by the solution of the problem (19):

$$\underset{s}{\text{maximise }} V(s, \omega)$$

subject to $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (19)

$$E(s, \omega) = z,$$

where V is the social welfare function, E net excess demands and z public supply (many components of which may be zero). We suppose the problem is feasible so that the dimension of s is at least as great as that of z. When the two dimensions are exactly equal, then if $E(\cdot)$ is invertible (given ω), s is defined as a function of z and there will essentially be no choice. Thus, the situation where the

policy variables are fully determined and there is no scope for optimisation is a special case of the model. The equality in the constraint in (19) and the assumption that the dimension of s is at least as great as z are not strong assumptions but involve merely the assertion that there is a process by which equilibrium is established and goods are allocated in the economy (it may well be of the non-competitive variety with fixed prices, rationing and so on).

The Lagrangian for (19) is

$$L(s, \omega) = V(s, \omega) - \nu[E(s, \omega) - z],\tag{20}$$

where ν is the vector of shadow prices. The shadow price of a good is *defined* as the increase in the value of the social welfare function when an extra unit of public supplies becomes available, and it is a standard result that it will equal ν in (20) (whether or not the model is fully determined). Thus, the increment in social welfare from a given project dz (at constant ω but with s endogenous), from the definition of ν, is ν dz.

The first-order conditions for a maximum in (19) are

$$\frac{\partial V}{\partial s} - \nu\frac{\partial E}{\partial s} = 0.\tag{21}$$

A reform is a change dω in the variables ω which had previously been seen as predetermined. In order to satisfy the constraints we must have:

$$\frac{\partial E}{\partial \omega}d\omega - \frac{\partial E}{\partial s}ds = 0.\tag{22}$$

Using (21) and (22) we have:

$$dV = \left(\frac{\partial V}{\partial \omega} - \nu\frac{\partial E}{\partial \omega}\right)d\omega.\tag{23}$$

This is the general result on policy reform. It tells us that the welfare impact of a reform is given by the direct effect on social welfare less the cost of the extra net demands at shadow prices $\nu\,\partial E/\partial\omega$. This is a unifying principle which underlies very many discussions of policy change. It is at one level simple and obvious but it often seems to be imperfectly understood.

The model (19) and the derivation of (23) we have used makes it very clear that the shadow prices will depend critically on how equilibrium is re-established after a change in z or ω, i.e. they will be different for different specifications of the endogenous variables s. For example, we can think of a change in net demands of an imported good (whose world price is fixed) from a parameter change being

satisfied by extra imports with no price change or by rationed imports with an increase in the domestic price. In the former case it is the net imports that form part of *s* and in the latter case the price. The general equilibrium effect on social welfare will be different, and thus so too will be the shadow prices.

The marginal analysis of the preceding section can readily be seen as a special case of (23). The details are not provided here [see Stern (1987a)] but one way of expressing the generalisation provided by (23) for the case where indirect taxes are to be reformed is through

$$\lambda^\nu_i = - \frac{\partial V}{\partial t_i} \bigg/ \frac{\partial R_\nu}{\partial t_i} , \tag{24}$$

where R_ν is *shadow* revenue, i.e. government revenue where we treat $q - \nu$ as shadow consumption taxes and $(\nu - p)$ as shadow production taxes. When $\nu = p$, shadow and producer prices coincide, and we are back with λ_i and (10). One can also write

$$dV = \left[\frac{\partial V}{\partial t} + \frac{\partial}{\partial t}(t \cdot X) + (p - \nu)\frac{\partial X}{\partial t} \right] dt \tag{25}$$

(where the derivatives are taken for constant p) so that in addition to the welfare and revenue effects [the first two terms on the r.h.s. of (25)] we have an additional shadow revenue term arising from the difference between shadow and producer prices.

There are many economies where shadow prices have been calculated. We have seen here that their use is not confined to project appraisal but applies also to the analysis of policy reform in general. Care should be taken, however, to ensure consistency of the models used in the reform discussion and those used to calculate shadow prices.

The shadow prices capture a great deal of information, essentially the full general equilibrium effects on welfare of a policy change. In principle they should be derived from a fully articulated general equilibrium model and one could argue that if such a model is available then welfare effects of policy changes can be calculated directly. However, in many cases the set of shadow prices will be a tool which is more flexible, reliable, less demanding and more easily understood than the full model. They provide sufficient statistics for policy from the full model and can be discussed directly. And one supposes that corresponding to any plausible set of shadow prices one could construct a general equilibrium model and welfare judgements which would be consistent with the shadow prices. Hence, for example, if one argued that population growth, and better labour market policies were likely to bring about a substantial reduction in the shadow

wage, one could then examine fairly rapidly the consequences for tax policy. On the other hand it may involve a great deal of effort to redesign a large model (if such already exists) to take account of the changed assumptions. At the same time one hopes that (or should try to check that) variations of assumptions in one area do not produce huge changes in the whole shadow price vector otherwise the credibility of the approach would be undermined (although such a situation would be likely to make any approach perilous).

3.5. Dynamic assumptions

The theories described so far have had n goods and time has not appeared explicitly. We now ask how they can be reinterpreted in a dynamic context and what extensions or modifications would be desirable [for a more detailed discussion of the issues raised see Newbery and Stern (1987b)]. The familiar Arrow–Debreu model of general equilibrium which underlies the standard models presented in Subsection 3.2 can be interpreted in the usual way as a full intertemporal model provided all goods are distinguished by their date of availability. Thus, if there are N physically different goods and T periods, there will be NT markets (a similar interpretation in terms of uncertainty and different states of nature is also possible). The standard results in welfare economics relating competitive equilibrium to Pareto efficiency then apply (and one can extend this to infinite horizons provided one adds an assumption about asymptotic behaviour to rule out over-saving). Similarly, the Diamond and Mirrlees taxation model can be applied to this framework too. Thus, consumers maximise utility, defined over the indefinite future, with knowledge of future consumer prices and incomes and make commitments for supplies of services and purchase of goods. Producers maximise the present value of profits at the producer prices which they face. The Ramsey taxes which are the difference between consumer and producer prices then define a tax system over the indefinite future. All producers face the same interest rates, profits taxation applies to present values and is not based on period-by-period returns, and savings would in general be taxed (producer and consumer prices will differ) to raise revenue and improve the intertemporal and interpersonal distribution of income.

The model is a useful point of reference but raises a number of basic difficulties for applied policy analysis for developing countries, many of which apply to analyses for developed countries also, and examples of which follow. First, many of the postulated markets do not exist. Second, it is difficult to separate savings and investment decisions (and thus consumer and producer intertemporal prices) for a large fraction of the private sector. For example, many or most business startups are financed out of individual savings [see Little, Mazumdar and Page (1984)]. This problem arises in part from lack of markets

but also has to do with the poor development of financial intermediaries, asymmetric perceptions or information (the bank may not share my view of my chances of success) and costs of enforcing arrangements in an informal sector. Third, the kind of dynamic optimisation by individuals and firms which is assumed is implausible for individuals who may have a hazy vision of the future and ill-formed and complex preferences over future outcomes. This is not to say that they are irrational but that the detailed dynamic optimisation model with unrestricted trading possibilities may not have an overwhelming claim as the appropriate representation of their behaviour. There is no doubt that all these problems arise in some shape or form in the static model but they are particularly pervasive and severe in the dynamic context. There has not in our judgement been great success in the literature in integrating these features into a dynamic tax analysis, but we shall discuss below some models which are specifically designed for a dynamic context.

Furthermore, there are particular features and difficulties which arise when we move to dynamic problems. For example, there may be incentives to renege on previous commitments or announced policies (sometimes called "dynamic inconsistency"). Second, the open-endedness of the economy can lead to problems of dynamic inefficiency of the kind which do not arise in a static economy (e.g. it is easy to write down growth problems where no optimum exists, essentially because there appear to be grounds in the model for postponing consumption indefinitely). Third, there are problems associated with how individuals are forced to observe budget constraints (there have to be mechanisms to prevent build-up of debt in circumstances where individuals can promise to pay later). Fourth, in models of overlapping generations transfers between generations can produce types of inefficiency which do not arise in static problems (e.g. if each generation is endowed with a chocolate then the first generation can be made better off by each generation passing a chocolate forward whilst none of the others is worse off). One has to look carefully at how resources can be transferred.

Of the problems special to dynamic economics perhaps the one which has received most attention in the policy literature is that of "dynamic consistency". The issue was raised by Kydland and Prescott (1977) and a clear description in the tax policy context is provided in Fischer (1980). The idea is that the future tax policy announced by the government last period will no longer be optimal when it comes to implementation this period not because the future has developed in an unexpected way, but because the passage of time makes certain disincentives now irrelevant. Thus, last period the government may have announced that capital taxation in the second (now current) period would be low in order to encourage accumulation. In the second period the government may then simply announce a capital levy. This is a lump-sum tax with no distortionary implications and, ex post, is the best way to raise second-period revenue. The

argument is persuasive if the second period is the last one. However, things are more complicated if the economy is open-ended, for then government which has made a capital levy in the past may not be believed if it promises not to do it again in the future, so that the second period capital levy ceases to be lump-sum and has its own distortionary aspect.

Examples of the problem arise with amnesties for tax evaders. These are sometimes announced as one-off chances to "come clean" with very lenient penalties if evasion is revealed before a certain date but very severe penalties if evasion is subsequently discovered. If the evader believes this then he may be tempted to reveal, and the subsequent very severe penalties will become redundant and need not be used. However, if the taxpayers see this happen once they may be very tempted to evade subsequently.

