Multi-Year Perspective in Budgeting and Public Investment Planning

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1 Introduction

Many problems of public expenditure budgeting are common to virtually all nations, whatever their style of government or state of development. Some are administrative and political, such as the distribution of authority – between the centre and regions, between government and parliament, between the ministry of finance and line ministries, and between line ministries and other agencies; and government consistency – an ability to keep to plans once agreed. Other problems are more technical - such as procedures for approving capital projects and for subsequent procurement and control; the "rules of conduct" for budgetary negotiation: information technology; and new technical developments such as accrual accounting. Some problems are more political, and depend more on the type of government - such as the handling of public opinion and lobby group pressures, and sometimes ministerial pressures, when these are not consistent with the public interest. In democracies in particular, government budgeting is complex and difficult.

As well as facing common problems, budgeting procedures over time also tend to follow similar paths of reform. In recent years these have included increasing emphasis on outputs relative to inputs, more delegation to agency managers combined with stronger performance measurement, and interest in the moving the boundary between public and private sector activity.[1]

At the same time there are wide differences between countries. In developing or transitional economies some problems are much more severe than in developed economies, and some are wholly different - notably the handling of donor finance. And within developed economies there are differences in constitutional structure, history and culture, which lead to some very different ways of dealing with the same problems. Moreover no budgeting system stands still. In most countries the system changes significantly year by year, with changes in government, in economic circumstances and in technology, because any system which does not change will become weaker, as ministries and agencies learn how to exploit the inevitable compromises.

This paper therefore follows the guides produced by the OECD, the World Bank and the Asian Development Bank,[2] in accepting that priorities and methods of approach will always vary widely between countries, but that we can learn from experience some universal principles of good (and bad) practice. It draws heavily on the experience and wisdom recorded in these guides.

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[1] A classic reference on these and related developments is Schick (1999).

[2] See Allen and Tommasi (2001), the World Bank (1998), and Schiavo-Campo, Salvatore and Tommasi (1999) .

2 Scope of this paper

Budgetary management entails three functions, namely:

- Aggregate fiscal discipline (spending no more in total than can be afforded);
- Efficient allocation (spending on the right public services);
- Operational management (making best use of the money that has been allocated).

The main focus of this paper is on planning to achieve efficient allocation. Of the many important activities of budgetary management, the focus is on budgetary allocation and the appraisal of policies, programmes and projects. The paper addresses especially medium and long-term considerations in budget and project appraisal processes, in particular for capital investments.

The paper follows a top-down sequence, starting with aggregate budgeting, including capital, then addressing programme budgeting, and then project appraisal. However efficient budget management depends upon information flowing strongly both top-down, imposing macroeconomic constraints and broad national policies and priorities, and bottom-up, with information on the costs and benefits and performance of present and potential future expenditures. This is emphasised in a later section on the sequencing of reform of budgeting and investment planning.

Most of the paper is closely consistent with the international guidance noted above. However sections 6 to 8, on more technical aspects of appraisal and evaluation, address issues on which there is less international consensus.

3 The medium term budget framework

3.1 The need for medium term budgeting

In nearly all economies government budgets are prepared once a year.[3]

The usual pattern in developed economies is for not only an annual government budget for expenditures in the following year, which is approved by the parliament, but also budgets agreed with line ministries for, say, two further years.[4] These budgets for later years are

[3]. One exception is the United Kingdom. The government elected in 1997 introduced a system in which 3 year budgets of spending ministries are renegotiated at *two*-year intervals, with the intervening years devoted to programme reviews. This would not be appropriate for countries undergoing more rapid rate of change in economic development from year to year, and may not be sustainable in the long run in any country. However it illustrates that even such concepts as the annual budget negotiation should not be taken for granted.

[4] So giving a budget covering a total of three years. This is probably the best choice for most countries. Some countries have sometimes taken five years, but this is politically a long time; and discussion of the later years

open to some revision in the next annual negotiation, and are sometimes less detailed than those for the first year, but they carry considerable weight. Many developing and transitional countries are moving to a multi-year budgeting pattern of this kind. The World Bank describe this as a medium term expenditure framework (MTEF). We use in this paper the OECD convention of describing it as a medium-term budgeting framework (MTBF).

Budgeting needs to be tied closely to policy making and planning. Otherwise policy making and planning are not constrained by resource availability, or by strategic priorities. This leads to an unmanageable mismatch between what is promised through government policies and what is affordable. In the words of the World Bank, the annual budgeting process becomes more about "scrambling to keep things afloat", rather than allocating resources on the basis of clear policy choices to achieve strategic objectives. Policies are not delivered.

Medium-term budgeting helps to achieve this linkage in many ways.

- A medium term budgeting framework makes it clear to ministers, parliament and the public that many commitments to expenditure in future years are for practical purposes unavoidable. These may include "entitlement programmes", where expenditure levels may change even though basic policy remains the same.[5] They include debt repayment; maintenance and operation of existing assets; committed expenditure on capital investments; and, at least for a year or two, most of the other costs of many public services.

- An MTBF also makes it clear that the revenue to finance this spending is constrained, by macroeconomic circumstances, and by tax policies and their implementation.

- An MTBF makes clear to everyone the direction of change, in terms both of total spending and the distribution between programmes. In particular, with single year budgeting each budget negotiation starts without a well defined baseline. Briefly during the 1970s there was a fashion in some OECD countries for "zero based budgeting", whereby every item was supposedly examined from a zero base each year. In practice this is wildly unrealistic for more than a very few activities at one time, even within one sector. Efficient annual budgeting is not possible without a well considered baseline from which to start.

- In the absence of an MTBF, spending adjustments to reflect changing circumstances tend to be ad hoc, and on activities that can be reduced at short notice. Often these are

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diverts attention from the more important earlier years. Three years provides for the next annual budget negotiation a baseline for two years ahead, with a third year to be negotiated for the first time.

[5] The special problems of budgeting for "demand led" programmes, such as unemployment benefits, as distinct from programmes over which the government has full control, have yet to be well developed in international guidance. They are however only rarely relevant to capital, which is the main concern of this paper.

important public investment expenditures, which can be cut back with little short term political cost but considerable longer term social cost.

- An MTBF is also needed for efficient planning in line ministries. The time span of an annual budget is too short for adjusting expenditure priorities. A significant adjustment of expenditure priorities, if it is to be successful, usually needs a time span of several years. This may be because of the time taken for investment, or training, or administrative change, or to introduce change at a rate which is fair and politically acceptable.

- By increasing predictability, an MTBF forces more clarity about the criteria for funding decisions. In developing and transitional countries, the resource allocation process is sometimes dominated by uncertainty, much of which is avoidable.

- The transparency of an MTBF enforces political discipline, by constraining policy announcements. With only annual budgeting, sector politicians are free to announce policies for future years, either for short term popularity or as an attempt to pre-empt the next year's budget negotiation. With a medium term budget such announcements are constrained by the need to explain how they can be financed within the later years' budgets.

- An MTBF also allows more freedom for line ministries, to make decisions about the allocation of their own budgets, within a tight overall constraint. This freedom can lead to problems. However it is a necessary step to developing the skills and commitment needed in line ministries to achieve efficient and effective expenditure policies.

3.2 Some problems of multi year budgeting

The concept of multi-year budgeting evolved in many OECD countries in the 1970s, but often with a special focus on new programmes. In the 1980s it evolved into a stronger concept of general expenditure control. However these developments revealed two problems (OECD, 1997).

One problem is the temptation of governments to base medium term plans on macroeconomic forecasts which reflect their politically driven aspirations, rather than objective analysis. Ministers may truly believe that some new policy, say to improve productivity, or reduce tax evasion, will come up to their expectations; or they may even believe that publishing a forecast will be self-fulfilling, by giving people confidence. But in practice the use of "political" forecasts as a basis for expenditure planning has a dismal record. The answer is one of political leadership. Senior ministers need to insist that the macroeconomic projections are based on objective professional advice and judged against their subsequent accuracy, not against their short term political appeal.

The other problem of an MTBF is that the expenditure figures for the later years are seen by line ministries as being policy entitlements. Indeed that is to a large degree the purpose of an MTBF. However this provides the temptation to line ministers to press for new

programmes in the later years, and then fight hard when it turns out later that the programme is more expensive, or less funding is available, than was first projected. This problem is less easy to resolve and is handled by different countries in different ways.

- One approach is to limit the scope of the later year budget figures to *the cost of existing programmes*, without making any room for new programmes.

- A second approach is to set *conservative budgets*, which include planned savings of expenditure on existing programmes and some expenditure on new programmes, but only on new programmes for which the funding is certain.

- A third approach is set budget based on *best estimates of actual spending* in the later years, and to rely on having strong mechanisms (as discussed below) to ensure that these budgets are held.

The OECD recommends the last of these approaches to transitional economies (OECD, 2001). This is a courageous recommendation since, as discussed below, the conditions needed for consistently good expenditure policy are very demanding, and weak processes are likely to lead to excessive medium-term budgets. However the adoption of either of the first two approaches creates another problem, which again requires political discipline to manage. This is the problem of how to handle the gap between the sum of the conservative programme budgets and the unbiased estimate of aggregate expenditure derived from macroeconomic forecasts.

In developed economies this is usually handled by assigning the money to a reserve, which, in each subsequent annual negotiation, is partly allocated to programme areas according to the government's priorities at that time, so that for each year there is a small reserve for the first year (for short term emergencies), a larger one for the second year and a still larger one for the third year. For this to work a clear understanding is needed among all ministers that the reserve is to be used in this disciplined way and is not available for "extra" spending for short term political popularity or government exploitation.

The choice of approach depends on the capacity and institutional context of the particular country.

However, the first year budget should always be placed in a multi-year perspective. Two crucial requirements are:

(i) *aggregate* expenditure totals which are consistent with a politically neutral medium-term macroeconomic framework; and

(ii) inclusion, in the review of budget requests from line ministries, of well based estimates of the costs in later years of ongoing programmes.

3.3 Other requirements for efficient and effective budgeting

An MTBF is necessary for efficient and effective budgeting, but it is not sufficient. Many other conditions are needed. We note here four of the most important.

3.3.1 "Needs" versus "affordability"

Line ministries, the public and, where there is a free press, the media, usually see public expenditure in terms of a needs which the government ought to meet. In the finance divisions of government departments, in contrast, and especially in ministries of finance, public expenditure is more often seen as a limited pool of revenue to be tightly rationed.

Both perspectives matter: spend where it is really needed, but within the limits of what is affordable. However unless line ministers are willing, when it comes to serious negotiation, to accept the overall budget constraint and submit bids based on reasoned arguments, *and* unless the budget setting process is able to consider such arguments seriously, there cannot be efficient budgeting. Negotiations in which either side is unwilling or unable to balance needs against affordability typically follow a process of bids from line ministries far in excess of the available aggregate, or what line ministries expect to receive. This matched by crude rationing by the ministry of finance and other sources of power, based on poor information about the country's real comparative need across different programmes, or how effective the programmes are. Line ministries face few incentives to improve efficiency, because they fear that any extra savings they achieve will all be taken from them.

In public budget setting there will always be some rough justice. Expenditure is never exactly matched to priorities. But a reasonably fair and efficient budget settlement depends on good arrangements to balance need against affordability, to which we now turn.