The discussion of practical policy towards taxation in developing countries has avoided the more esoteric modelling problems and has expressed the dynamic issues in terms of broader or more aggregated concepts such as savings, investment and growth. Much of the early post-war literature on development [see, for example, Lewis (1954)] placed the rate of growth at the centre of the stage and many authors have singled out government concern, and perceived responsibility, for raising the rate of growth as a major distinguishing feature of public finance in developing countries [e.g. Prest (1972), Eshag (1983) and Goode (1984)]. Developed countries may worry about the growth rate too but often greater emphasis is placed on the rate of technical progress than on savings and investment per se. And the experience of developing countries in the 30 years since Lewis was writing tells us that raising the savings rate is not necessarily a sufficient condition for rapid growth [for example, India and many other developing countries have savings and investment rates between 18 and 25 percent in common with most of the industrial market economies – see World Bank (1984)].

If the growth objective is firmly adopted then governments should take careful account of the effects of its policies on saving and the level and productivity of investment. Policies for the encouragement of savings and investment include favourable tax treatment of saving, promotion of financial institutions and interest rate policy. One would like to examine these policies in the consequentialist manner by first predicting their outcomes and then evaluating the changes. A major problem is that the elasticities of response are very hard to judge. This applies to both savings and investment.

There has been a considerable recent literature on modelling and estimating savings responses in developed countries. A useful survey is provided by King (1985) who argues that one often finds that life-cycle models are consistent with behaviour for 70–75 percent of the population but not for the remaining 20–25 percent, and one may suggest that for this minority credit constraints may be important. Whilst the data underlying these studies are very rich compared to those available for developing countries, the researchers have not found it easy to

pick up the response of savings to post-tax returns, an aspect which is crucial for the design of tax policy. The lessons for developing countries of these studies may be as follows. First, the 20–25 percent for whom life-cycle models are inappropriate may be much larger in developing countries where financial markets are less well-developed. Second, it is unlikely to be possible given current data to establish an interest elasticity of saving for developing countries. In the meantime policy has to be formulated and it seems sensible to avoid losing substantial amounts of tax revenue in schemes for the promotion of savings whose net effect may be very obscure. Furthermore, one should try to avoid creating tax anomalies which may arise from special treatment of different kinds of savings since they can lose tax revenue and redistribute income in favour of the more rich and knowledgeable, and may have little further effect other than the rearrangement of some portfolios.

There have been a number of applied policy models focused on taxation and savings for developed countries but they will not be reviewed in detail here [for recent discussions see Chamley (1983), Kotlikoff (1984) and Newbery and Stern (1987b)]. In most of the models, however detailed, the interest elasticity is a crucial variable yet it is one on which we have little reliable in the way of estimates [see, for example, Gersovitz's chapter on savings in this Handbook (Chapter 10) or Giovannini (1985)]. The policy simulations have often been concerned with switches from income to consumption-based taxes and a central issue has been the effect on capital accumulation via saving.

The base of taxation has also been discussed in overlapping generations models which are in the same spirit as the Diamond–Mirrlees standard model of taxation in Subsection 3.2 [see Atkinson and Sandmo (1980) and King (1980)]. The relevant goods in the utility function are, for example, consumption in two periods and labour supply in one (if the second period is retirement). With separability of consumption from labour one can show (analogous to the results in the static model of Subsection 3.1) that taxation of consumption in the two periods should be uniform and one can interpret this as a proportional expenditure tax in the two periods. However, with labour supply in more than one period, or without separability, the result does not hold and thus one can conclude that there is no strong theoretical argument for an expenditure tax. More recent advocacy of such taxes has been on practical grounds and, in particular, that it removes the distinction between capital and income, a common basis of tax dodges and anomalies [see, for example, Meade (1978) and Kay and King (1986)]. These suggested practical advantages have not impressed themselves on many governments, at least not to the point of actually introducing it. An unfortunate example which still reinforces such hesitancy was the Indian experience when in the 1950s an expenditure tax was introduced on the advice of Kaldor, but raised negligible revenue and much protest and was very quickly withdrawn.

Our conclusion from this brief discussion of dynamic issues is that similar principles to the static analysis can be applied but that our present state of knowledge of response is not firmly based. Nevertheless, a concern to promote saving and growth can be embodied in the techniques which we used to guide public policy. Thus, for example, a premium on savings can be incorporated in shadow prices [see, for example, Little and Mirrlees (1974) and Drèze and Stern (1987)]. One should try to discover the consequences of proposed reforms for savings but be circumspect about confident claims for the likely effects of special tax concessions. There is no convincing theoretical argument in favour of expenditure rather than income taxes, although one should be aware of revenue losses associated with separate treatment of capital and income. On the investment side promising areas for study of the dynamic effects of public policy are the potential of financial markets in supplying credit more easily, constraints on investment associated with infrastructure such as water and electricity supplies, and the pricing of public sector enterprises. Thus, there may well be substantial scope for promoting the profitability of investments in ways which do not involve big tax concessions. Arguments for tax concessions should be examined rather carefully to check that any claimed response is likely to be present. Otherwise the concessions may simply act as a transfer payment. It should be emphasised that there is no assertion here that we should assume from our lack of knowledge that savings and investment actually are inelastic. Our ignorance should make us cautious and we should not therefore tax investment heavily on the dubious grounds that we "may as well assume" it is interest inelastic. At the same time the static analysis of taxes implicitly assumes that there are no strong intertemporal linkages particular to certain goods which are sufficiently large to change the whole picture.

3.6. Taxes and production

One of the most striking contrasts between discussions of public economics for developed and for developing countries lies in the treatment of taxes and production. The concentration in the theory for developed countries has been on government revenue, on the allocation of consumption and on factor supply, issues which are within the spirit of the standard model of Subsection 3.2. The assumption of fixed producer prices is common. On the other hand, in the study of developing countries great attention has been focused on the incentives facing producers in terms of the effects of government policies on the prices they face – these considerations lie at the heart of discussions of effective protection, shadow prices and so on. Thus, many have argued that the consequences of government policy, particularly concerning taxes, in developing countries have been the wrong pattern of outputs, whereas in developed countries criticism is

often focussed on the alleged curtailment of incentives for factor supply and on the distributive effects on different types of household.

The basic principles of the normative analysis of policy reform when shadow prices are not equal to producer prices are provided in Subsection 3.4. One calculates the direct effect on households of a policy change and then adjusts this for the value at shadow prices of the net changes in excess demand associated with the direct effects in order to pick up the general equilibrium repercussions of the change. It is interesting to contrast this approach with discussions based on effective protection, a very popular applied tool used in discussions of tariffs and the pattern of production [see the *Journal of International Economics* symposium (1983), where a number of aspects of effective protection are examined]. The first point to note is that the rate of effective protection, defined as the value added at domestic prices less that at world prices (as a proportion of value added at world prices) is not a normative concept but an attempt to describe what happens to value added in different industries as a result of tariffs. It is often rapidly transformed into a normative statement with the suggestion that resources should be transferred to sectors with a lower effective rate of protection from those with a higher.

As a normative suggestion concerning resource movements the argument is unsatisfactory. First, it takes no account of possible divergences between market prices and social opportunity costs (or shadow prices) for non-traded and factor inputs. Once proper account is taken of the former we have domestic resource cost (or DRC) calculations and the further step of treating the social opportunity cost of factors carefully takes us to a system of shadow prices. Second, the adjustment prescription based on effective protection takes no account of the scale of movement. If coefficients for non-factor inputs are fixed it would appear to tell us to transfer an indefinite amount into the activity with the lowest effective protective rate. Third, one cannot in general argue that when there is substitution amongst inputs and factors that resource flows follow the direction indicated by rates of effective protection; thus the effect of a tariff structure may be to direct resources to an industry with a lower rate of effective protection [see Dixit and Norman (1980, ch. 5)]. Fourth, the question as to why one might want to protect is not put. Whilst the arguments for protection are often spurious one should not assume that they always are.

Effective protection calculations are also often used in discussions of tariff reform in that it is suggested that tariffs should be adjusted to make lower the effective protection rates for industries with higher rates of protection. Again this is unsatisfactory. There is nothing to suggest that uniform effective protection rates have any general optimality properties. As we argued in the previous section, in the absence of lump-sum taxes a government concerned with incentives and distribution should in an open-economy competitive world have taxes on final sales only, irrespective of origin. Thus, there would be no tariffs or any

other taxes affecting relative producer prices. And the taxes on final sales would not usually be uniform. One would require an articulated model with a careful statement concerning constraints on policies to justify any assertion that uniform effective rates of protection are optimal and it is very unclear how such an argument could be constructed.

The main advantage of calculations of effective rates of protection lies in reminding policy-makers that their actions affect not only output prices but also input costs and in making some of these effects explicit. As we have argued, however, they are unreliable guides to policy reform. The central notion in the area is that of shadow prices and greater use of this concept outside the area of project appraisal could be valuable.

The analysis of tax reform which incorporates an account of production and general equilibrium when producer prices and shadow prices are unequal would essentially add an extra term to an analysis of costs and benefits of tax reform as we saw in eq. (25). Thus, in addition to revenue and direct effects on household welfare one takes account of the losses associated with any shift in demand towards industries with shadow prices higher than producer prices, i.e. one subtracts $(\nu - p)\Delta X$ corresponding to a demand shift ΔX arising from the tax reform. This is a suggestion which should apply to policy reform for both developed and less developed countries. We find the general assumption that producer prices are equal to shadow prices for developed countries a little surprising. Is it true, for example, that the labour market clears under conditions of perfect competition? Are there tariffs? Does the pricing policy for major inputs to production such as electricity, oil, transport and so on, avoid either implicit taxes or subsidies and reflect social marginal costs? Are all final goods taxed and are the rates optimally set? If the answer to such questions is negative, then one must take seriously the possibility that producer and shadow prices do not coincide.