3.3.2 The role of the centre of government

No set of rules or organisational structures can produce effective budgeting without a strong and well informed authorities at the centre of government, to lead both the political and the administrative process.

In most democracies the political forum for strategic decision making is the Cabinet or Council of Ministers. Successful budgeting depends on this forum making strategic decisions on the basis of budget realities, and keeping to the budget timetable.

It also depends upon a central administration which provides this political forum with policy information at the right time, and clear and consistent advice on budget procedures, and how they should be developed; and is competent to implement the budget process with line ministries, and maintain and develop the administrative and electronic systems.

3.3.3 Budgeting and policy analysis

In the 1960s and 1970s it was widely believed that government budget allocation could be largely reduced to a "scientific" process, by systems such as PPBS (planned programming and budgeting system) or even ZBB (zero-based budgeting).[6] This belief turned out not to be true, for three main reasons. One reason was that, for most public policies, finding the best way forward depends not only on analysis but very largely on pragmatism, political intuition and windows of political opportunity. Second, the information demands were analogous to those required to run a centrally controlled economy, and unmanageable. Third, the implied power structure within government was that of control in detail from the centre, as opposed to delegated authority, incentive structures and local initiative.

During the 1980s and 1990s, expenditure management systems became more practical, with policy initiatives concentrated on areas which happen, at the time, to be of highest priority.

This means however that effective budgeting depends upon a continuing programme of policy development and review, mostly *separate* from the budget setting process. The point is sometimes missed in international guides that, while the *linking* of analysis and central budgeting is essential, the actual processes of analysis and budgeting are largely separated in time. The interaction between them is rarely direct.

The budget settlement between a ministry and the centre is typically achieved by negotiation based on whatever arguments are immediately to hand. The annual budget setting process follows a strict and usually hard-pressed timetable, which usually cannot be combined, on the hoof, with significant policy analysis. It is a political process, which does not follow a logical sequence of thorough analysis followed by systematic decisions. However the quality of argument in this political negotiation depends crucially upon the analysis done in previous months or years.

The analysis needs to be done, but to its own timetable. This timetable will sometimes be planned to fit in with the budgeting cycle, but analysis will typically proceed throughout the year, often to fit around the peak demands of budget setting.

Much policy, programme and project analysis needs of course to be concerned with much longer timescales that the central government budget.

3.3.4 Information

Effective public budgeting, no less than effective control, depends on a huge range of quantitative information. International conventions help countries to develop information

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[6] The term PPBS is still sometimes used to describe any well balanced, analytically based approach to planning expenditure programmes. However it was originally presented as a way of deriving by rigorously analysis the "optimal" allocation of expenditure. At the "Planning" stage, systems analysis identified objectives and potential solutions. "Programming" applied economic techniques such as cost-benefit analysis to existing and potential new policies. "Budgeting" applied the results of this analysis to derive annual budgets. ZBB was a later experiment, which applied a rather similar, comprehensive logic to individual programmes.

systems and make possible international comparisons.[7] However it is sometimes not fully recognised in transitional and developing economies how many ways public expenditure information can be defined, and the extent to which different types of information – including different classifications of the same data - are needed for different purposes.

The maintenance and development of classification systems and their use is another vital central function.

4 Public investment

This paper is concerned especially with public investment. However some of the most common and serious problems with public sector capital budgeting arise from its interface with current spending.

4.1 The Distinction Between Capital and Current Expenditure

Capital and current expenditures need for some purposes to be considered separately:

- capital spending within the budget needs to be clearly identified *separately*; and
- *capital-specific procedures* are needed for asset procurement and for project management, and for subsequent monitoring and management and disposal of capital assets.

For other purposes capital and current expenditures need to be considered together:

- For planning and budgeting capital and current spending need to be considered *together*; and
- investment proposals need to be appraised in terms of *both* capital *and* operating costs.

It is normal in developed economies for the section in the ministry of finance, or the OMB in the US, which is familiar with a spending unit's activities, to deal with both capital and current spending. For each spending programme, the budgeting of capital and current expenditure are developed together.

However programme budgets in these countries still have capital and current components, usually with only limited freedom (if any) to vire between them. Capital and current expenditure are also distinguished in the *accounts* of spending units and in *reporting*

[7] These conventions include in particular the IMF Government Finance System (GFS), the United Nations Classification Of Functions Of the Government (COFOG), which was revised in 1999 to include among other issues environmental accounting, and, for European countries, the European System of Accounts (ESA) and the System of National Accounts methodology established in 1993. These systems are well summarised in Chapter 4, Section A of the OECD guide (Allen and Tommasi, 2001), together with a wider discussion of classification issues.

expenditure. Development of capital investment plans is usually seen as an issue for the internal management of line ministries or agencies.[8] Specific ministry of finance approval may be needed for some large capital projects.

The annual government budget for all public spending in most OECD countries is broken down into several hundred headings for approval by the parliament. Each heading is usually wholly capital spending or wholly current spending. Indeed parliaments often require capital expenditures to be specifically identified in the budget documentation. However, presentation and debate in the parliament and in public focuses on the expenditure programmes as a whole.[9]

Policy developments in some countries are beginning to draw a sharper distinction between capital and current public spending. These developments include accrual accounting; "private financing" for public service projects; and in some cases stronger links between capital spending and changes in public debt. However none of these developments challenge the principle of integrated *planning* of capital and current expenditure.

In many transitional economies the preparation of capital and current budgets are in contrast largely separate procedures, carried out by different departments in the Ministry of Finance or, in some cases, by different ministries (for example the Ministry of Finance for current budgets, and a Ministry of Economy for capital budgets).

In some cases this separation is a historical consequence of the special treatment and status given in former command economies to capital expenditures, as part of national development plans, and the powerful institutional status given to the central plan (and to some line ministries) relative to the Ministry of Finance, which was regarded more as a ministry of accounting.

Another factor which separates the planning of capital and current spending, in both transitional and especially developing countries, is the use of aid financing for capital projects. Donors usually wish to pay directly for capital assets (but often not the subsequent operating costs) and often to supply capital assets directly from the donor country. We discuss below "Public Investment Programmes", which can greatly help the management and prioritisation of capital intensive aid programmes. However such programmes can separate capital from current budgeting. Donor finance also leads to the assembly of

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[8] There may be a "public works agency" which manages a wide range of public service construction work, but the trend is towards delegating these functions, and the appraisal of the investment is anyway a task for the agency whose programme it is supporting.

[9] France is untypical in having strictly separate capital and current budgets (for both spending and revenue); however, the budget proposals for each line ministry are negotiated and drafted together by the relevant ministerial "desk" in the Ministry of Finance. The Netherlands had separate capital and current budgets from 1927 to 1976; subsequently there has sometimes been pressure to return to this arrangement, from those who believe that this may lead to more public investment, but these arguments have been resisted. In many countries there is a stronger distinction between capital and current expenditure planning in *regional or local* government. However, this is generally for reasons which do not apply to central government; but which arise from the complex relationships between the different levels of government.

powerful teams in recipient governments to promote the aid financing of capital. This further isolates capital from current planning.

4.2 Public Investment Programmes and dual budgeting

Many countries have been encouraged by the World Bank to developed Public Investment Programmes (PIPs), to help increase coordination of planning and in particular the prioritisation and subsequent management of aid finance. However the World Bank is also a perceptive critic of the dangers presented by PIPs. It is an especially severe critic of the separation of capital from current budgeting (dual budgeting[10]), which it suggests "may well be the single most important culprit in the failure to link planning, policy and budgeting, and poor budgetary outcomes" (World Bank, 1998).

Separation of the planning and budgeting of capital (or development) spending from current spending brings serious problems. This is important in particular for EU funds, and for World Bank funds, which finance both capital and some current spending, (for example on policy reform or project preparation) and are also set within a medium-term framework.

Separate planning of capital brings the danger of over investment, because capital is often seen as inherently more virtuous, or at least more politically rewarding, especially if it can be approved separately from its associated current spending. One consequence can be capital projects which are left only partly completed, or not used on completion, because of a lack of finance which good planning could have foreseen.

Separate planning also duplicates work, using scarce administrative resources. It contributes to communication problems and political tensions between ministries or ministers. It discourages integrated forward planning within spending units.

Even without dual budgeting, PIPs themselves present serious problems of their own.

PIPs encourage countries to focus on projects, as opposed to policies and programmes. As with dual budgeting, this distorts priorities and tends to generate unsustainable future commitments.

These problems are increased by the ratcheting effect that, when a project is first proposed, there is too little data to assess its worth reliably, but once it is in the PIP, political momentum builds up; it is difficult to remove it. They are also increased by the still widespread perception that investment of itself drives economic growth. A PIP does not naturally support policies for structural change to improve the use of resources.

PIPs tend to centralise project decisions, rather than requiring the line ministries and agencies responsible for sectoral programmes to take responsibility. A related problem is

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[10] A dual budget system may entail one budget for current spending and one for capital, or sometimes a separate "development budget" for aid-financed spending, including some current spending.

the inclusion sometimes in the PIP of public enterprise investment which is not funded through the government budget, directly or with a guarantee. This also weakens management autonomy and accountability.

However growing understanding of these problems has led to important changes in the way that PIPs are perceived and managed. One change has been towards a more realistic use of analysis. The belief that economic analysis alone can provide a clear cut measure of the a project's value has given way to consideration of a broader range of criteria, including for example incentives and the appropriate role of government. Heavy economic expertise is now more often concentrated on a small number of large projects.

There is also increasing acceptance that spending commitments and plans for *current* spending should be the driver of government budgeting, and that the PIP and capital or development budgets should be developed within a medium term budgeting framework. There is also more emphasis on sectoral envelopes, within which line ministries have discretion to select projects up to a specified share of the PIP.

Nonetheless most transitional and developing economies have significant problems with capital budgeting, some of which could be much reduced with expert and politically supported reform.

4.3 The appraisal of capital projects

There are differences of view within and between OECD countries about some technical aspects of appraisal methodology. However, investment appraisal in government is in all cases seen as a mainly economic analysis of the national costs and benefits which might be generated by the proposed investment, or by alternative options. Alternative options may include alternative locations, size, design, or timing of a new or renovated prison or hospital or defence establishment, and – especially – the alternative of not undertaking the investment. The appraisal in principle includes all costs, certainly including the costs of using the asset throughout its lifetime. It preferably includes sensitivity analysis where costs or benefits are uncertain. It also considers items such as legislative impact or environmental impact, and any impacts on other sectors.

Crucial requirements are:

- well-informed and open-minded consideration of alternative options, against well-defined policy objectives;
- taking proper account of opportunity costs (so that the use of labour, for example, is normally recognised as a cost, and not seen instead as a benefit);
- consideration of factors which cannot be explicitly valued in money terms as well as those which can.

This contrasts with what is often understand by appraisal in transitional economies, which is an *engineering* analysis of an already well defined proposal. The capacity of countries in

transition from command economies to undertake engineering analysis is often strong; whereas the capacity for *economic* analysis, to question initial proposals, is usually weak except, sometimes, in one or two of the most progressive ministries.

However capital investment approval is a uniquely effective point at which to require a clear justification of expenditure. It is a point at which the proposer of the investment can be faced with a strong incentive to demonstrate good value, by making this a condition of approval. It is also the last point at which a proposal can be cancelled, delayed, or heavily modified without a high cost.

We turn in later sections to more technical aspects of project appraisal, and to how project analysis feeds into political decision making.

4.4 Golden rules, balanced budgets and limits on borrowing

Some countries have or are developing explicit links between the level of net public investment and the level of public debt. This may include the "golden rule", that increases in the stock of public debt should not exceed net public investment.

There has also been increasing interest in recent years in conventions limiting the budget balance, and conventions limiting the total level of public debt. These developments were reinforced in the European Union in the 1990s by the conditions for membership of the Monetary Union, which put limits on budget deficits and the total level of debt. These have been now succeeded by the Stability and Growth Pact, which limits the level of public sector deficit.

The golden rule and budget balance are specified in the German Constitution. However, a law was passed in 1967 – at a time when public investment was still widely seen as an instrument for controlling unemployment - allowing exceptions for federal and state governments where more public investment is considered justified by macro-economic conditions. This exception has been applied many times. The Netherlands applied the golden rule between 1927 and 1958. A new UK Government introduced a policy in 1997, under which the budget is balanced over the economic cycle, with no exceptions, and a target is set for the level of government debt.

Control of public debt is at least as important in transitional and developing as in developed economies. However, the first priority is to develop reliable measures of public assets and, especially, liabilities. Information on capital assets and liabilities needs to be monitored, and some countries may find it helpful to establish some form of golden rule.

4.5 Capital accounting

The way that capital is presented in accounts ought not to affect policy decisions. But in practice the effects are often strong.

Few if any governments resist the temptations of off-budget capital finance. This is true where the external finance costs less than direct government borrowing (as with developing economies, where the external finance may bring inefficient commitments to later spending). It is also true where the external finance costs more (as in developed economies, although it may bring offsetting gains in management efficiency). It is usually unrealistic to expect a government to apply an accounting level playing field to finance which it borrows on its own account and to external financing of specific projects. However ministries of finance in particular should try to establish accounting conventions which do not seriously mislead governments and parliaments about the commitments being acquired by off-budget finance.

In accounting and budgeting for publicly financed capital some countries have developed procedures such that, once spent, the capital does not disappear from view, but remains on the accounts, as in the private sector, with depreciation and capital charges. However this development (under "accrual accounting") is best left until very strong procedures have been developed for cash accounting.

One of the many problems of accrual accounting and budgeting, which applies to a lesser degree to conventional budgeting, is the choice of price base. The most common method of budgeting in all countries is in terms of cash. Each year's budget is expressed as cash, having regard to the expected change in the level of prices. This means that if inflation is higher than expected there is a squeeze on the volume of public spending, which is generally what sound policy would require. However accrual accounting faces the problem of whether the depreciation charged to the capital should recover only the cash expenditure, but with a nominal interest rate, or the real cost of the expenditure, with a real interest rate.[11] Different countries handle such choices in different ways, all of which present difficulties.

5 Planning of sector and sub-sector programmes

5.1 Sectoral budgeting compared with central budgeting

The need for and conditions for effective linkages between policymaking, planning and budgeting apply no less at the sectoral (or institutional[12]) and sub-sectoral levels than to the centre. However they also raise issues of their own.

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[11] The use of a real interest rate with "current cost" accounting provides a truer picture of the cost of government programmes, but faces conflicts between accounting tradition and economic consistency.

[12] We do not develop here the arguments for and against sectoral budgeting as opposed to administrative budgeting – e.g. setting a sectoral budget for "education expenditure" as distinct from an administrative budget for "the ministry of education". The trend in developed countries is towards administrative budgeting, on the grounds that this imposes more direct accountability on ministers and ministries to deliver their performance targets. The tendency in many transitional and developing countries is still to prefer sectoral budgeting – partly because this was the fashion when aid programmes were first established and partly because it was the basis of central planning in command economies.

- The most obvious difference is that efficient management of sectoral budgets depends heavily upon the confidence about future funding which can only be provided by efficient central budgeting – and the same applies to sub-sectors with regard to their own sector budget managers.

- Another difference is that budgeting within a sector needs generally to be more analytically intensive than the negotiation with the centre of the budget for the sector as a whole. The setting of sub-sectoral budgets within the main sectoral budget is often less political, and based more directly on analysis carried out in, or for the relevant line ministry.
- Another difference is that sectoral budgets are, or should be, tied to quite detailed objectives and performance targets and performance measures, which have been agreed with the centre. (The central budget of course has its own macroeconomic objectives, but these are often more in the nature of constraints, and they are not accountable to any higher authority except sometimes to international institutions.)

- Yet another difference is that sectoral and sub-sectoral budgets sometimes need to cover much longer periods than the three years typically chosen for centrally approved budgets. Sometimes, as in transport and energy, this is because of the long lead times to introduce new assets, which themselves have long lifetimes. Sometimes it is because of the long lead times required for training, for example in education or health services to handle future changes in demography. Sometimes it is because of the long lags in introducing changes to previous government commitments, in fields such as pensions or other welfare support.

5.2 Objectives and performance measurement

Effective planning and budgeting needs clear objectives. Increasing delegation (and contracting out) has led in many countries to much more interest in performance goals, performance targets and performance measurement, against which managers or contractors can be held accountable.

The construction of effective performance measures and targets is surprisingly difficult. The difficulties have over the years become more widely recognised, and some institutions have, with considerable effort, developed satisfactory frameworks for some applications. The difficulties, and the current situation, are well described in Chapter 15 of the OECD's "Managing Public Expenditure" (Allen and Tomassi, 2001). This includes a discussion of the potential confusions between performance orientation, performance indicators and performance budgeting; the need for clarity about the concepts of input, output, outcome, impact and process; and the concept of a hierarchy of performance criteria and indicators, measuring compliance, efficiency and effectiveness.

The "science" of performance indicators has developed acronyms to describe what qualities they need. One popular one is CREAM, standing for Clear (precise and unambiguous); Relevant (appropriate to the objective at hand); Economic (available at reasonable cost);

Adequate (providing, by itself or in combination with others, a sufficient basis for assessing performance); and Monitorable (amenable to independent scrutiny). Another acronym, which adds important further qualities but overlooks others, is SMART, standing for Specific, Measurable, Agreed, Realistic and Timely.

5.3 Policy and programme reviews

Sectoral policy and hence budget development should ideally be built upon sectoral and sub-sectoral reviews. A review may be initiated by the line ministry or be imposed from a higher level. It may originate with a crisis, or it may be part of a rolling programme. A review may be wholly within one ministry. More often it will be led by one ministry but also involve a few others. This is especially likely for reviews with important implications for the environment. A review may be designed to bridge ministries and conventional budget divisions – addressing a cross-departmental issue such as environmental and medical impacts on health, or the prevention of crime.

This analysis will normally include the budgetary consequences (capital and current expenditure, and revenue, across all programmes) of any proposed change of policy, and an assessment of the impacts on private sector companies and individuals. In a developing economy it should normally include a realistic assessment of the full costs of maintaining relevant existing policies, including for example proper maintenance and sustainable salaries. In a developed economy a substantial environmental review is likely to entail public consultation and strong pressures from environmental lobby groups and perhaps from industry. A review is also likely to generate defensive responses from any agency which feels that its authority or budget is threatened.

6 The role of quantitative analysis in government policymaking

6.1 Types of quantitative analysis

In the 1960s and early 1970s, great hopes were placed on techniques such as *cost-benefit analysis* (CBA), in which most or all of the outputs of a public investment are explicitly valued in monetary terms[13], as a way of deciding scientifically the optimal level and distribution of investment. However experience showed that for most areas of public investment this was much too ambitious. Even in those areas where there is useful scope for such scientific analysis (notably transport), there are usually some major impacts, including most environment impacts, for which there is no agreed monetary value. In other areas of public policy, such as law and order, defence, employment, regional development, industry,

[13] The term cost-benefit analysis (CBA) is used here in its most common usage, to describe analysis which includes valuations of important costs or benefits for which there is no market price. However the term is sometimes used to describe *any* kind of quantitative comparison of costs against benefits. There is also no established convention as to whether a CBA includes any, or some, or all of the factors in the particular case for which no explicit monetary valuation is available.

education, health, or public administration, it is rarely possible for outputs to be explicitly valued.

The 1980s and 1990s saw important advances in CBA, for example in the valuation of safety and environmental impacts. However, most numerical analysis of public sector investments in developed economies is confined to *cost-effectiveness analysis* (the comparison of the input costs of alternative ways of producing similar outputs). Sometimes it is confined even more narrowly, to *financial analysis* (comparing the effects of alternative options on cash flows).

6.2 The gap between formal analysis and policy decisions

Even with cost-benefit analysis, there will nearly always in practice be important factors which cannot be explicitly valued. (In particular, decisions about *distribution*, as opposed to efficiency, are inherently political: they are about how much the government and the country care about the affected parties.) There is therefore a gap between the analysis and the policy decision. The conventional approach to this gap is that economic analysis informs policymakers. The policymakers then considers the economic analysis alongside any other factors which they consider to be important, such as international opinion, or satisfaction of lobby groups, or the distribution of costs or benefits between different interests.

Sometimes this approach is the best that can be done. However there is often scope for further analysis to make these other factors more transparent, to encourage ministers or officials to recognise the other factors explicitly, and to quantify the trade-off between these factors and the costs which alternative policy decisions would impose.

Sometimes this can be formalised in the techniques described by the European Commission and generally by government officials as multi-criteria analysis (MCA). These techniques lack the external discipline of CBA, being devices to focus ideas and judgements. Unlike CBA, they do not provide independent valuations. They are therefore easy to misuse and misunderstand and they are widely distrusted by economists. However in many environmental fields these techniques could add substantially to the usefulness of economic analysis.

6.3 Cost-benefit valuations

A major feature of cost-benefit analysis (CBA) is the monetary valuation of non-marketed impacts. These may be impacts which are policy objectives, such as the savings in road congestion costs which might be achieved by an improvement in public transport. Or they may be external effects such as environmental pollution, which may affect the welfare of people living near a factory or a noisy road, or the benefits to the wider

economy of training provided by a company, but transferred to others when trained staff move to other employers.[14]

Private sector companies are concerned about the external costs or benefits of their activities only insofar as they are "internalised", by adverse or favourable publicity, or by government regulation, or by the preferences of the company itself. However the government, if it is concerned with public welfare, is always closely concerned with the wider impacts of both its own and others' activities.

The monetary valuation of some kinds of impact, notably impacts on people's time and on risks of injury or death, is in many countries fairly well established and routinely applied to compare these with other costs and benefits. In other applications, techniques of valuation are continually developing. So too is understanding of the many difficulties and biases to which they are subject. However most non-marketed impacts still cannot be valued – either because it is impossible to derive a well based monetary value which is politically acceptable, or because the effect is unique to a particular project and the research required to value it (usually by measuring people's willingness to pay for a better outcome) would take too long or be too costly.

Another major element of CBA (and also of cost-effectiveness analysis and of financial analysis) is the comparison of costs and benefits over time. This we address in the next two sections.