3.7. The taxation of income and profits

The analysis of Section 3 has, to this point, been mainly theoretical. We have been trying to assemble what theory has to offer in the provision of methods of applied policy analysis and in the formulation of principles for the setting of policy and by which it may be judged. In the remainder of Section 3 we shall draw this analysis together in a discussion of particular taxes and in a set of guidelines or principles which summarise some of the lessons of the theory. In so doing we must bring to the centre of the stage some of the practical difficulties which governments and tax authorities face, some of which have been discussed at the end of Section 2. We begin with income and profits taxes. From the point of view of a theory which sees changes in welfare in terms of effects on

households the corporation tax has a limited role. In the class of models considered in Subsection 3.1 the pure profits tax should in general be used where possible (assuming owners of firms do not have very high net social marginal utilities of income) but a corporation tax does not otherwise appear in the models unless one considers it as, in part, a tax on entrepreneurial or capital services provided by households. In answering the question, however, why there should be a corporation tax within the type of theory we have been examining one can point to four possible responses. First, it acts in part as a tax on monopoly rents or pure profits. Second, it provides a way of taxing foreign owners. Third, it may help in policies designed to promote savings or investment. Fourth, because it is already there in the sense that its removal would provide a windfall gain to groups which are far from impoverished. All of these arguments apply to both developed and developing countries but they may well be stronger in the latter case. Hence, the more prominent role of the corporation tax, relative to the personal income tax, in developing countries is not without foundation in the principles we have been discussing. Perhaps the most important reason, however, for taxing corporations is as a means of collection of taxes on personal incomes. As we have already noted, this applies to foreign owners but it applies to domestic owners too where the system of domestic personal income taxation is weak and easily evaded, particularly by the owners of corporations who, we suppose, are not usually amongst the poorest of the population.

The form of the corporation tax can vary greatly depending on its treatment of distributed and undistributed profits, depreciation allowances, inflation, interest payments, and so on. Profits can also be manipulated by multi-nationals through transfer-pricing, e.g. inflating the costs of certain inputs, or deflating output prices to depress measured profits in countries where profits taxation is high. These complications require careful scrutiny in the examination of policy for a particular country.

Theoretical and empirical research on the corporation tax is even less easy to present in a coherent and integrated form than it is for other taxes, partly because it sits somewhat unhappily in the economic theory of tax policy. Discussion has focused on a number of issues concerning the possible effects of the tax rather than on attempting to construct a theory of policy design. Furthermore, the effects of the tax are rather difficult to quantify both theoretically and empirically. Thus, concentration has often been on the incentives and disincentives associated with different systems rather than the explicit modelling of the full effects of these incentives. Most of the work has been for developed countries although, as ever, the issues apply to developing countries too. However, in the latter case one suspects that the immediate problems are more in devising ways to actually collect revenue rather than fine tuning. This should not, however, lead us to ignore the possible effects on the level and allocation of investment and saving. The revenue from the corporation tax is likely to grow

over time as more advanced sectors develop and it is important to have a sensible system in advance. It is surely possible to learn from the experience of developed countries where, for example in the United Kingdom the corporate tax system has grown as a series of rather ad hoc responses to short-term pressures [see Kay and King (1986)].

We shall describe very briefly some of the prominent issues in the literature on the corporation tax and then point to possible lessons for tax design. One of the major themes has been the differential treatment of distributed and undistributed profits together with the returns to and choices between different forms of finance. With the *classical* system, for example, the corporation tax applies (usually at a flat proportional rate) on all profits whether distributed or undistributed, together with a personal income tax on the dividends. Thus, dividends are taxed at a higher rate than undistributed profits. In this sense there is a "discrimination" in favour of retentions. Undistributed profits, it is true, may be taxed via a capital gains tax, if it exists, but this is usually at a lower rate than personal income taxes. Furthermore, it is often haphazardly collected, raising very little revenue.

Under this classical system there is a bias in favour of loan finance as against raising money from new share issues. Interest payments are deductible for corporation tax purposes so that a project which yields a return above the rate of interest will generate a surplus for the shareholders if it is financed by a loan (assuming all costs are properly charged including depreciation). In this sense the corporation tax treats loan-financed investment in a neutral way. On the other hand, a project financed out of a new share issue is financed by a promise to pay dividends (as opposed to interest). Dividends are not an allowable cost for corporation tax purposes so that the required return on the company's investment now exceeds the rate of interest.

Finance out of retained profits is more complicated. If a firm retains profits rather than paying out dividends, then the shareholder forgoes the net-of-tax dividends. The company invests this amount gross-of-tax. If it retains the proceeds from the investment, then from the point of view of the net returns to the individual shareholder, these are taxed at the corporation tax rate plus the capital gains tax rate. If this latter combined rate exceeds the personal income tax rate, then the required rate of return again exceeds the rate of interest. Thus, whether there is also a bias against retained earnings (relative to loan finance) depends on the personal tax position of the shareholder. If corporate taxes are collected more effectively than the personal income tax we would indeed expect this bias to be present.

The other major form of the corporate income tax in practice is the *imputation* system. Tax withheld on dividends is credited against the corporate tax at a rate known as the *imputation* rate. If the imputation rate is equal to the individual shareholder's personal marginal rate then that is the end of the matter. Otherwise there will be extra tax to pay by the individual if the imputation rate is lower

than the marginal rate (and a refund if higher). This system reduces the bias in favour of loan versus equity finance but it is still present provided the imputation rate is lower than the corporate rate (if the former is 30 percent and the latter 50 percent, then £100 in gross dividends reduces corporate tax liability by £30, whereas £100 in interest by £50). The classical system operates in the United States and several other developed and developing countries, whereas the imputation system applies in the United Kingdom and several Commonwealth countries.

The discussion makes it clear that the relation between the rate of return on an investment gross-of-tax and the return to savers will be a very intricate one depending on many things, including the form of finance, the corporate tax system, the personal income tax system, the tax status of the saver, the tax treatment of the particular kind of asset, and so on. In these circumstances the task of describing the tax system in terms of the "wedge" placed between the gross and net-of-tax rate of return is formidable, leaving aside any attempt to work out the allocative consequences of such wedges in terms of the response by individuals to the different incentives and the general equilibrium ramifications of these responses. For further discussion of the implications of different forms of corporation tax, along the lines presented above, see, for example, Kay and King (1986) and King (1977). Calculations of the different tax wedges for different forms of asset, finance, and individual for the United States, the United Kingdom, Sweden and West Germany are presented in King and Fullerton (1984). They show that within a country the range of tax wedges is very large. It also varies considerably across countries with pre- and post-tax rates of return being on average very close for the United Kingdom, and the latter being half the former, an average, for West Germany.

Notwithstanding the difficulties of describing the system, there have been a number of calculations of the welfare losses associated with the tax wedge following the work of Harberger in 1962 [reprinted in Harberger (1974)] – see, for example, McLure (1975) and Shoven and Whalley (1972). The assumptions involved are highly restrictive even for developed countries and according to Goode (1984, p. 116), have little influence or relevance for developing countries. It is nevertheless important to try to understand the likely important determinants of the incidence of corporation tax. This is often referred to as "the shifting of the corporation tax", although the term is ambiguous as it is sometimes taken to mean the effect on prices and sometimes the ultimate incidence in terms of its effect on households [see King (1977, p. 248)]. In particular, Diamond (1970) has looked at the incidence of property taxes in a growth model. Perhaps the most important influence on incidence, however, is the openness of the economy as Goode (1984), King (1977) and Gil Diaz (1987) all emphasise. Gil Diaz (1987) in particular provides a valuable practical example in his evaluation of Mexico's recent tax reform (1978–82) where he argues that post-tax rates of return in Mexico cannot fall below the pre-tax rates in the United States for

those Mexicans who cannot be prevented from having access to these U.S. investment opportunities. Hence, taxes on capital income are borne in large part by those credit users without access to international markets.

Another interesting recent discussion of the role of corporation tax has been Gersovitz (1987), who examined the effects of such taxes on foreign private investment. These effects turn out to be very complex depending on many factors including the tax agreements and treatments of host and home countries, the likelihood of expropriation, the potential for transfer pricing, and so on.

In such an intricate, and rather messy, problem one cannot expect to be able to provide a synthesis of the basic determinants of optimal policy in the manner attempted for indirect taxes. King's response (1977, p. 249), is to seek criteria of neutrality or ask that the system be non-distortionary. Thus, for example, it is suggested that, unless there is special reason it should not distinguish amongst different forms of finance or amongst different forms of assets. Possibilities are (i) a classical system without deductibility of interest payments, together with capital gains taxed at full personal rates; (ii) full integration of corporate and personal income taxation (with deductibility of interest); or (iii) a cash flow corporation tax (where the flow excludes financial transactions). Space limitations prevent further detail here but it should be clear that the merits of any particular system will depend on what is possible in practice in the country under study.

A corporate tax system which does not distort will, in general, act like a government shareholding in the firm, if losses are fully off-set, since the government takes a given fraction (the tax rate) of the gains and losses from any project. This sharing of risks between public and private sector may encourage risk-taking.

Special incentives for investment are very popular in developing countries. Amongst these, tax holidays are particularly popular [see, for example, Shah and Toye (1979)]. However, as Gersovitz (1987) points out, there are a number of problems and abuses which may lead simply to a loss of tax revenue without any corresponding increase in investment. And any tax bonus for investment should be very carefully justified. Are there externalities to investment which are not reflected in market prices? If so, perhaps taxation or subsidy policy should be focused directly on those prices which are supposed to be wrong. Is the tax incentive proposed compensating for some alleged disincentive elsewhere in the tax system of the kind we have been discussing? If so, then perhaps it is the disincentive which should be tackled directly. Or is it being argued that for reasons of inter-temporal allocation (e.g. future generations being under-represented) the tax wedge should be negative rather than positive? Again, the position is unclear. Too often, it is taken as obvious that special tax incentives for investment are needed. The evidence that they have much incentive effect is scanty and it is likely that revenue losses are substantial.