7 Comparing costs and benefits over time

7.1 Why does time matter?

Costs or benefits which are apparently identical except in their timing are rarely, if ever, equally important, for one or more of several reasons:

i) The real monetary value of the unit in which the cost or benefit is measured changes over time. This applies for example to quantities measure in cash terms, when there is inflation. It applies to marketed commodities measured in physical terms, such as labour, or energy. It applies to quantities which are measured in monetary terms at "today's" valuations, when their valuation is likely to change over time as people become richer.

ii) The utility which people enjoy from a marginal dollar declines as they become richer. Other things being equal, most people would rather have an extra unit of income when they are poorer than when they are richer.

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[14] An "externality" is an incidental cost or benefit of an action by one party, which falls on another. In formal economics it defined more rigorously and slightly more narrowly as being outside the price mechanism. For example: "An externality arises whenever an individual's production or consumption decision directly affects the production or consumption of others *other than through market prices*." (Begg, Fischer and Dornbusch, 1984).

iii) While most people care about future populations, most people do not care quite so much about more distant populations as about those closer in time.

iv) The resources used to produce the earlier cost or benefit might instead be saved or invested, to produce a smaller net cost or a larger benefit in the future.

v) In addition to project-specific risk (which should be considered case by case) there may be some non-negligible chance that the future cost or benefit would not in fact occur, because of some natural or man-made world catastrophe such a asteroid collision, or epidemic, or nuclear or biological war.

vi) At a more mundane level, the cost or benefit may simply be more convenient in some periods rather than others – for example in meshing in with other investments, or expected new market developments, of simply cycles in budgetary pressures.

The first of these items, although at a broad technical level uncontentious, is widely overlooked or misunderstood in practice, especially in public environmental debate. We discuss it in section 7.2.

Items (ii) to (v) are aspects of the problem of time discounting[15], which is technically more contentious, in many dimensions – some economic, some ethical. This is discussed in sections 7.3 and 7.4. Section 8 covers the significantly different issues which arise in relation to exceptionally long periods, beyond say half a century and extending to millennia.

Item (vii) is often of real practical importance over periods of several years. However it is in principle uncontentious and very case specific and we do not discuss it further.

7.2 Changes over time in prices and other monetary valuations

7.2.1 Changes in the general price level

In quantifying costs and benefits in future years, care is needed in handling general inflation – that is the decline (or possibly rise) over time in the value of the dollar or other monetary unit used for the analysis.

Future costs and benefits can be valued in *nominal terms* (or cash terms, or current prices), or in *real terms*. If the general price level[16] changes, real and nominal values in future years will

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[15] In every developed country the technique of discounting is used in the public and the private sector, to compare costs and benefits which are expected to occur at different times. The technique divides future costs or benefits by a factor $(1+r)^n$, where n is the number of years after a *reference date* (or baseline date), and r is the *discount rate*. (Or sometimes no discount rate is specified, but a calculation made of the discount rate at which the NPV is zero. This rate is described as an *internal rate of return* (IRR). However this is rarely, if ever, a useful measure in the public sector.)

[16] Usually expressed, as for example in IPCC (2001), as a GDP deflator or some form of consumer price index. The choice is usually based on availability and convenience; it rarely makes any material numerical difference.

differ. Suppose the general price level in 2010 is expected to be 20% higher than it is in 2002. then $120 in cash terms in 2010 will be equivalent to $100 "in real terms", in the money value of year 2002.[17] If the numbers to be discounted are in real terms, they should be discounted at a real discount rate. If the numbers to be discounted are in nominal terms, they should be discounted at a nominal discount rate. If inflation is constant, the nominal rate will be higher by an amount near enough equal to the rate of inflation.

Carrying out analysis in real terms has many advantages. It makes all the *undiscounted* costs and benefits over time directly comparable, because they are all valued at the same money value. It allows a discount rate to be specified which is independent of inflation, and which thus needs to be revised only infrequently. Analysis in real terms also often avoids the need to forecast general inflation.[18]

7.2.2 Changes in relative prices or other monetary valuations

More confusing than general inflation are changes in *relative* prices. Sometimes the forecast inputs of a project or programme may be specified in terms of physical quantities – such as numbers of staff, or area of floor space. When these inputs are converted to monetary values "in real terms", the valuation should reflect expected future changes in relative prices. Thus, for example, the unit cost of staff is likely to increase with economic growth.

Usually more important are the changes in monetary valuation over time of impacts such changes in physical risks, or in levels of health, or leisure time, or environmental impacts such as visual amenity, or loss of diversity or fauna or flora, or noise. The real monetary value to future populations of most of these impacts is likely to increase over time if incomes increase, probably at least as rapidly as per capita income itself. This is often misunderstood in public debate. It is often argued that a discount rate designed for discounting *monetary* impacts is ethically inappropriate for something so special as risk to human life or the environment. But this is often asserted without understanding that the real monetary values of such impacts, before discounting, are usually assumed to increase over time.

7.3 Principles of time discounting and capital costing in government

7.3.1 Basic concepts

A clear presentation of public sector discounting needs to distinguish between two concepts:[19]

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[17] Unfortunately the term "year XXXX prices" is widely used to describe valuations at the general price level or money value of the year, say 2002. This is a source of confusion in the handling of relative price changes. People sometimes misunderstand it and believe that it means that each *individual* good and service is valued at its year 2002 price. (Indeed "year XXXX prices" is also sometimes used in this second sense!)

[18] Although general inflation has to be forecast if some of the numbers are specified in nominal terms. This might apply for example to some rental contracts.

[19] The framework described here is based on work first developed in the UK Treasury in the 1980s. It is consistent with the mainstream welfare economics approach to these issues, as summarised most notably by Lind (1982).

- *Social time preference*: This quantifies, as a discount rate, the extent to which society prefers national benefits to be enjoyed sooner rather than later (and costs later rather than sooner).
- *The cost of capital*: This is the rate of interest at which public capital should be costed, to price it efficiently (and fairly) relative to pricing in the private sector. It measures the opportunity cost of locking up capital in public sector assets. It is derived from the risk free rate of interest, with adjustments for tax and risk.

Also closely relevant is a third concept:

- *The opportunity cost of public expenditure*: This measures the cost of using public expenditure, over and above its direct monetary value. It includes the opportunity cost of diverting investment from the rest of the economy, and any other effects of a marginal increase in taxation. It is a measure of the loss of consumption incurred by raising one extra dollar of taxation. It is the ratio of the cost to the economy of $1 of public expenditure relative to $1 of consumption. It applies equally to all public expenditures or receipts.

7.3.2 Principles of time discounting in the public sector

In practice the great majority of applications of discounting in government are to *cost-effectiveness analysis*, in appraisals which compare alternative ways of providing a service which has no well defined market value. This may be, for example, alternative ways of providing a hospital, or school, or road, or prison, or piece of defence equipment, or public office accommodation. In cost-effectiveness analysis the discount rate is used to compare alternative time streams of public expenditure.

The criterion for this comparison over time is social time preference. Opportunity cost is irrelevant. Each dollar of public expenditure may have an opportunity cost of more than one dollar, but this applies equally to all the expenditures.[20]

The economic academic literature, and international organisations, focus much more on the techniques of *cost-benefit analysis.* In this case public expenditures are usually being compared with later benefits, such as lower risks of injury, or time savings, or better irrigation, or flood protection, which are valued at market prices paid by the private sector, or by estimating people's hypothetical willingness to pay for these benefits. Typically, in CBA, costs in the numeraire of public expenditure are being compared with benefits in the numeraire of consumption.

However it arranges and updates the issues to meet the practical needs of day to day project and policy analysis and costing in government. It is applied in the UK, and has been broadly reaffirmed in a recent review of the discount rate for the Treasury by academic experts. It is summarised in the current guidance issued by UK central government (HM Treasury, 1997).

[20] This simplification was first recorded in the literature by Feldstein (1970),.

Public expenditure has to be financed. This diverts some resources away from other investment. That investment would have produced a flow of consumption which, when discounted at the social time preference rate, would probably be greater in value than the value of the initial investment. The raising of extra public finance may also impose other social costs. For these reasons a dollar of public spending is widely accepted as costing the nation more than a dollar of consumption.

In practice this is handled by most governments by the rough and ready technique of public expenditure rationing. Cost-benefit valuations of non-marketed benefits, such as environmental improvements, are simply not given as much weight as public spending. Some countries may choose to formalise this by quantifying an opportunity cost for public expenditure.[21] However this opportunity cost is a ratio to be applied when comparing public expenditure with consumption. It is not a contribution to the discount rate.

Thus for practical use a government discount rate, however it is presented, should be based conceptually on social time preference. This is conventionally derived as described in section 7.4 below.

7.3.3 Principles of capital costing

Public sector activities often need to be *costed* in a way which costs capital as the sum of a depreciation charge (to repay the capital) and a cost of capital or interest charge. This generally applies to services for which the costs are recovered from users. As noted in section 4.5 above, some countries use accrual accounting and budgeting to cost and budget for all public expenditure programmes in this way.

This cost of capital, to be fair and efficient, would be equal to the real risk free interest rate[22] plus two adjustments. One adjustment is for tax, to offset any disadvantage the private sector might otherwise face from paying a higher quantum of tax on its generally higher rate of return. The other adjustment is for the risk.

The estimation of the tax adjustment is conceptually uncontroversial but empirically difficult. For the tax paid on interest payments on government debt, and by private sector

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[21] Different experts propose widely different numbers. In the UK there is a consensus for a premium on public spending relative to consumption of around 30%, but some literature derives premia of 100% or much more. Such high numbers may follow from one or more of several doubtful assumptions. They may assume for example that public expenditure is money diverted entirely from private investment, whereas it usually diverted largely from consumption. They usually assume that the return from private investment is wholly a social benefit, whereas the return in excess of the risk free rate plus tax is a cost, compensating lenders for the risks associated with, in particular, equity investment. These high numbers are often based on assumed private sector real rates of return which are far in excess of the historical long run real return to equity in the US, UK and German markets of around 6 per cent (Siegel, 1994).

[22] The financial economics literature often takes very short-term government debt as a measure of the risk free-rate, to avoid the problem that there is little data on expected inflation over longer periods – nor, therefore, on investors' expected *real* returns on longer term government debt. However, for deriving a cost of capital for general use an estimate is needed for the expected cost, in real terms, of medium to long-term government debt – as measured for example by returns to indexed government debt, where there are such markets,

companies on their profits, the tax rates are known; but an accurate estimate of the impact of allowances generally requires substantial research. In practice, in this context, tax paid on government interest payments is often ignored. Research in the UK suggested that the tax paid by private sector companies on marginal returns to capital amounted to between 1 and 2 percentage points in the 1980s , and about 1 percentage point in the 1990s.

For risk, in sharp contrast to tax, the adjustment is empirically fairly straightforward, but conceptually controversial.

Many financial economists take the view that capital markets are near enough perfect, so that the cost of any risk premium observed in private financing must apply equally with public financing. The usual welfare economics view is that there are important differences between public and private financing.

One difference is that equity markets, although they are essential to free capital markets and the huge benefits which they bring, are subject to erratic and sometimes very persistent swings which impose a cost on investors, for which there is almost no analogue with public financing. Another is that private financiers may face asymmetric incentives. As Arrow and Lind commented in their famous paper on public sector risk neutrality (Arrow and Lind, 1970), for corporate managers "careers and income are intuitively related to the firm's performance. From their point of view, variations in the outcome of some corporate action impose very real costs". This is so even when "from the stockholder's points of view, risk should be ignored".

The only corresponding cost of risk with public financing appears to be that of variations in future costs and benefits which vary systematically with (i.e. are correlated with) people's incomes.[23] The effects of these variations can reasonably be estimated by standard welfare economics, as illustrated in the accompanying box. The effect appears to be in practice negligible.

It follows that the real cost of capital for an efficient and fair comparison of public sector with the private sector might generally be, after adjustment for tax and risk, not much more than 1 percentage point above the real interest rate on medium term government borrowing.

The effect of systematic risk on the present value of future marginal changes in income

The percentage by which the certainty-equivalent of a future cost or benefit, C, is reduced below its expected value is give by the equation[24]

[23] A fixed benefit, independent of income, is more valuable than one which has the same average value, but which is higher when incomes are high and lower when incomes are low.

[24] This is readily derived from a standard equation, as presented for example by Layard and Walters (1978). It seems reasonable to apply this equation to small fluctuations of which people are not directly aware (so there are no complication such as the regret people may feel when the value of their equity savings falls). The fluctuations in equity markets impose a larger premium (of at least a few percentage points) than the equation would imply.

$$100\delta C / C = 100b\rho\sigma_c\sigma_y$$

where b is the elasticity of marginal utility, as defined above;

ρ is the correlation coefficient of C and per capita income, Y;

and σ_c and σ_y are the proportional standard deviations of C and Y.

For a cost or benefit which varies in exact proportion to Y (which might be a reasonable assumption for wages, for example), $\rho=1$, and $\sigma_c=\sigma_y$.

The magnitude of σ_y can be estimated empirically, for an economy with a long and fairly stable history, by comparing outturn values of GDP with the value which would have been expected say 10 or 15 years beforehand. For the UK economy this gives a standard deviation of about 10% over 15 years, and slightly less over 10 years. For other stable economies, it might be reasonable to expect similar variability.

Taking values of b=1.5, $\rho=1$, and $\sigma_c=\sigma_y=0.1$ reduces the certainty-equivalent of C by approximately 100x1.5x1x0.1x0.1 = 1.5%. This is equivalent, if discounted over 10 to 15 years, to an increase in the discount rate of about 0.1 percentage points.

This effect can be quantitatively significant in some extreme cases, such as an aid project which increases farmers' incomes in drought years but not in good years. It is in any case an important issue in any discussion with economists who approach discounting from the financial economics perspective. However it appears to be in practice to be quantitatively unimportant in the great majority of applications.

Although the public sector cost of capital is a different concept from time preference, the concepts are in practice always either presented by governments as if they were the same, or recognised as different but given the same numerical value. In practice the derivation in section 7.4 below for time preference implies slightly higher figures than those derived here for the cost of capital. However, given the uncertainties, the choice of the same number for both may often be broadly defensible on empirical grounds. On administrative grounds it is probably the only workable solution. An attempt by any government administration to apply different numbers as a general rule (as opposed to sometimes considering different numbers in rare special cases) would almost certainly end in confusion.

7.3.4 The relevance (or irrelevance) of private sector returns

In the private sector there is no corresponding conceptual distinction between "the cost of capital" and the discount rate. Conventional private sector financial practice is to estimate the relevant cost of capital and use this as the discount rate.[25] Many financial economists carry this approach across to the public sector. For example Grout (1997) proposes that a discount rate close to the risk free interest rate should be used for discounting public sector costs, but that for discounting benefits the public sector should a rate derived from similar applications in the private sector. The arguments against this (setting aside any practical difficulties of deriving a different rates for different applications) are that the risk premia are mainly not applicable to the public sector, and that market interest rates are not a good measure of society's preferences over time. However one country – New Zealand – has adopted a private sector style financial approach, with different rates for different costs and benefits.

[25] As set out for example in successive editions of Brealey and Myers (1981 – 2000).

It also is sometimes argued that the public sector should discount at a rate equal to the private sector return in capital because this is "the opportunity cost of capital". Indeed this has attracted the respectable sounding term "descriptive approach" in the debate on global warming (to which we return in section 8). The argument's technical weaknesses include those noted in a footnote to section 7.3.2 above, on valuing the opportunity cost of public expenditure. However its fundamental weakness is the failure to recognise the difference between a true compound return and a return which describes a cash flow which is mainly consumed.

Even if all public investment were diverted from private investment, and even if the risk premium in the private return were a measure if social benefit, and even if the return to private sector investors were as high as 7% or more, this would still have implications only for the ratio to apply in comparing public expenditure with consumption. The *compounding* effect over time of private investment cannot exceed the economic growth rate.[26] If the economic growth rate were higher than social time preference, *then* there would be case for discounting at that growth rate, but it would be very exceptional indeed for an estimate of social time preference to be lower than the expected growth rate.

A related argument is that some average of, or compromise between, a social time preference and private sector return, is a simpler way of dealing with the opportunity cost of public expenditure. This has some intuitive and political appeal, but (setting aside the many issues about the magnitude of the private sector return) this would be irrelevant for the great majority of applications, because they are cost-effectiveness comparisons, where the opportunity cost of public expenditure applies equally to the costs and benefits, and so "cancels out". And for cost-benefit analysis it is a seriously distorted way of applying such ratio, because the effective ratio depends very heavily, and arbitrarily, on the time distribution of the project.

7.4 Derivation of a public sector discount rate

Serious analysis of the public sector discount rate enjoys an extraordinarily extensive literature, extending from Ramsey (1928). For the reasons explained above we focus here on the derivation of a social time preference rate, which defines the extent to which society prefers national benefits to be enjoyed sooner rather than later (and costs later rather than sooner). In doing so we follow the mainstream welfare economics literature. As noted earlier, we do not in this section address the special issues raised by the very long term, beyond say half a century; we turn to those issues in section 8.

It is tempting to suppose, and some economists claim, that society's preferences over time can be adequately observed from real interest rates. However there are several reasons for rejecting this. One reason is the huge range of rates. More fundamental is the fact that people save for many reasons, including for example the provision of a buffer against

[26] A rare example of explicit recognition in the literature of the infeasibility of a compound private sector return exceeding the national economic growth rate is Rabl (1996).

uncertainty, and as an insurance against lack of employment income in old age. Even if real interest rates were zero or negative (as they were in some countries in the late 1970s) people would continue to save. The interest rate tells us rather little about individuals' time preference, let alone about their preferences for government behaviour on their behalf.

The welfare economics literature therefore approaches the problem from first principles. It conventionally derives a social time preference rate on the basis of two components:

1) As people's incomes increase, the utility which they enjoy from an extra dollar declines.
2) People may care slightly less about the marginal utility of future populations than they do about the marginal utility of the present generation. This effect is often described as "pure time preference".

The first component, which allows for the effect income growth on the marginal utility of money, is relatively uncontroversial. It adjusts for the fact that an extra dollar usually brings much less utility to a billionaire than it does to someone living in poverty.

This component is conventionally derived from an estimate of the "elasticity of marginal utility of income". It is usually assumed that, over the range of income of interest, this elasticity is constant.[27] Empirical evidence on its value is inconclusive, but values in the range of 1 to 1.5 are defensible and consistent with common experience (such as, for example, a widespread belief that taxation should take a higher percentage of high incomes than of low incomes).[28]

If the elasticity is b, and the rate of growth of per capita income is g, the contribution of this effect to the discount rate is bg – so that an elasticity of 1.5 and per capita income growth of 2 per cent per year would imply discounting on this account alone at about 3 per cent per year.

The second component, that people may care slightly less about the marginal utility of future populations, is generally numerically smaller, but much more controversial.

In the literature it is regarded very often as an issue on which "experts" – usually in this case economists - should seek to impose their view. However these personal opinions differ.

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[27] This is not unreasonable. It implies that richer and poorer populations would be prepared to forego the same percentage of their income in exchange for being relieved of the same proportionate small variability in their income. The elasticity, for an individual or household, is given by YU''/U', where Y is income; and U' and U'' are the first and second derivatives of utility with respect to income. The elasticity is a negative quantity, but is conventionally quoted and discussed, as in this paper, as a positive number.

[28] Some estimates are presented in Arrow et al (1996), which find that this elasticity is "1.5 or less". If it has a value of b, this implies that a household with Z times the income of another (otherwise similar) household, enjoys only $1/Zb$ as much utility from each extra $1 of income. Thus if Z=2 (i.e. household A has twice the income of household B) and b=1, then the poorer household B enjoys twice as much utility from an extra $1 as does the richer household A.

The early English economists (Ramsey, 1928, Pigou, 1932, Harrod, 1948) took the view that to give any less weight to the utility of future generations was ethically indefensible. Later defenders of this moral high ground include Koopmans (1965), Solow (1974) and Cline (1999).

One well developed, persuasive argument against applying such a view is that it implies implausibly high savings ratios, of the order of 1/b, where, as before, b is elasticity of marginal utility. If b is equal to or less than 1.5 this implies a savings ratio of at least 2/3. This argument and its literature is set out very clearly by Arrow (1995), where Arrow expresses his own view that *"the strong ethical requirement that all generations be treated alike, itself reasonable, contradicts a very strong intuition that it is not morally acceptable to demand excessively high savings rates of any one generation, or even of every generation"*.

However it is not clear that economics, or for that matter any other profession, has a special claim to judgement about this ethical aspect of weighting future relative to the present populations.[29] The trend in the politics of ethical issues is increasingly towards exploring the preferences of people as a whole. This has its own problems of measurement, and the dangers of distortion by lobby groups, but it better reflects the idea, in democracies, that people elect governments to best serve the population's interests. We quote in section 8 some signs of a healthy shift in this direction on time preference.

It is all too clear that most people are at least slightly less concerned about small changes in the welfare of *contemporary* populations with whom they have less cultural affinity, and it seems fair to suppose that this extends to some degree to future populations.

In the words of Arrow (1995), *"very tentatively, it would seem that the pure rate of time preference should be about 1%"*. There is a practical case for also including in pure time preference an ethically neutral factor for the small general risk of a man-made or natural catastrophe which destroys much of life on earth, or of the physical assets then in place, as noted under item (v) in section 7.1. This might justify a total figure for pure time preference in the range of 1 to 2 per cent per year.[30]

To summarise, the conventional formula for social time preference (STP) is

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[29] The point is nicely expressed by Kopp and Portney (1997), commenting on the coverage of discounting in Second Assessment Report of the IPCC, which was similar, in its references to "prescriptive" and "descriptive" approaches" to the corresponding contribution to the Third Assessment Report (IPCC, 2001). Kopp and Portney note that *"the prescriptive approach is premised on the view that there is an ethically or morally "correct" rate of discount to use in project evaluation – a rate that is independent of the views of the present generation (save, of course, those who get to determine what the morally just rate is). Yet those of us who teach benefit-cost analysis and advocate its use in public policymaking generally point approvingly to its democratic nature. That is, we argue that BCA is attractive because it is based in the preferences of all those around today."*

[30] In cost-benefit analysis some costs and benefits – such as personal risk, or some environmental impacts – have an impact on personal utility which is almost or completely independent of personal income. This is conventionally handled by ascribing increasing monetary values to these effects through time, and then discounting them at the standard discount rate. It may sometimes be simpler and clearer to value these effects in all years at "today's" valuation, and then discount them at the pure time preference rate.

$$STP = bg + a$$

where b = elasticity of marginal utility of income
g = per capita rate of growth of income
and a = pure time preference

This leaves the contentious issue of risk. The usual welfare economics academic convention is to exclude risk altogether from the public sector discount rate. However in practice it is easier to defend the rate if the different kinds of risk are clearly recognised and some explicitly included in the rate.