Our conclusions from the somewhat messy state of the subject are that the guiding principles should probably be simplicity, practicality and neutrality. Complex provisions without clear rationale should be discarded, particularly where they lose revenue. Special treatment for particular industries should be viewed with suspicion. Allowable deductions should be scrutinised very carefully. Finally, we would suggest that the withholding of tax on dividends is likely to be a practical way of actually collecting the revenue.

As we have seen, the theory of the optimal personal income tax is rather better developed than that of the optimal corporate tax. However, it probably has limited applicability to developing countries where the coverage of the income tax is usually limited. Nevertheless, like the corporate income tax, it has potential for the future and one should think ahead. Again it is sensible to focus on simplicity and practicality in designing policy.

One area where theory and practicality come together concerns transfers where distributive objectives can be effectively pursued by direct transfers to the poorest. The personal income tax is not a useful tool for protecting the poorest. How far it is a useful tool for redistribution by taxing the rich is largely a question of coverage and enforcement. Here, as broad a base as possible, together with moderate marginal rates, probably provides the best marriage between theoretical and administrative considerations. There is no general theoretical argument for anything other than a broad base. Permissible allowances should be confined to aspects of horizontal equity, principally concerned with family structure. Non-cash fringe benefits such as housing, cars and education should, as far as possible, be included. A broad base provides scope for lower rates and we find that calculations of optimal taxes in which redistribution and incentives are traded off do not provide arguments for very high rates [see, for example, Mirrlees (1971) and Stern (1976)]. It is often argued that very high rates encourage evasion so that theory and administration, in this case, point the same way. As with the taxation of dividends, the withholding of tax at source for all types of income is an important tool for collection.

The exemption level for the personal income tax involves balancing redistribution, revenue and administration. A low exemption level is likely to bring more potential taxpayers into the tax net than might be managed by the revenue authorities. On the other hand, high exemption levels lose revenue and may be seen as unfair. There is no general rule but often governments in developing countries seem to err on the side of generosity. This may be understandable where administrative resources are scarce but it may be desirable in some cases to let these exemption levels increase less fast than money GNP per capita so that over time a greater proportion of the population is brought into the income tax net. In this way one can provide for a growing role of the personal income tax.

We have seen in Section 3 that theory has quite a lot to say about the optimal balance between income and indirect taxes. The crucial elements are (i) the

sources of differences between households, (ii) the structure of preferences, and (iii) the form of the available income tax. We saw, in particular, how one could check the requirement in this theory that an optimal uniform lump-sum transfer was in operation – one compares the social marginal cost of a rupee of revenue spent on such a transfer with the social marginal cost of raising it through indirect taxes. If the former is higher, then indirect taxes should be increased to finance an increase in the transfer. In Ahmad and Stern (1987) we carry out such a calculation for India and find that for most reasonable value judgements the lump-sum transfer would appear to be too low. This is hardly surprising since the element of transfer for many households would be negligible. We also carry out a comparison between the welfare costs of raising revenue from higher income tax payers and from indirect taxes and find that the former is preferable under most value judgements.

There are, however, major problems with this type of calculation. First, one would normally be forced to leave out of account factor supply responses. These are imperfectly understood for developed countries notwithstanding the great amount of econometric work on rich data sets [see, for example, Hausman (1981)]. There are few data sets in developing countries which would permit such exercises, and even those that exist might not provide answers. Second, they require an assessment of the incidence of changes in the income taxes or transfers. If the food-ration system were to be expanded, would this really be a transfer to each household or would just a few benefit? If so, whom? Similarly we have to ask about the pattern of extra payments if rates for upper income groups are changed. Third, one has to consider administration costs. It should be emphasised, however, that these are not problems special to the marginal or non-marginal techniques we have been examining. They would arise in any serious attempt to examine possible changes.

It is probably reasonable to suggest that the relatively small role for the income tax in developing countries can be attributed to costs of administration rather than judgements about items (i)–(iii) listed above. Nevertheless as the economies grow, the population becomes better educated, and accounting more widespread, one may suppose that the income tax will play an increasing role and one should think carefully how to structure the tax system to take advantage of the potential for growth. An advantage of the theory is that it points to tax tools and to comparisons which might otherwise be missed – for example, the central role of lump-sum transfers or taxes linked to household characteristics.

3.8. Indirect taxation

Indirect taxation can take a number of different forms. We briefly discuss three here: tariffs (and quotas), domestic excises, sales taxes and VAT. In general, trade

quotas are inferior to tariffs. One could improve on a quota/licence system by auctioning the licences and the auction price is then the equivalent of a tariff – the value of the quota licence goes to the government rather than the firm getting the licence. Furthermore, one can argue that tariffs are inferior to taxes (sales taxes or VAT) on final consumption goods, whether domestically produced or imported, since tariffs distort the allocation of resources in favour of the domestic production of the good under tariff [see Dixit (1985)]. More formally one can show that if lump-sum taxes are impossible, then the optimal indirect tax system (with respect to a welfare function embodying both incentives and distribution) in an open economy is to have taxes on final sales, a sales tax for short – this is essentially an application of the Diamond and Mirrlees (1971) efficiency theorem, and see Dixit and Norman (1980, ch. 6), for an explicit formal argument. A tariff plus an equal excise on domestic production would have the same effect as a sales tax, for goods which are for final consumption only.

Arguments in favour of tariffs as against sales taxes would then be associated with administration or with the desire to protect a particular domestic industry. No doubt the administrative considerations are of substance but it is important for revenue growth over time to build up an efficient internal tax administration and to encourage formal accounting, so that one would not want to hold fast to an administrative argument in favour of tariffs over the indefinite future. The protection argument would have to be examined directly in terms of the particular industry, whether it was likely to grow or whether it should grow, whether or not there were better ways of encouragement than the tariff and so on. It seems that some of the more recent theories of international trade without the (perfectly) competitive assumption have added arguments for protection although not all the theorists would want to emphasise this point [see, for example, Dixit (1984) and Helpman and Krugman (1985)]. For example, as Dixit (1984, p. 14) puts it, there is the "possibility that a partly countervailing duty may be desirable when a foreign country subsidises exports". On the other hand, if oligopoly is associated with increasing returns to scale, then there are potential gains from specialisation which are not included in the standard model of gains from trade.

Our last comparisons will be amongst domestic excises, sales taxes and the VAT. Excises on domestically produced goods distort production in an analogous manner to tariffs – this time in the opposite direction. If coupled with a tariff they have the effect of a sales tax if the good is for final consumption. Distortions arise, however, if the good concerned is also an input into production. Domestic excises, as with tariffs, may lead to unintended consequences. For example, in our calculation of effective taxes in India we found [see Ahmad and Stern (1987)] that some goods for which the government offered subsidies (e.g. khadi and handloom cloth) were in fact taxed if one took into account taxes on inputs, and the particular culprit was domestic excises. As with tariffs the main argument for domestic excises would appear to be administration. It is interesting to note that

in India the revenue from domestic excises has overtaken that from tariffs as the productive base of the economy has expanded (see Section 2) as in the story told by Hinrichs (1966). In the Indian case an important element is also the federal structure. Excises on production are the preserve of the centre whereas sales taxes are generally in the hands of the states.

The most attractive taxes from the point of view of theory are the final point sales tax and the VAT. The former has the advantage that it need involve only the final sale. Thus, firms throughout the economy are not involved as they are with VAT. A disadvantage with this sales tax is that the final stage has to be identified and this can lead to much evasion. However, many countries, e.g. India, have had some success in levying a sales tax at the wholesale stage. The VAT has been introduced in a number of countries in recent years, Tanzi (1987) noted 22 developing countries, stimulated in part perhaps by its extensive use in the European Community. It has the advantage of the in-built checking system whereby buyers have an incentive to reveal the purchase (in order to get credit for tax paid on inputs) thus discouraging concealment by a seller. Furthermore, VAT can be applied to services as well as goods since it does not require the specification of a unit of output (although a sales tax could be extended in this way too). It is also straightforward to rebate VAT on exports. A major disadvantage is that it involves everyone in the production chain thus imposing a substantial administrative cost both on the authorities and the enterprises.

One advantage that should *not* be claimed for the VAT is uniformity. There is nothing in the logic of a VAT to require uniformity and neither, as we have seen, is uniformity generally a desirable property of an indirect tax system.

This discussion therefore suggests a fairly clear strategy for indirect taxes. This consists of a replacement of trade taxes by taxes on final goods. These taxes should be differentiated to take account of the distributional pattern of consumption with such differentiation being less important the more successful is the direct income support system. Whilst this advice is useful as a description of a long-term goal, the strategy is not something that most developing countries could introduce very quickly. Administration is a central problem and many developing countries would have difficulty in levying taxes at the retail stage. This would appear to be true, for example, for much of Africa and Bangladesh. On the other hand, many other countries do levy taxes at the retail stage with some success. For example, in 1985, Turkey introduced a full-scale VAT including the retail stage which with a 12 percent rate now raises around 3 percent of GDP. Thus, the coverage is one quarter of GDP (with a notional legal coverage estimated around 50 percent of GDP). The Mexican VAT is also collected with some success, as is sales tax in a number of Indian states. The appropriate sequencing of an introduction of a consumption tax through to the final stage will depend on the circumstances of the country concerned. Most countries

should be capable of handling the import and manufacturers stage and many could include wholesale. Probably the majority could not go directly to the retail stage although one should not assume it is impossible without careful scrutiny. It is an advantage of the VAT that it can be introduced incrementally through the system gradually increasing coverage and revenue. Thus if a stage is lost it does not imply that a good escapes tax altogether, whereas with a final stage tax (such as the old U.K. purchase tax) all revenue is lost if evasion takes place at the final stage. There is a great advantage of the VAT over other types of indirect taxation where introduction has to be gradual.

Where an indirect tax is not at the final stage then retail and/or wholesale margins will influence the proportion of tax in the price. In these circumstances an "effective tax" calculation of the type described in Ahmad and Stern (1986a) would be necessary and input–output information including retail and wholesale margins would be necessary.

We shall not discuss in detail here the precise form of a VAT. One has to define the base for taxation and how the taxes are to be calculated and administered. The "consumption base" allows the deduction of capital inputs in computing value added but the "income base" does not. The most common method of administration is the "subtraction" method whereby the taxpayer levies taxes on all output and subtracts from this tax collection the taxes paid on his inputs to compute the tax he must transmit to the authorities. This appears to allow the most satisfactory administration. An excellent recent discussion of experience and problems with VAT is provided in Tait (1988).

The basic theories of public finance do then provide help in judging the balance of taxes of different types. Furthermore, if developed, and with enough data and assumptions, they can be constructively applied to guide decisions on possible reforms. Examples of explicit calculations comparing the impacts of different types of tax increases, domestic excises, tariffs, sales taxes and so on are contained in Ahmad and Stern (1987).

3.9. Some simple guiding principles

As a partial summary for this long section we shall draw out some simple guiding principles from the analysis. We shall attempt to keep the statements short and direct and as such the many qualifications which would be necessary are omitted. We have discussed the relevant assumptions and the underlying logic in the preceding subsections.

(i) Where possible lump-sum taxes and transfers, or close approximations, should be used to raise revenue and transfer resources. Examples are land taxes and subsidised rations. It is not easy to find other examples where the lump-sum taxation can be appropriately linked to a relevant criterion (particularly wealth or

poverty) without the tax or transfer ceasing to be lump-sum. See Subsection 3.2 for further discussion.

(ii) It can be very misleading to look at one set of tax tools in isolation from what is happening elsewhere in the tax system. For example, we should not allocate redistribution to the income tax and revenue-raising to indirect taxes. Both taxes affect distribution, affect resource allocation, *and* raise revenue; furthermore, the presence and role of the one set of taxes strongly influences the appraisal of the other. In particular the desirability of the differentiation in commodity taxes on distributional grounds is closely related to other policies towards distribution. The stronger are the other tools the smaller is the redistributive role for commodity taxes. See Subsection 3.2.

(iii) The focus of indirect taxation should be final consumption. This means that intermediate goods should not be taxed unless there is difficulty in the way of taxing final goods or there are special distributional reasons for taxing these intermediates. This applies also to tariffs, which should be rebated on intermediate goods and linked to other taxes on final goods. They should be used for protection only when the case for supporting a particular domestic industry (and penalising its users) is very strong and where other means of stimulating the industry are less satisfactory. It must be recognised that the elimination of tariffs except for protection is a long-term goal which for revenue reasons could not be achieved in the short or medium term in countries with very few tax handles. But it should be pursued in the sense that tariffs should be reduced as and when the revenue from final goods taxation can be built up. Again in the short term, it is generally preferable to replace quotas by tariffs so that the rent from the quota flows directly to the government rather than to those agents who allocate or receive the quota. See Subsections 3.6 and 3.8.

(iv) Public-sector prices should be set according to the same principles as indirect taxes: price equal to marginal social cost for intermediate goods (except for the cases noted in (iii) above) and marginal social cost plus an element for taxation for final goods. See Subsection 3.2.

(v) The appropriate microeconomic criterion for the expansion of industries is profitability at shadow prices of the incremental output. Other indicators (such as effective protection rates or domestic resource costs) are reliable only where they coincide with shadow prices. Similarly, a reform rule based on the other indicators, such as adjusting tariffs to move towards uniform effective protection is incorrect. See Subsections 3.4, 3.6, and 3.8.

(vi) Indirect taxes should be guided by a trade-off between efficiency and equity and in the absence of well-functioning schemes for income support there is no prescription for uniformity of indirect taxation. See Subsection 3.2.

(vii) A central argument for a corporate income tax is as a means for taxing personal incomes and thus an analysis of the tax should be closely linked to the personal income tax. See Subsection 3.7.

4. The taxation of agriculture

4.1. Distinctive features for taxation

There are many reasons why the taxation of agriculture deserves special study in developing countries and cannot be treated as just another example of a production activity in the standard competitive model. First, it is of central importance in both employment and output, the contributions often being in the region of one-half to three-quarters and one-quarter to one-half, respectively. Second, there are strong limitations on the tax tools available to the government, in particular it is often impossible to tax transactions between producers and consumers, the difficulty arising both when the "transaction" is within the household and when sales are between households or in informal markets. Third, the rural labour market and working arrangements dominated by agriculture, interact directly and indirectly with labour markets throughout the economy with important repercussions for all households and production activities. Fourth, land is a crucial input so that the problems with taxing rents must play a role. Fifth, the government is often the main or only supplier of vital inputs such as water and electricity so that its pricing policy must be integrated into the taxation of production. Sixth, food, its availability, distribution and price is of such importance to welfare that all governments have to take some responsibility for its price, quality and security.

The subject is clearly a major one and we do not have the space to go into details of data, arguments and models. In this section we shall simply try to bring out some of the major issues; we draw on the introductory chapter (Newbery) to Part V of Newbery and Stern (1987a). In Subsection 4.2 we look at some of the main influences on the incidence of agricultural taxes. We discuss briefly in Subsection 4.3 the question of the extent of taxation of agriculture as a whole, and the allocation of resources between agriculture and industry. Finally, in Subsection 4.4 we examine the availability and use of different kinds of tax instruments towards agriculture.

4.2. Some influences on tax incidence

With agriculture playing such an important role in output and labour markets it is clear that one has to take a general equilibrium view and, therefore, there will be many influences on the incidence of taxes. In this subsection we focus on four of these: the difficulty of taxing food transactions within the country, the elasticities of supplies and demands, effects operating through the labour market, and the variety in technological choice by farmers.

If transactions between producers and consumers of a food commodity cannot be taxed, then the price for producers and consumers (apart from selling and transport costs) will be the same. Let us suppose, for example, that the good (rice, say) is imported (without quantity restrictions and from a competitive world market) and subsidised. This will act as a tax on producers, as well as a subsidy to the domestic price (the domestic price is the world price less the subsidy). This means that the (marginal) incidence of the subsidy is as an imposition on producers related to their production and as a benefit to consumers related to their consumption. The policy analysis of the subsidy must therefore take account of the welfare weights on incomes of both consumers and producers. The revenue cost will be given by net imports in equilibrium (times the subsidy) and this will depend on net supply elasticities by producers and demand elasticities of consumers. An import tariff can be analysed in an analogous manner with the signs reversed. Pricing policies of marketing boards raise similar issues. Notice that the difference between world and domestic prices for producers involves a basic inefficiency in production.

Where the good is non-traded, the incidence of a tax will depend on supply and demand elasticities. Consider, for example, a tax on an input such as water. The effect on food prices will depend on the elasticity of net supply of foods with respect to input and output prices and the elasticity of demand. Generally, it should be clear that the overall effects on prices and incomes of any tax will depend sensitively on whether or not the good is traded, supply and demand elasticities, and the extent to which the government can tax transactions, for example, how far it can separate urban and rural markets.

Taxes on agriculture would in general affect the wages and real incomes of both urban and rural workers. They will affect different kinds of workers in different ways. If the price to producers of food is lowered then the agricultural labourer will be worse off to the extent that the real wage in agriculture would be expected to fall – for example, less inputs complementary with labour may be used thus lowering the marginal product. This is an argument sometimes used against food aid. Furthermore, any reduction in agricultural wages may also have an affect on urban wages although urban workers would benefit from the reduction in food prices. And a reduction in urban wages might increase investible surpluses. One has to ask again whether urban and rural labour and food markets can be separated, whether the food is imported (lower prices then implying an import subsidy) or produced domestically and so on. A number of models can be constructed and we shall not go into details, but it should be clear that the consequences flowing through the labour market may be of importance for the incomes of the poor, for profits and for government revenue.

Finally, on judging incidence one must remember the very broad range of production techniques one finds within agriculture, indeed within a single village. Thus, some farmers will use electrically powered tubewells, others bullock-driven

Persian wheels, and some land will not be irrigated. Some will use a combination of chemical fertilisers, some farmyard manure and others no fertiliser at all. Cropping pattern and thus input choice will vary considerably. The reasons for these differences may be many, including differences in knowledge, attitude to risk, access to credit, influence over government suppliers, position and quality of land and so on. One cannot assume that techniques are homogeneous and thus the pricing and taxing of inputs and the relation of input patterns to outputs should take account of these differences in practices amongst peasant householders and other producers. Such differences would not matter for the consideration of incidence if they were uncorrelated with social marginal utilities of income. Prima facie this is unlikely and should at least be investigated. For further discussion of some of these issues see Part V of Newbery and Stern (1987a).

4.3. The balance between agriculture and other sectors

The terms of trade between agriculture and industry and the allocation of resources between agricultural and non-agricultural sectors has long been a central topic in discussions of development [see, for example, the early Indian five year plans, Dixit (1973), Lipton (1977)]. We examine briefly here the influences of some of the issues raised for the analysis of tax policy. There are a number of arguments which have been advanced for turning the terms of trade against agriculture. Given that the discussion is often in terms of a single price and we are looking at the agricultural sector as a whole the discussion is at a fairly aggregated level. First, it may be suggested that aggregate agricultural supply is relatively inelastic. Second, one might argue that investible surplus should be extracted from agriculture to finance growth elsewhere. Third, it might be argued that food producers are relatively well off, whereas consumers, rural or urban, are not. We examine these suggestions briefly.