A factor for the small general risk of catastrophe has just been noted – this is after all one of the first issues that many people raise when addressing the question of sacrifice for future populations, and it is not an issue which is considered in estimating specific project risks.

It can also be presentationally helpful to include explicitly a factor for the typical variability of future public expenditure costs and benefits with future per capita income. As illustrated in the box in section 7.3.3, this appears to be quantitatively trivial. However it addresses explicitly the increasing criticisms of economists committed to the perfect capital market concept developed in financial economics in the 1970s and 1980s.

This leaves two other types of risk which, by almost universal consent of economists of all schools, are best left out of the discount rate, and handled separately case by case.

One of these risks is optimistic bias in estimates of project costs and befits. This is discussed in the following section.

The other risk is *non*-systematic variability risk (i.e. variability which is not correlated with income). This was addressed long ago by Arrow and Lind (1970) and their conclusion – that it is for most practical purposes costless in the public sector, has become widely accepted. This conclusion is sometimes attacked by financial economists, but the more common financial economic argument (as for example in Brealey and Myers, 1984-2000) is that non-systematic variability risk is also costless in the private sector.

7.5 Other arguments applied to public sector discount rates

Discussion within OECD governments about the setting of a public sector discount rate often raises the following issues.

- It is fairly common in the private sector for required *ex ante* rates of return to be increased as one way of **offsetting optimistic bias** of projected costs and benefits. Government officials sometimes also argue for a high public sector discount rate for this reason. However, there are two good reasons for not adjusting a public sector discount rate on this account.

  One reason is that discounting in the public sector is most often applied to cost-effectiveness analysis, where increasing the discount rate is as likely to increase

optimistic bias as to offset it. The other reason is that, even for commercial appraisals of costs against sales revenues, a higher discount rate is a very crude way of offsetting risk. It is discouraged in finance textbooks. It reduces incentives to examine risks carefully. It increases incentives on those making proposals to bias their projections of cost and benefits.

The most that can be said is that optimistic bias provides a weak case for applying a higher discount rate to financial appraisals where the benefits are forecasts of sales revenues, than to cost-effectiveness appraisals, if other forms of discipline are weak. However it is better for the risk of optimistic bias to be addressed explicitly case by case, drawing on past experience of similar projects.

- Officials in finance ministries sometimes argue for a high discount rate as a way of **reducing pressures for public expenditure**. There are good reasons for rejecting this argument too.

  One reason, again, is that discounting in the public sector is most often applied to cost-effectiveness analysis. In cost-effectiveness analysis, increasing the discount rate will tend, in the long-run, to *increase* pressures on public expenditure, because it gives too little weight to future expenditure savings. Another reason is that, if such a premium is applied only to financial appraisals of costs against sales revenues, it provides an incentive for public bodies to find ways to adjust their projections of costs and benefits to offset the premium.[31]

- It is also often argued that **private sector <u>average</u> returns on assets** should be taken into account in deriving a public sector discount rate. There is reason to believe that the average returns achieved by private sector firms are higher than the marginal returns.[32] However the discount rate, in the public sector as in the private sector, applies to *marginal* expenditure.

- Public sector **organisations which make long-term investments** – such as forestry, or the building of dams or power stations or other long-lived assets, or environmental investment - often search for arguments to justify a specially low discount rate for their activity. These may include, for example, arguments about spin-off benefits from technology, employment creation, saving imports, or some special quality for environmental benefits. These arguments are sometimes politically successful. However, they rarely have technical merit. Where they do, it is very rare for them to be technically relevant to the discount rate. Generally finance ministries oppose such arguments.

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[31] The UK tried an experiment of this kind in the early 1970s, by raising the public enterprise discount rate to 10% in real terms. It later concluded that this had not succeeded in reducing demands on expenditure.

[32] This implies that the equity market value of companies is typically higher than the current cost accounting value of their capital assets.

The *very* long term (say beyond half a century) and extremely long term (say beyond several centuries or even millennia), do however raise other issues, which we examine in section 8.

7.6 Practical application and administration of the government discount rate

7.6.1 The choice of numbers

As we noted in section 7.3.3, the figures in this paper imply a somewhat higher number for *time preference* than for the *cost of capital* and this is probably true for many countries. However the general application of different numbers would be unmanageable. In practice, given the greater political objections, on balance, to lower numbers than to higher numbers, and the usually more widespread use of the time preference rate, a sensible approach may often be to derive a well based time preference rate and use the same number as a routine cost of capital.

This number, if it is based on analysis rather than political preferences, will be a little higher than the expected future per capita growth rate, plus a further addition of 1 or 2 per cent for pure time preference. With an annual per capita growth rate of 2 per cent, this implies a discount rate of around 4 or 5 per cent, or higher of lower for higher or lower expected per capita income growth.

Quantification of the *opportunity cost of public expenditure* is in practice less important. It does not affect most applications of public sector appraisal or evaluation, because they are cost-effectiveness analyses, comparing public spending with public spending. In any case it is applied in all countries pragmatically, by expenditure rationing.

7.6.2 Lessons from experience

For successful application, discounting conventions have to be expressed in extremely simple terms, which can be understood by officials with no technical background. Experience suggests the following lessons:

- The best approach, if it is politically feasible and technically defensible, is to have a single number, expressed in real terms, which is the government discount rate and cost of capital. This number can then be applied throughout government and the public enterprises.
- This number is usually best presented as an "opportunity cost". This is more widely accepted than the term "time preference", which is often seen by officials and ministers as academic and theoretical. Time preference is also difficult to explain – for example to spending bodies or ministers[33] - even though in practice the number is most often being used as a time preference rate.

[33] The concept of time preference does, however, need to be used when discussing the discounting of environmental impacts with environmental lobby groups.

- It is difficult to manage a system in which more than one number is used by any single organisation (except for occasional special cases).
- Few countries specify an opportunity cost for public expenditure. However it is always applied implicitly by expenditure rationing. It is a matter for the finance ministry to decide whether setting an explicit number is helpful.
- The numbers chosen for discount rates or other related quantities will always be influenced by many factors. It is, however, helpful if analysis can be applied to define a technically defensible range. Political factors can then be applied to choose from within this range.
- The coverage of any centrally specified rate needs to be clearly defined. It is common for local government and public enterprises make their own decisions about the rate or rates appropriate to their circumstances
- Misunderstandings about discount rates are widespread. Guidance needs to be clear and simple. The handling of changing prices – both general inflation and relative prices - needs to be explained especially carefully.
- Monitoring and enforcement is difficult unless the finance ministry is directly responsible for approving some appraisals by the body concerned.
- It is helpful if those responsible for external audit in the public sector have a good understanding of the government's discounting conventions and procedures.
- Because of the technical and administrative complexity of setting the discount rate, and the confusion which can arise when it is changed, there is much to be said for not changing it unless, and until, it has become clearly out of date – for example, because of a significant change in view about future long-term growth, or future real interest rates.
- It is helpful if control of the revision process can be held firmly within the finance ministry, and if senior officials and ministers can be persuaded to see these numbers as primarily a technical issue, not as an instrument to achieve narrow objectives such as the encouragement of private financing, or short-term public expenditure constraint.

7.6.3 Practice in some OECD countries

The first of the following tables outlines some information collected in 1999 on the approaches to discounting adopted in several countries.[34] One of these countries (New Zealand) has adopted the conventional financial economics approach. The others have adopted pragmatic approaches, influenced by various aspects of the welfare economics approach. The second table records some discount rates reported in 2001 (European Conference of Ministers of Transport, 2001) as being applied to government transport projects.

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[34] I am indebted to James Foreman-Peck of HM Treasury, London, for most of this data.

Country	Central guidance on appraisal and evaluation	Standardisation across government	Discount rate	Theoretical basis of discount rate
Canada	Treasury Board Secretary issues 'benefit-cost analysis guide'	Applied throughout national government	Social discount rate of 10% real. Treasury guide of 1976 suggested range of 5-15%, but later revised to 8-12%	Based on opportunity cost of foreign borrowing, foregone investment in the private sector, or foregone consumption
France	No general guidance. Expert committee for *Commissariat General du Plan* prepared recommendation in 1995 for transport	Each sector draws up its own methodology, using the specified discount rate	A real discount rate has been set since 1960. It was last examined in 1985 and set at 8% real	1985 working group estimated cost of capital at 6%, but discount rate was set at 8% to keep a balance between public and private sector investment
Germany	Federal Finance Ministry publishes guidance	Applied at federal level	4% real	Average federal government refinancing rate over the past 5 years was 6% nominal. Average GDP deflator (2%) is subtracted, giving 4% real
New Zealand	Finance ministry issues handbook on 'Estimating the cost of capital for crown entities and state owned enterprises', including capital budgeting and costing public services	Project appraisal on departmental basis, following central broad methodology	Varies with cost or benefit being discounted, following financial text book conventions for private sector investment	Based on Capital Asset Pricing Model (CAPM), using private sector comparators to estimate project betas
Norway	Government wide recommendations	Departmental interpretations of central guidance	Set in 1978 at 7% real	New proposal to use world prices as shadow prices for traded goods, with 3.5% real as the discount rate
United Kingdom	Finance ministry issues guidance to all central government	Central guidance, plus departmental guidance adapted to departmental needs	6% real in most cases since 1989. Consideration being given to reducing rate(s) to around 4%, perhaps with shadow price of public spending	Time preference and cost of capital both derived in 1989 as in range of 4%-6&%. 6% chosen from top of range, mainly because of belief that this would better motivate public enterprises.
USA	OMB issues a Capital Programming Guide (1997) and OMB Circular A-94	Departments take note of OMB guidance but also have their own standards and guidelines	7% real since 1992. For some purposes a shadow price of capital also recommended	Based on average private return to capital in US in 1970s and 1980s. Before 1992 rate had been 10% real, based on private return to capital in 1960s

Country	Discount rate (in real terms) applied to transport

Belgium	4%
France	8%
Germany	3%
Sweden	4%
United Kingdom	6%

8 Analysis of the very long-term and the extremely long-term

8.1 Why is the very long term seen as different?

Since the mid 1990s, following especially from the emergence of nuclear waste and, more substantially, global warming, as problems which may impose measurable costs on very distant generations, there has been a resurgence of academic interest in time discounting. This has been driven by the fact that applying a conventional discount rate to costs over periods of centuries implies a level of concern for distant populations which seems intuitively too low, and is any case unacceptable to popular and political opinion.