Given that food is such a high proportion of output and budgets it may well be necessary to spread the tax net to include it if sufficient revenue is to be raised. It may also be true that the taxation will fall in large part on production since the opportunities for taxing consumption and production separately are limited. The size of supply elasticities will then be an important element in the analysis. The magnitude of the aggregate elasticity is an empirical issue. A recent survey by Binswanger et al. (1985) has suggested rather low aggregate own-price elasticities (between 0.1 and 0.3). Individual crop elasticities will, of course, be higher [see, for example, Askari and Cummings (1976) and Timmer, Falcon and Pearson (1983)].

The second argument which concentrates on dynamic aspects is less well-founded. The allocation of investment is related to but distinct from its source of finance. If the marginal investment has high social productivity in a certain sector

this does not tell us that the revenue should come from that sector or some other. And there should be no presumption that investment in agriculture is less productive than elsewhere, often the opposite will be true [see, for example, Schultz (1978)].

The third suggestion relates to the incidence of taxes. It is not obviously correct that food producers are relatively well off, and incidence may not only be on landowners or producers. As we saw in the previous section incidence is sensitive to a number of questions concerning the structure of the labour market (e.g. what happens to agricultural workers and the rural and urban wage) and the government's ability to control prices in different sectors of the economy.

Overall we would suggest that there are no strong and general arguments one way or another. The appropriate terms of trade and their control by government policy would depend on the structure of the economy, investment possibilities, and the availability of tax tools in a particular context. And it should be remembered that agriculture versus industry may not be a very useful way of putting any question. Welfare does not reside in industries or sectors but in households. We should be asking about the distribution and incentive effects of combinations of taxes and of investment policies in different parts of agriculture and industry.

4.4. The use of individual tax instruments

4.4.1. The land tax

As we have emphasised, the appropriate policy for any particular tax instrument will depend on the availability and levels of other taxes and policies. We shall therefore examine briefly some of the instruments that exist for the taxation of agriculture and how they might interact. An obvious and important example is the *land tax*. Land is in inelastic supply and its distribution is unequal. From the viewpoint of both efficiency and equity it would seem the natural base for taxation and has been seen as such by economists from David Ricardo and Henry George. And historically [see, for example, Bird (1974)] the land tax seems to have been of substantial or dominant importance in many countries (for example in India under Moghul and British Rule). Now, however, land taxes seem to be a negligible source of revenue. One of the main reasons for this would seem to be that the rich and powerful have been particularly successful in resisting the tax [see Bird (1974) and Wald (1959)]. Land taxation would require careful land records but this is not in principle so difficult (compared to measuring the base for other taxes) when landowners have a strong incentive to establish the legal title to their lands. One can adjust for the quality of the land

by basing the tax on its presumptive value. And it can be made progressive by taxing only holdings above a certain level.

The reason land taxation becomes difficult is that resistance to proper valuation and collection can be fierce and effective. Apart from possible disincentives to the improvement of land this resistance to effective implementation seems the crucial argument against land taxation. There are two possible reactions. One can either advise governments to attempt to force measures through or take the absence of land taxation as a constraint and devise other taxes. The former course can be perilous for the government, possibly also for the economist, and may damage his credibility as an adviser. We shall discuss some of the alternatives, but, the possible political difficulties notwithstanding, one should not remove land taxation from the agenda without careful discussion and thought concerning the circumstances in the particular country under examination.

4.4.2. Taxation of inputs and outputs

It is interesting to ask how far taxes on inputs and outputs substitute for a land tax. Clearly, if the prices of all outputs and inputs are reduced in the same proportion, then this is equivalent to a proportional tax on land. This would involve an output tax and an input subsidy. Such a combination is clearly impossible, however, since labour could not be subsidised in this way. An attempt at such a system would therefore distort incentives towards purchased inputs. The example does show, however, that one must examine carefully the effects of combinations of taxes.

A tax on marketed surplus, for example, is equivalent to a tax on the purchases by the agricultural sector of non-agricultural goods. This latter method is perhaps the most common form of taxation of the agricultural sector in developing countries.

Water and electricity are important examples of publicly provided services to agriculture. The basic principles of second-best pricing would seem to suggest prices at least as high as marginal cost, for reasons of revenue and of distribution. Similar second-best analysis can be applied to the other main inputs, fertilisers and draught power. Bullock power, however, would not easily be taxed, and such a tax is likely to be undesirable for distributional reasons (at least relative to tractors) since it is the richer farmers who own the tractors (although poorer farmers may rent their use, so the issue is not clear-cut). One would also want to take into account the extent to which governments wanted to encourage technical change based on water and/or electricity. If there were benefits which were underestimated by households or considered too risky then there may be an argument for subsidy. Insofar as the underestimation is based on ignorance and will diminish over time then this element of subsidy should be gradually removed. It is unlikely, however, that adequate insurance for risk in agriculture will

emerge quickly and it is possible that some subsidy might be justified on these grounds. The argument would have to be developed rather carefully and in our judgement it is far from obvious that this would be the best vehicle for dealing with the problem.

4.4.3. Agricultural income tax

An agricultural income tax is, in principle, equivalent to a tax on income from land and household labour. A major problem concerns the definition and measurement of the value of inputs and outputs. And there are a vast number of small producers and limited resources of the tax authorities. A partial solution would be to use *forfaits* or taxes on presumptive income, and a land tax is an example. A challenge of an assessment of forfait should then require production of accounts. An alternative would be to have an output levy, with some standard adjustment for inputs. This would be made progressive and would reduce administration costs if it were limited to larger farmers.

4.4.4. Export duties

In practice certain crops are often singled out for special treatment. Often these are export crops such as cocoa in Ghana or cotton in Pakistan. And in many cases such taxation occurs through marketing boards. Given that supply elasticities for individual crops (see Subsection 4.3) are likely to be much higher than for agriculture as a whole, considerable distortions are possible through substitution between taxed and untaxed crops. Smuggling can also become a major problem.

The different possible methods we have indicated suggest that a careful study of the potential for reforming different combinations of the taxation of outputs, the pricing for publicly supplied inputs and the taxation of purchased inputs may well yield substantial improvements for revenue, efficiency and distribution. It is an area where it can be very misleading to look at one agricultural tax in isolation and for which a general equilibrium framework will be important. For examples of empirical work of this kind, see the chapters by Braverman, Ahn and Hammer, Heady and Mitra, and by Newbery, in Newbery and Stern (1987a).

5. Tax reform in practice

5.1. Some experience since the Second World War

Tax reform has been an important item in the agenda of most governments in developing countries, faced with an increasing need for revenues. In Subsection

5.1 we review some of the major reform enquiries or missions that have been conducted since the War. And in Subsection 5.2 we illustrate proposals for reform for India and Pakistan based on our own work, which attempts to apply some of the unifying principles described in Section 3 above, and which is influenced by the experience of the earlier enquiries [see Ahmad and Stern (1986b)].

There have been a number of comprehensive studies or proposals for tax reform for developing countries in the post-war (and for some countries, post-colonial) years. The fashion seems to have been set by the Shoup mission to Japan in 1949 [see Shoup et al. (1949)], if post-war Japan may be considered to be less-developed. The Shoup mission was the first time that the reform of taxation was considered as a comprehensive exercise to cover all aspects of the tax system. The Shoup report also contained the first detailed proposal for the introduction of a VAT in such a context. Although a number of the Shoup proposals were accepted by the Japanese, then under U.S. administration, the VAT was not and a further attempt to introduce a VAT bill was defeated in the Japanese Parliament in 1978. However, the eventual introduction of a VAT in Japan is considered inevitable by some legal experts [see Kaneko (1985)]. Other missions also led by Shoup include Cuba, before the War, and Liberia and Venezuela since. The 1958 Shoup Venezuela mission included some of the leading public finance specialists of the time and was influential in moulding other missions. However "what it did not do is reform the tax system of Venezuela... many of the Report's recommendations were not followed and, what is more important some of the subsequent changes went against the spirit of the Shoup report" [Tanzi (1985)].

Musgrave has also been associated with a number of important tax reform studies, two of the best known being those in Colombia [see Musgrave and Gillis (1971)] and the 1977 Bolivia report [Musgrave (1981)]. While the recommendations of the Bolivia report were not implemented, possibly due to a change in the government, a number of influential Colombians were on the Musgrave Colombia Commission, which subsequently greatly influenced the 1974 reform.

In addition to a large number of proposals for comprehensive tax reform, there have been several attempts to reform or introduce given taxes in particular less-developed countries. Perhaps the best known such example is the "expenditure tax" recommended by Kaldor in reports for India and Sri Lanka. Both countries unsuccessfully experimented twice with the tax. Whilst the theoretical justification for the expenditure tax is not overwhelming (see Section 3 above), it has been advocated in the United Kingdom [see Meade Report (1978) or Kay and King (1986)] on administrative grounds, in terms of removing the distinction between capital and income and thus simplifying the tax base. However, practical difficulties with the administration of such a tax make it unlikely that the expenditure tax experiment will be repeated in another developing country before

convincing workable examples have been provided in countries with more administrative resources and skills.