A thorough account from a North American economists' perspective is recorded by Portney and Weyant (1999). The papers in this workshop proceedings illustrate the limited progress on public sector discounting and costing since the 1960s and 1970s.[35] However they also present an interesting spread of views and some important new developments. New developments which we summarise here are: the effect of uncertainty about the discount rate; people's preferences for the very long term; new approaches to determining social preferences over time; and new approaches to presenting CBA output data to policymakers.

8.1 New developments prompted by the very long term

8.1.2 The effect of uncertainty about the discount rate

As discounting is applied to the increasingly distant future, the value of the relevant discount rate becomes less certain. We face increasing uncertainty about the rate of per capita growth of income. We are also uncertain about the present population's preferences (or what preferences we ought to impose) about the marginal utility of very distant populations. However a much more important effect is that, as the discounting period becomes longer, the *effect* of uncertainty about the discount rate becomes increasingly skewed in favour of lower rates.

To illustrate this, suppose that we believe that the time preference rate should be either 2% or 4% with equal likelihood. The table below shows the effects of discounting $1 million

[35] Notably Layard's (1972) excellent introduction to a collection of papers on CBA, and Lind's (1982) profoundly influential introduction to the papers of an American conference held in 1977, several of whose authors also contributed to this 1999 seminar.

over periods of 30, 100, 200 and 500 years at these two rates. In each case we derive the effective discount rate, which would give a present value equal to the mean of the present values implied by the discount rates of 2% and 4%.

The effect of discounting period on the effective discount rate

	Present value (PV) of $1 million, discounted over:			
	30 years	100 years	200 years	500 years
PV with discount rate of 2%	$552,000	$138,000	$19,000	$50
PV with discount rate of 4%	$308,000	$20,000	$400	$0.003
Expected PV (equal to mean of previous two rows)	£430,000	$79,000	$9,700	$25
Effective discount rate (corresponding to expected PV)	2.85%	2.57%	2.34%	2.14%

A discounting period of 30 years is towards the end of, or beyond, almost all practical discounting periods for projects such as roads or other procurement. Over this 30 year period the effective discount rate is 2.85%. This is fairly close to the average of 2% and 4%. However over longer periods the effective discount rate falls progressively towards 2%.

This effect is described by Weitzman (1999), who presented to the 1999 American seminar a paper which he had presented in 1996 (on the likelihood of continued strong economic growth), before recording how, since then, "the light bulb that signals 'Eureka' experience finally flashed" and he saw the fundamental significance of uncertainty about the discount rate itself over the longer term.

This effect implies convincingly that, for the very long term (and even more so for the extremely long term), *much* more weight should be given to the bottom end of the plausible range of discount rates than to the middle of the range.

The effect has been discovered by other authors. One extreme assumption tested by Newell and Pizer (2001) is that the discount rate follows a random path. This greatly increases the chance of its reaching very low values, but seems an implausible model.[36]

[36] It is reminiscent of the widespread assumption in financial economics that equity returns follow a random walk, even in the long term, rather than swinging around a smoother long run trend, in response to shocks such as wars, oil price hikes, business cycles, and dot com bubbles. This random walk assumption contributes to the very high returns to equity often estimated in that literature.

On the other hand the uncertainties are considerable. Per capita income over the next century and beyond may continue or exceed past trends, but how confident can we be that it will not flatten out or decline? There does seem good reason to believe that, in terms of technical advance, the adverse effects of human consumption of resources will continue to be more than offset by the accumulation of knowledge. Less clear is the continuing future world political stability needed for this process to continue.[37] how As for how much weight we ought to give to the marginal utility of very distant generations, opinions vary. What is a "reasonable" lower end to this distribution?

8.2.2 People's preferences about the very long term

For discounting over a few decades it is always assumed that pure time preference is constant – so that the weight we give to the marginal utility of future populations declines at a constant exponential rate. For several decades this is a good enough approximation, but beyond say two or three generations we might expect people to discriminate more weakly over time. If some small but certain loss of utility were to be imposed on the population in, say, either 400 years time or 450 years time, people might give more weight to the former, but probably to a lesser extent than they would if they were comparing say 2005 with 2055.

Portney and Weyant (1999), in introducing their seminar report, note that there is considerable empirical support for this decline in pure time preference in the very long term. There is evidence from behaviour in markets, stated preference studies of attitudes to risk, saving behaviour, and the life saving activities of government.

This effect applies to pure time preference, not to the effect of declining marginal utility of money with increasing wealth.[38] But given the uncertainties about long term per capita income growth, and the relative importance noted above of the low end of the range of plausible discount rates, the effect is very material to decisions about the very long term.

One obvious consequence of a discount rate regime of this kind, in which the relative weights of any two given years changes over time, is time inconsistency. What looks like the best choice at one time may no longer be seen as the best choice at a later time, for no reason other that that it is being viewed later in time. However it is hard to see any serious philosophical or policy objection to this, if it reflects the considered preferences of people at the time that each decision is made.

8.2.3 New approaches to determining social preferences over time

For the very long term the crucial issue in determining how much weight to give to future marginal costs, where these can be estimated, is the largely ethical one of pure time preference. As noted above, it is hard to see that any professional group, or for that matter

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[37] Economists tend to be relatively bullish about very long term growth, and environmentalists much less so. This bullish view is updated by Weitzman. (1999). The economists have been mostly right so far – especially in the wake of the Club of Rome debate in the 1970s, about declining resources.

[38] Although this too of course is likely to change over the very long term.

any lobby group, have any special claim to authority on what this weighting should be. There is some literature on public preferences. However revealed preference studies can contribute little if anything to the measurement of preferences about the very long term, which are beyond the time span of markets or of virtually all personal decisions. And stated preference studies are profoundly difficult. However there are some signs of increasing willingness to explore wider preferences.

Weitzman (2001) extended consultation on the public policy discount rate to economists in general, with surveys based of the opinions of over 2000 PhD graduates, and of a blue-ribbon panel of 50. The larger sample gave a mean of 4%, a median of 3% and a mode of 2%. The second, smaller but high profile sample gave a mean of 4.1% and a standard deviation of 3.1%. Applying the logic outlined in section 8.2.1 above, Weitzman derived from these distributions a pattern of discount rates, from 4% for periods up to 5 years, declining to 3% for years 6 to 25, and eventually to "around zero" for years beyond 300.

A more policy oriented proposal by Kopp and Portney suggests that, for major intergenerational issues, specific policy proposals should be informed by "appeal made directly to the citizenry". A sample of (US) households would be drawn, presented with a considerable body of information on costs and benefits and timescales, including costs which they might themselves face, and invited to cast a "vote".

The idea that it is good to widen the debate, to draw in the value judgements of a full cross section of society, is itself a value judgement. Another view might be that people in general cannot be expected to understand enough – or even to be sufficiently morally enlightened – to contribute to such judgements. However the alternative is to leave the decision either to unaccountable technical experts, or to governments under pressure from powerful lobbies, whose interests may be far removed from those of society as a whole. History, as well as democratic tradition, would seem to favour wide consultation.

8.2.4 New approaches to presenting CBA output data to policymakers

Today's difficulties with very long term analysis repeat some of the lessons, of nearly half a century ago, on the role of analysis in more mundane policy appraisal and budgeting.

It will always be tempting for experts to believe that, given all the available information on some issue of public policy, a logical process can be applied to produce the "right" answer. But this has never been true in the real political word. Good decision making on complex issues in the public interest depends on good analysis. Analysis can all too often show persuasively that a decision taken is not the one that best serves the public interest, but has been swayed by some kind of personal or sectional interest. Analysis also helps to focus the thinking of policymakers, to help them towards a mindset which sees the issues in the round. However in major policy decisions there are always aspects which require political judgement or, very often, common sense, in making the final decisions.

The weight which governments should give to the very long term, in the present state of empirical understanding of people's preferences, is not an issue to which economics yet has

much to contribute. It may usefully counter extreme assertions by lobby groups, but even here the main issues in dispute are in hard science rather than social preferences. And economics has a massive and essential contribution to make to developing and comparing policy responses to whatever very long term concern emerges from the political process.

In the papers presented in Portney and Weyant (1999), the most persuasive policy advisory approach to global warming, in terms of practical policy management and presentational clarity, is that developed by Nordhaus (1999). This cuts through the agonies of debate about the discount rate by "focusing on ultimate objectives". In Nordhaus's words this "*allows public decisionmakers to weigh options explicitly, rather than allowing technicians to hide the choices in abstruse arguments*". Specifically, Nordhaus calculates the effects on annual world income in perpetuity of reducing the (500 year) temperature change by varying amounts.[39]

An approach of broadly this kind is probably the best approach to all very long term environmental problems.

8.3 Valuation and distributional aspects of the very long term

As noted in section 7.2.2, valuation and discounting are often confused, and in the very long term they interact even more closely.

One issue is the need to distinguish clearly between marginal impacts and catastrophic impacts. Some lobby groups present global warming in terms of a major catastrophe which will occur if the world does not start taking serious action immediately. If there were indeed a foreseeable catastrophe – say that we knew that some phenomenon would destroy the world in 300 years time, unless we started some massive investment now to prevent it - there would be a strong and fascinating public debate, but the issues would be far removed from the concerns in the IPCC Assessments about discounting. The current debate is about issues which may have intra marginal effects on some people and communities (just as do, for example, most big infrastructure projects), but in terms of the population as a whole we feel justified as regarding them as marginal.

The very long term also heightens the problem of distribution. Over periods of a few decades we feel reasonably safe in assuming that the future world and its families will be rather the same as today. But after hundreds of years, we have little idea who, if anyone, will be occupying which parts of the earth, and whether we would have the slightest affinity with them, or with how their leaders choose to distribute any benefits we bequeath to them.

In the case of global warming the problem is even more severe, because most of the costs of reducing emissions appear fall on the developed economies, and most of benefits, of reduced impacts on sea level and climate change, appear to fall on developing countries. Schelling (1999), with some logic, presents this an issue of overseas aid. On the other hand

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[39] He also assumes that the policy instruments are efficient instruments, such as tradable permits, rather than regulated reductions in emissions, but that is a separate issue.

the developed economies are also the main producers and beneficiaries of the emissions. This all contribute to an ethical quagmire, which can only be resolved, given our present level of understanding of human preferences, by political rather than analytical processes,

8.4 How should the very long term be handled?

For many environmental impacts, the use of conventional cost-benefit analysis, with lower discount rate for years beyond say half a century, is defensible.[40] It is hard however to see an empirical case for pure time preference ever being as low as zero. There is the "asteroid" point – item (v) in section 7.1. More fundamentally, people patently care more about other populations with whom they have more affinity, and this must surely decline over time. However this takes us back to the fundamentals of government.

Some lobby groups and some experts believe that policy should based not on the considered wishes of people as a whole, but on the views of a specially expert or enlightened minority, to which they belong. However the mainstream view of economists is probably that we need more information about public preferences, and about how people wish them to be reflected in government policy. This information can then be used to better align policy advice with these preferences.

It is hard to see any sensible case today for calculating present values of very long term impacts, where they are an important determinant of policy, as in the case of global warming. There is no empirical basis yet for doing so. To present policymakers with a present value therefore conceals questions which should be determined by political debate. If and when we do understand these preferences more clearly, it may turn out that "discounting" is not the way that people see it, for the very long term. They may see many other issues, such as distribution, and reversibility, as much more important, and time as something to be treated pragmatically, case by case. (The calculation of a time schedule of discount rates, on the basis of the uncertainty about what the rate should be, provides a useful warning against extending conventional rates into the very long term. But it does not provide a defensible way of analysing the very long term.)

The IPCC analysis tries to build on existing approaches to discounting and stretch them into the very long term. This is unlikely to advance the contribution of economics. The way forward is via the "common sense" exploration of ways in which the information on how very long term cost and benefits are distributed over time can be processed, or extended, to guide public debate and policy making. Some examples are noted above, in the presentation developed by Nordhaus (1999) on global warming, and the proposal by Kopp and Portney (1999) on how to extract more information on public preferences.

As Toman (1999) put it, in commenting on the contributions by Arrow and by Weitzman to the 1999 American seminar: *"In a political decision setting, rather than simply calculating a net*

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[40] A provision to this effect has for some years been included has been in the UK guidance for central government. However this is only on the basis of doubt about very long term growth in per capita income.

present value of benefits minus costs … the present value of the risk reduction costs to be borne by the current generation could be presented to decision makers and the public, along with estimates of the ultimate effects (monetary and otherwise) of risk reduction in time and space. Decisionmakers and others then have to weigh whether the benefits justify the costs."

On discounting in general there are still loose ends (notably on the clarity of handling of opportunity costs) and if the new life which has been injected into the subject by the very long term debate carries these forward, that will be a useful gain. But for very long term impacts it would be best to set discounting aside for the time being. Information on policy options for the very long term needs to be presented in ways that policymakers can absorb; but this does need the calculation of present values for everything.

9 The sequencing of reform of budgeting and investment planning

9.1 The need for constant reform

In any well functioning democracy the reform of arrangements for budgeting and investment planning is a never ending journey. If it is a developed economy, some aspects may remain unchanged for many years. However there is constant review of problem areas, of scope for improving incentives, and of technological improvement. Occasionally some fundamental reform will emerge, such as a change from functional to institutional budgeting, or from real terms to cash budgeting, or from cash budgeting to accrual budgeting. These changes may be driven by technology, or more often by the views of ministers or officials, especially following a change of government. As noted earlier, the changes tend to follow a world wide pattern.

Developing and transitional countries are mostly at an earlier stage of reform. They face the task of building their own national conventions. They have the advantage of being able to draw on worldwide experience, which can provide a clear and detailed picture of the questions that need to be asked, and the conditions needed for efficient budgeting and investment planning. Their task however is more difficult than that of developed economies.

It is more difficult because budgeting reform depends upon the availability of scarce technical skills, in the centre and in line ministries. More important, it is difficult because administrative reform depends upon the wide acceptance of common ground rules, among ministers and officials, on decision making processes, the sharing of information, delegation of authority, and the concept of the public interest. Whereas developed countries are concerned mainly with the strategy and tactics of the game as they play it, the developing and transitional countries are also concerned with finding equipment and establishing their own rule book.

The international guides remark on the paradox that, for developing and transitional countries, a medium term budgeting framework is both especially difficult to develop and especially important.

9.2 The steps to reform

The many questions that need to be asked about the path to budgetary reform are well set out in the international guides.[41] The summary below also draws on a discussion of the coordination of public expenditure management and public sector reforms by a consultant to the IMF (Peters, 2002).

Budgetary reform is profoundly important; but it is difficult, and in many respects unrewarding. Measures to impose reform can be unpopular and the benefits are likely to be taken for granted. It is always hard work, and often frustrating.

It follows that a first requirement for successful reform is clear ownership and sustained commitment. Crucial to reform is political leadership which is strongly committed to reform and its implementation. (Commitment in the central European transitional countries has been greatly strengthened, even if the process is also complicated, by the political objective of EU membership.)

A second requirement is an institutional framework for reform. This needs an appropriate legal framework, with clearly defined responsibilities to specific members of the Executive, for reform coordination and implementation, and accountability arrangements. It also requires capacity building, in all ministries, so that key officials and their staff understand and have the skills to implement the reforms.

A third requirement is commitment in the civil service. Civil service reform swept developed economies in the 1990s, with major changes in incentive structures and in delegation of authority and individual accountability. At the very least, successful reform requires some recognition and reward, if only in terms of tenure and promotion, for good individual performance.

Thus the steps of expenditure management reform, of which budget management is an integral part, might be listed as follows.

i) Procedures to ensure that *existing* laws and regulations on public expenditure management are observed, and non-compliance remedied.

ii) New budget management regulations to carry forward the reforms, including specific penalties for non-compliance.

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[41] In particular by the World Bank (1998) Chapter 5; The Asian Development Bank (Schiavo-Campo and Tommasi, 1999) Chapter 17 and Annex XI; and, especially for European transitional countries, the OECD (Allen and Tommasi, 2001) Annex I and summaries of "Directions for reform" at the end of each of the four Parts of the guide.

iii) Staff development: New job specifications for staff involved in public expenditure management, to help improve their accountability; modern staff performance management methods to improve incentives; recruitment of those qualified staff essential to meet the operational needs of the new system; and specialised training.

iv) Implementation of modern IT infrastructures

v) Procedures to monitor and report on the performance of the expenditure management system, to remedy weaknesses, and develop continuing reform.

Budgetary reform needs to be strongly tailored to the national circumstances. It is tempting to ministers in developing and transitional countries to imagine that some process which they understand works well in some other country can be imported, and for those in the other country to be more than willing to help with such a process. However the record of such good intentions is poor.

Public expenditure management reform also has to combine many reform activities at the same time. In particular the rules and informal procedures, including shared understanding of concepts such as "ownership", "information sharing" and "consensus-building", need to be developed in parallel with any organisational changes, such as strengthening analytical skills and delegating authorities.

In any country there are many alternative paths to reform. Some may be driven mainly top down, some mainly bottom up. Some may be driven mainly through the national budget, some mainly through one or more large sectoral budgets. Much depends upon the accidental disposition of skills and leadership, and upon spotting and exploiting windows of opportunity, following for example a change of ministers.

However experience shows that some developments need to come before others. A list of "ten basic principles", tabulated below, is provided by Schick (1999):

	TEN BASIC PRINCIPLES OF BUDGETARY REFORM
1	Foster an environment that supports and demands performance *before* introduction of performance and outcome budgeting
2	Control inputs *before* seeking to control outputs
3	Account for cash *before* accounting for accruals
4	Establish external controls *before* introducing internal controls
5	Establish internal controls *before* introducing managerial accountability
6	Operate a reliable accounting system *before* installing integrate financial management systems
7	Budget for work to be done *before* budgeting for results to be achieved
8	Enforce formal contracts in the market sector *before* introducing performance contracts in the public sector
9	Have effective financial auditing *before* moving to performance auditing

10	Adopt and implement predictable budgets *before* insisting that managers efficiently use the resources entrusted to them.

One essential element is the development of linkages between the many agencies of government. Efficient budgeting is about agencies working together, not in harmony but in synchrony, sharing broadly the same perceptions of what is fair and efficient and what is not, and how this can best be achieved. This needs frequent and close communication.[42]

9.3 The role of donors

Budgetary reform often depends on aid financing, but aid also provides obstacles to reform.

Donors now widely appreciate the need for their contributions to be planned and managed in ways which mesh well with other aid and with locally financed spending. For developing countries this has been much helped over the past two years by the Comprehensive Development Framework and associated Poverty Reduction Strategy Papers. However donors have their own accountability requirements and domestic pressures, none of which have close regard for the administrative interests of the recipient country. The problem is compounded by the lack of direct experience of the problems in the donor countries themselves. On most budgeting problems the donor countries have potentially useful first hand experience. But not on the handling of aid.

This is a field where work by those familiar with the problems, seen from within developing and transitional countries, might propose stronger conventions and codes of practice to adapt the donor administration of aid more closely to the needs of budget management and development in the recipient country.

There may also be scope for more coherent guidance on training. The need to develop administrative skills in the governments of developing and transitional countries is obvious, and large sums are paid by donor organisations to provide training. Much of this is probably of great value, but it does not always fit into a well coordinated framework. There may be scope here for the international organisations, in consultation with developing and transitional countries, to develop a clearer framework or syllabus for some areas of training.

8 Conclusion

This paper covers two broad aspects of public expenditure management. One is the mainly administrative challenge of budgetary planning, with special reference to investment. The

[42] Communication in many countries, and with donors, would be helped by clear definitions of exactly what they wish to mean by English language terms such as budgeting programming, planning, control, and audit, or whatever concepts of this kind they find useful. Clear definitions, which might vary markedly from country to country, would help to clarify discussion and development of budgetary procedures and in training programmes.

other aspect, in sections 6 to 8, is the mainly technical issue of quantitative analysis of policies, programmes, or projects, with special reference to comparisons over time.

On budgetary planning, the paper provides a summary version of issues covered in the guidance developed by the international organisations. The main points are:

- One requirement for efficient and effective budgeting is a medium term budgetary framework, extending over about three years. There is no set route to achieving this. Nor is there any single end point. Every country has its own distinctive characteristics, in its organisational structures and its rules and informal procedures. And in no country does the budgeting system stand still. Budgetary reform is a never ending journey.

- There is however a great wealth of experience, mainly from developing and transitional countries, which is now well recorded in guides produced by the international organisations.

- For capital budgeting the most fundamental lesson from experience is the need to integrate capital and public expenditure planning. For some purposes, including budget approval and accounting, capital and current spending need to be separated. However the interdependence of capital and current spending is so strong that if they are planned by separate teams the outcome cannot be efficient.

- There is nonetheless a good case for public investment programmes (PIPs), where they can help the coordination of aid programmes.

- There may be scope for further development of international experience and guidance on some aspects of developing and transitional country budgeting, such as the effect of donor requirements on the budget administration of recipient countries, and the standardisation of training.

On quantitative analysis, the paper provides a perspective on the interface between academic debate and practical analysis in government. The main points made are:

- Quantitative analysis of policies, programmes and projects is crucial to good expenditure management. It is now widely recognised that there is no absolute scientific criterion for whether any particular investment or other budget proposal should or should not be accepted. However the reasons for policy decisions should so far as possible be transparent.

- The appraisal of an investment proposal needs to be seen as an economic comparison of alternatives, including the option of not proceeding. It should not be seen as simply an engineering assessment of costs and feasibility.

- Some technical aspects of public sector time discounting remain not fully resolved, but for normal applications, extending up to a few decades, there is something approaching

a consensus among welfare economists on the method of derivation of the discount rate. This generally supports a discount rate for public expenditure of perhaps 2 or 3 percentage points above the expected future rate of growth of real per capita income. It is best to define this discount rate in real terms (as opposed to nominal terms).

- The very long term, beyond say half a century, and the extremely long term, extending to centuries or millennia, present unusual problems for the technique of discounting. In the present state of knowledge about people's preferences about the very distant future, the calculation of "present values" by discounting very long term costs or benefits is misleading. Information should be provided to policy makers, in these cases, in ways which do not require discounting the very long term.

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