The VAT is an example of a tax that has a number of theoretical advantages (particularly the avoidance of the taxation of intermediates and exports, see Section 3) and has gradually come into use in a number of countries, where it has been shown that the administrative difficulties are not insuperable. Moreover, accumulated experience helps in avoiding pitfalls, drafting laws and polishing administrative procedures. Over 20 LDCs now have a variant of the VAT [Tanzi (1987)], and it has most recently been introduced in Indonesia [see Gillis (1985)]. India, through its MODVAT introduced in 1986, has initiated systematic rebating or crediting of excise taxes paid on inputs. For an excellent recent review of experience and discussion of problems, see Tait (1988).

The land tax is another theoretically superior tax (see Section 4) which has been recommended in a number of contexts [see, for example, Herschel (1971), which formed part of the Musgrave Colombia Report]. However, not all countries have the administrative capability to conduct cadastral surveys and administer the tax, which is often opposed by powerful interest groups. Furthermore, where there are migratory or transient populations, or where property rights are not well defined, as in parts of Africa, the land tax may not be a viable option. However, a land tax was recently proposed for Zimbabwe with the tax to be levied as a percentage of the "rate value" of output [for details see Government of Zimbabwe (1986)]. A flat rate for land tax was also suggested for communal areas, with a charge per unit of livestock in lieu of a land tax on pastures, although this recommendation was rejected by the government.

Tanzi (1985) has criticised expatriate advice on tax reform for often reflecting cultural biases of the experts rather than conditions and attitudes in the countries receiving the advice. This is partly associated with the emphasis on income and capital gains taxes relative to, for example, taxes on foreign trade that are so important in terms of contributions to revenue. There is also a tendency, particularly on the part of lawyers, to dwell at length on the direct taxes.

Yet another criticism of the expatriate adviser faced with an apparently open brief is that it is difficult to resist the temptation to experiment. In this respect, Shoup's recommendation for a VAT for Japan after the War was somewhat before its time, as the administrative and legal framework for a VAT was then, it seems, inadequate. On the other hand, many reports today recommend the VAT. Tanzi (1985) also cautioned against "intellectual fashions", pointing to the popularity of the VAT today, as against the unification of schedular income tax schedules which predominated in most reports in the 1950s and 1960s. However, the more recent recommendations may genuinely reflect cumulative learning experience and the relative unimportance of the income tax in most developing countries.

5.2. Some recent recommendations for India and Pakistan

In this subsection we highlight some of the main recommendations made during the course of studies on Pakistan and India conducted by the authors, although it should be emphasised that these were research programmes rather than tax missions and were much concerned with method. Indirect taxes account for around three-quarters of government revenue in Pakistan, as in India; consequently, the reform of the indirect tax system formed a major concern of our work. Much of our research on India (which preceded that for Pakistan) consisted of describing tax collections by commodity group and working through the effects of the taxation of intermediate goods and raw materials to the tax element in the price of final goods. This we called the "effective tax" and was calculated with the help of input–output information. Organisation of the data in this way was very useful to policy-makers in both Pakistan and India, showing the consequences of a complicated system operated by a number of different authorities and applied at different stages in the production and distribution processes. In both India and Pakistan there is a heavy reliance on the taxation of intermediate goods and raw materials, often imported. This has had effects which often diverged sharply from the expressed intentions of the policy-makers. Thus, the tool of "effective taxes" provided the policy-makers with a method of assessing the consequences of their proposed past actions.

The effective taxes were also a central element in evaluating the balance of taxation across commodity groups in terms of the marginal social cost of an extra rupee of government revenue. These methods, described in Section 3, involved the use of data on household consumption bundles and aggregate demand responses, in addition to the effective taxes. They also allow an evaluation of the balance across different types of taxes, say customs duties and excises, and between central and provincial taxes, such as sales taxes and excises which are the responsibility of the State and Central Governments respectively in India.

As well as looking at the consequences, problems and adjustment of the existing system, we also considered the possibilities of major reform [Ahmad and Stern (1984)]. Indeed, the approaches are complementary since the identification of difficulties with the existing system leads one to look at alternative methods of taxation which might avoid or ameliorate the problems. With respect to the taxation of inputs, an obvious candidate is the VAT, thus avoiding the cascading effects of the tax systems of India and Pakistan. We were able to examine the consequences of the introduction of major reforms, such as the VAT, by describing gainers and losers for different policy packages and looking at problems of introduction, administration and coverage. The distributive implications of a VAT are rather sensitive to the use of exemptions, particularly on food items. Whilst there will always be some losers and some gainers, a reasonably

progressive VAT package can be designed using appropriate exemptions and only one or two rates.

In the course of our research on Pakistan we were requested by the Pakistani authorities to formulate some specific suggestions arising from our work. Our main recommendations for Pakistan included, inter alia, a rationalisation of the indirect tax structure, particularly of the tariff structure, the introduction of a VAT with two rates; appropriate user charges; greater use of presumptive methods and deduction at source for corporate dividends; and a land tax. Since the Pakistan study provides an example of the economy-wide application of the principles and methods developed in this chapter, we provide a sketch of some of the proposals, analysis and arguments.

5.2.1. Indirect taxes

We envisage the VAT as eventually the major source of indirect tax revenue in Pakistan gradually replacing many customs and excise taxes, covering the intermediate goods early on but extending to final goods also. We emphasised that some customs and excise taxes should remain, for example on tobacco and certain imported luxuries, for revenue, distributional and social reasons. Rationalisation of the rate structure of tariffs would involve a reduction in the number of rates, a reduction of extreme import duties (say, those in excess of 100 percent) and a shift from quantitative restrictions to tariffs.

The current sales tax falls mainly on large- and medium-scale manufacturing and on imports. There is in place a system for deducting sales tax on inputs which appears to operate fairly successfully. This provides very useful experience for the introduction of a VAT.

As well as providing a more flexible, efficient, buoyant and productive base, the introduction of the VAT in this way would be a major step towards dismantling the haphazard and arbitrary structure of protection. Since the VAT treats imports and domestic goods symmetically, it is a tax on final consumption which discriminates neither for nor against domestic production. This is what one would wish, given a realistic exchange rate. The promotion of specific domestic industries would then be carried out with much greater clarity and rigour than is possible at present where the current system makes the existing structure of protection very opaque and one suspects, unlikely to be consistent with government objectives. Thus, the protection of particular industries, e.g. heavy goods and chemicals, goes with the discouragement of industries which use these goods as inputs. If there are clear arguments for promoting particular industries (and thus implicitly discouraging others) then there may be a number of methods for carrying this out, including protective tariffs. The adoption of protective tariffs on the argument that other satisfactory methods are not available, would require careful justification.

Finally, on the VAT we should note how the rates may be calculated. Essentially, one examines the revenue from the replaced taxes, assesses the likely base of the VAT to be introduced and divides the former by the latter to obtain the rate which would give constant revenue. Note that this would provide guidelines for the basic rate and there would be a luxury rate for certain items. The design of the balance between basic and luxury rates and the goods to which they apply should take account of the distribution of the consumption of the goods in the population and the pattern of demand responses to changing prices.

5.2.2. User charges and public sector pricing

As seen in Section 3, user charges and public-sector prices should be set on the same principles as indirect taxes. Thus, for intermediate goods a guideline is social marginal cost, and for final goods, social marginal cost plus an element for taxation (e.g. the VAT at a basic or luxury rate). The application of these principles could yield considerable benefits for efficiency, equity and revenue. Examples would include domestic electricity and heavy road transport. Domestic electricity is a good consumed primarily by the better off in Pakistan and with very high social opportunity costs in terms of generation, and often of disruption caused by load-shedding arising from the excess demand associated with prices being too low. The social costs of heavy road transport are very high in terms of damage done to roads (the damage, it is estimated, increases as the fourth power of the axle weight, so that if a lorry is 10 times as heavy as a car, the damage to the roads is 10 000 times as great [see Newbery (1986), Hughes (1987)]. We would argue that there is great scope in public-sector pricing and user charges for simultaneously raising more revenue and improving the allocation of resources.

5.2.3. Personal income tax and corporate tax

In this, as in other areas, particularly of direct taxation, we found in our discussions great emphasis on the importance of reducing the discretion of income tax collectors. We argued that more codified and publicly announced methods of presumptive taxation would help in this objective. We suggested a withholding tax on dividends as a means of collecting the corporation tax. This would yield revenue sooner than collecting through the personal income tax or corporation tax and dividends may be less easy to conceal than profits.

5.2.4. Land taxation

Our proposal for a land tax in Pakistan with a generous exemption limit (ownership above 12.5 acres) should be seen in the context of pricing policy for agriculture and industry (and of the already existing wealth tax on non-agricul-

tural property). It is much more efficient and open to raise the taxation directly on land rather than implicitly through increases of prices of goods bought by the agricultural sector and decreases in the prices of goods that are sold by the sector. Thus, we argued that a land tax coupled with appropriate pricing policy could yield a major stimulus to agriculture – the taxation would be on a fixed input and not on production.

The monitoring of the required collection in a given area by the tax authorities would be much easier than for other taxes since the amount of land eligible would not be difficult to identify and is public knowledge. We estimate from data on the distribution of land that the exemptions would apply to 75 percent of the holdings. The tax as a percentage of gross output would rise with farm size and the maximum rate suggested, would we estimate for the (relatively few) largest farmers represent approximately 7.50 percent of output. If successfully collected the revenue would be substantial (more than the tax revenues collected by the Provinces put together). This source of revenue could (for political and constitutional reasons) be earmarked for the Provinces and would save resources for the Centre in reduced transfers.

5.2.5. Data and estimation

The central question we have sought to address is how best to raise additional revenue. The methods we have described in the theory of Section 3 and put into practice for India and Pakistan examine reform in terms of its effects on households, revenue and production. The analysis of the consequences for households involves certain basic data requirements including (i) revenue collections, by commodity group for indirect taxes, and by income group for income taxes; (ii) household income and expenditure information; and (iii) inter-industry transactions data or an input–output table. Some estimates of aggregate demand responses are also necessary if one is to make a judgement concerning the effects of reforms of indirect taxes on revenue. And a system of shadow prices is required to analyse the effects of reform on the production side. These sets of information are also potentially useful for other analyses, and accumulating a systematic set has had several externalities for other studies.

6. Concluding comments and further research

In describing our subject we have tried to focus on a simple unifying principle: in considering a proposed reform or designing a tax system we first analyse its consequences and then evaluate them. This is, at one level, banal but it does lead

to a structuring of theoretical and empirical enquiry in a systematic way in a subject which has sometimes seemed to consist of rather disparate elements. The implementation of this general principle could lead to an investigation of possible reforms as follows. First, we have to ask which policy tools are possible and how they will work. Second, we have to consider the effect of using these tools in a general equilibrium framework which reflects the major aspects of the economy under study. Third, the inter-relationships between the various policies should be examined carefully since they may, in principle, play a crucial role. Thus, the list of possible policies should be kept open and their connections examined closely.

This approach to analysis is reflected in the structure and content of the chapter. We have not attempted an exhaustive account of the literature, although we have tried to give some picture of the most important areas. Rather, we have tried to describe what is possible in a systematic way. This has led us to concentrate on some of the more developed avenues of research. At the same time we have tried to show how the methods we have described can be extended to other problems of public policy and thus seek a greater coherence in the subject. Some of the possibilities will be emphasised in this concluding section.

The organisation of the chapter followed from the approach we have described. Thus, in Section 2 we examined the relationship between the structure of the economy, the balance between public expenditure and different forms of finance, administration and evasion, and the availability or importance of different tax tools. The appraisal of taxes formed the subject matter of Section 3 concentrating particularly on theory but also on empirical methods. We commented on the extension of the analysis to other areas of public decision-making such as public-sector pricing and rationing and controls in production and consumption. Agriculture plays a central role in the economies of developing countries and raises particular problems, for taxation and it was therefore given special attention in Section 4. And in Section 5 we described the experience of attempts to apply the principles described to practical problems of reform. Our concentration has, for the most part, been on micro-economic and medium-term issues.

Our description of the subject underlines the close inter-twining of theory and applied work. The tax tools to be analysed in the theory and the structure of the models should be influenced by close knowledge of the economy at hand. And the theoretical analysis will point to possible reforms, raise practical questions, show what data should be collected and influence how they should be used. The interaction of theory and applied work and of public and development economics make this a particularly rewarding and fascinating subject for research.

We shall not attempt an overall summary of the contents of this chapter but shall try to draw out some of the main lessons and possibilities for further work. Theoretical lessons and research avenues are considered first, and then the applied, although as we have emphasised they cannot and should not be disentangled.

6.1. Theoretical lessons and research

The first of the themes which we shall emphasise for further theoretical research concerns coherence in the analysis of different aspects of government policy: notably taxation, public-sector pricing, public expenditure, planning and regulation, trading policies and borrowing. The application of a single set of principles can point to inconsistencies. For example, the marginal-cost pricing rule for public enterprises is not appropriate in a world where revenue is raised by indirect taxes and the prices of public firms should be set according to the same principles as those used in taxation, taking account of revenue requirements, income distribution, elasticities of demand, marginal cost, shadow prices and so on.

This procedure should also bring out interrelationships between different aspects of policy. Thus, the role of indirect taxes for improving income distribution will depend on the availability of other tools. For example, increasing a uniform lump-sum transfer may be a more attractive way of spending extra resources on the poor than reducing some indirect taxes and one may want to increase indirect taxes in order to raise revenue to finance the uniform benefit. This broad view of policies and their connections should always lead us to ask whether the particular tool under discussion may not be the best way of achieving the results which are claimed for it. And it means that revenue and expenditure cannot be separated. This is not only because the structure of taxes will depend on the total level of expenditure one is trying to finance but also that the type of expenditure being proposed (e.g. food rations, which are a type of lump-sum subsidy) will have a critical influence on the appropriate choice of tax tools.

In looking for this consistency across areas of policy we have emphasised marginal techniques, the use of household data, and a disaggregated approach. And shadow prices will play a key unifying role. The formal discussion of shadow prices was set out in Section 3 where we saw that, on the one hand, shadow prices could and should be brought into tax analysis and, on the other, the correct shadow prices depend critically on the way in which government policies are determined. Project appraisal and tax policy are inseparable topics.

We have, however, gone further than describing techniques, methods and interrelationships arising from theory and have tried to distil the basic lessons arising from existing theory into the simple practical rules and guidelines which were described in Subsection 3.9. These guidelines show, we would argue, that careful but simple theoretical analysis can be of substantial practical value in designing and evaluating tax policy.

The second theme concerns the use of non-marginal techniques as complements to the marginal analysis. Here an important tool will be the applied general equilibrium modelling of the type discussed, for example, in Shoven (1983) and in Chapter 18 by Robinson in this Handbook. We emphasised that

marginal analysis makes less severe demands on data and on modelling assumptions than the computable general equilibrium (CGE) model. On the other hand, the CGE model does allow the analysis of large changes (although results can follow mainly from particular structures chosen for convenience and from untested assumptions). Furthermore, they do allow the examination of the shadow price of factors: thus they are complementary to marginal analysis in the additional sense of allowing checks on some of the more "macro" shadow prices such as shadow wage rates.

Third, both the multisectoral marginal analysis and the CGE models can and should be supplemented by smaller scale theorical general equilibrium models which allow one to focus more easily on the functioning of the economy than large models. And they should also be cast in a form which brings out the numerical role of crucial parameters.

The three themes above concern methods of approach and are equally applicable for developed and developing countries. The same applies to two problems which we would recommend for closer attention by theorists. The first concerns dynamic aspects of taxes. Some of these we examined in Section 3 and we showed that similar techniques to those used in the static analysis could be utilised and some progress had been made. There is no doubt, however, that the characterisation of dynamic behaviour by agents and the effect of taxes and government policies requires intensive theoretical investigation. Furthermore, one would like to see more careful integration of the long-run and short-run analyses through these dynamic models. Short-run stabilisation problems, for example, have been examined using models which are rather different from those used in medium- or long-run discussions. Different forms should not necessarily be based on or lead to different principles.

A similar requirement for intensive theoretical research applies to the welfare economics of policy with non-competitive markets and imperfect information. Again, this is beginning although much of the positive theory is still at an early stage, for example, of establishing the existence of equilibrium.

We have intentionally discussed theory in a way which applies to both developed and developing countries. The structure of the economies of developing countries and their limited tax tools bring out clearly the importance of using the techniques of second-best welfare economics, or to put it in language that some might find more palatable, the study of policy where governments have a variety of objectives and face many constraints. In developing countries those constraints are particularly important in relation to the availability and coverage of tax tools. Here policies have to take account, for example, of the fact that income taxes will have a limited role and that many food transactions may not be directly taxed or subsidised. Other taxes may be applicable to some sectors, or types of enterprise, only. We have emphasised the limitations on tools and coverage as a crucial aspect of public policy in developing countries and they

should be a central feature of any research which attempts to adapt and construct the tools of public policy analysis for application to models of developing countries.

6.2. Applied research

Many of our recommendations for applied research arise from the same considerations as those which generate our suggestions for theoretical work. Thus, we need to know more about the supply response of, for example, savings, entrepreneurial effort and factors to tax changes. These are not simple applied questions that one could expect to have answered by a single research project. Rather, we should work for a gradual and systematic accumulation of evidence.

The investigation of the coverage of different taxes and subsidies in practice would be of substantial value in considering reforms. Thus, for example, one would be greatly assisted by simple descriptions of which groups do and do not pay income tax, which type of establishments collect sales taxes, what sorts of household actually receive food and other subsidies and so on. These affect not only the models we should be building but would directly influence the appraisal of particular reforms.

One should encourage the collection of data by national and regional agencies in a form which allows tax analysis. For example, where possible indirect taxes should be attributed to goods which are described in a similar manner to other economic data such as national accounts classifications. Household income and expenditure surveys should be made available to Finance Ministries and academic researchers to enable the study of the distributional effects of proposed reforms. Indeed, the calculation of these effects should be a responsibility of the Finance Ministry when it prepares changes for discussion or enactment.

The interrelationship between taxes and other policies could be a most fruitful area for analysis. One could investigate, for example, the relationship between pricing rules for public enterprises and tax policy; or food subsidies and tax policy. A systematic analysis of agricultural taxation and the pricing and supply of inputs would be likely, in many countries, to produce striking results, both in terms of inconsistencies and the effect of the policies as a whole on incomes and incentives.

Detailed case studies of actual reforms would be very desirable [a notable and valuable example is Gil Diaz (1987) on Mexico]. A systematic description of effects and pitfalls that occurred in practice could provide real guidance to those embarking (or thinking of so doing) on substantial changes.

All these recommendations refer to analyses which involve detailed investigation of the circumstances of particular countries. Comparisons between countries can be instructive and useful but they are no substitute, and should not supplant, the close examination of the country at hand. Thus, we should be suspicious of

simple formulae of the type that say country A has the following five simple characteristics and therefore should follow tax policy B. Accumulated experience, clear theory, and empirical research no doubt have systematic lessons but these should be in terms of simple principles, areas for study, warnings and so on rather than in packaged policy prescriptions.

The agenda is clearly long and daunting. However, much real progress has been made in recent years and we would suggest that many of the lines of enquiry proposed could be very fruitful, both for practical policy and in advancing our conceptual understanding. There have been many theoretical advances in both public economics and development economics and the availability of and facilities for use of data have expanded very rapidly. The further integration of the two areas provides fascinating possibilities.

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