

1. Introduction: why has government productivity been so neglected in economics and public management?

In advanced industrial societies, public sector activities account for substantial shares of total economic activity. In the UK, for instance, the government's share of final consumption represented almost 24 per cent in 2009 (Office for National Statistics, 2010a). So it matters a great deal to national competitiveness and to overall economic welfare how well government sector production activities are organized. For many decades, the conventional wisdom has been that government is a low productivity sector where improvements in the organization of activities always take place with a slower tempo than in the private sector, creating a significant drag on changes in the rest of the economy.

Many observers argue that the public sector performs far worse than this, constituting a huge zone of the economy where productivity increases hardly at all, and may even move negatively over a long period. For instance, a well-known centre-right UK think-tank, the Centre for Economics and Business Research, claimed in mid-2009:

In a little noticed revision slipped out on 14 August, the Office for National Statistics let on that the *public sector's productivity performance had been even worse than earlier admitted, with a decline of 3.4% from 1997 to 2007*. At the same time productivity in the market sector rose by 27.9%, so *had productivity in the public sector moved in line with that in the market sector, productivity would have been 32.4% higher*. On the other hand . . . over the whole period from 1997 to 2007 pay in the public sector rose by slightly less [than the private sector]. So in looking at the cost of public expenditure it is probably fairer to use the unit labour cost comparison which shows public sector costs rising by 30.5% relative to the market sector. This productivity calculation . . . applies to General Government Final Consumption Expenditure . . . [which] amounts to about £250 billion a year. So *had costs risen in line with the market sector, this would have cost £58.4 billion less*. (Centre for Economics and Business Research, 2009, original emphasis)

Seeking to evaluate the worth of such apparently dramatic claims, we quickly run into the difficulty that no one seems to know at a more detailed organizational level what the productivity of government organizations is.

A whole swathe of analysis that has been developed over more than four decades in the analysis of private sector industries and firms remains in its infancy in the public sector. A start has recently been made on the macro-analysis of government productivity, at the level of national statistics, which we review in Chapter 2. But at the level of individual government departments and agencies the norm is still that managers have little systematic information on how productivity *at an organizational level* has changed in recent years, or how their performance in achieving improvements compares with other similar agencies.

In this chapter we first show how difficulties in the analysis of government sector productivity have led to the neglect of an important set of tools for improving the available data on government organizations' performance. As a result, little systematic progress has yet been made on analysing the factors that condition improvements or lack of improvement in how government carries out its activities *at the level of individual organizations* – a deficit that cries out for explanation. The second section briefly reviews how organizational productivity has been studied in the private sector over recent decades, showing what the key influences seem to have been on modern productivity growth. Lastly, we show how this analysis has begun to be slowly extended into the public sector, beginning with organizations operating in decentralized delivery systems (discussed in detail in Part II of this book). Analysis has been least effective for national or federal government departments and agencies (which are the focus of Part I).

1.1 BARRIERS TO ANALYSING GOVERNMENT PRODUCTIVITY

Productivity is defined as the ratio of outputs divided by inputs, and at first glance it seems to be a simple index. In fact, in the private sector, its measurement is mostly straightforward. The total volume valuation of outputs for a firm or an industry can be derived by multiplying the numbers of the outputs (units of goods and services produced and successfully marketed to customers) by the prices for which each has been sold. Price here automatically controls for the variations in the value of different products within and across firms. This allows us to derive a price-weighted measure of overall output that is then divided by a measure of total inputs to obtain a productivity ratio.

The fundamental difficulty of measuring productivity in government services has been that we do not have anything equivalent to a price for (most of) the many different services and goods that government depart-

ments and agencies produce. Public service outputs are generally supplied to citizens, firms or other stakeholders for free, or at highly subsidized prices. In many cases (for instance, policing and law and order functions, or defence spending) the consumption of public sector outputs is often made mandatory or imposed on citizens (some of whom may be very reluctant 'clients' of the services). So the conventional wisdom for almost all of the last century held that it was not feasible to value the diversity of government outputs – and hence we could not achieve any effective measure of the volume of outputs at an organizational level for government departments and agencies.

Instead, the predominant way in which government outputs were counted for national statistics and other purposes was by valuing the inputs that went into producing them – that is, by simply entering the costs of the government staff employed, and the materials and procurements and capital used up in their production. A single baleful implication followed. The productivity of government services (i.e., 'outputs' divided by inputs) was always automatically one, because it reduced to total inputs divided by total inputs. In other words, the productivity of government services was represented as always completely flat, decade after decade.

Of course, in practical public management terms, both governments and economists knew full well that this practice was a myth, a simple equation-filler for national statistical purposes. But faced with the methodological difficulties posed by the absence of public sector prices, it also became politically convenient for governments to go along with this myth at the national statistics level, because counting the *input* costs of government as part of national outputs tended to inflate GDP numbers. What's more, if private sector outputs slipped, and government increased its spending counter-cyclically to offset the risk of recession, then by definition national output started to recover straightaway, because the government part of it (defined by input costs) was already rising.

In addition, we shall see below that it was especially hard for central or federal government departments and agencies to develop indices to measure their own organizational productivity, chiefly because each government tends to have only one agency of each type – for instance, one national tax collecting body, one customs regulating agency, one education ministry or one social security agency. So there was nothing else in the country to compare these unique and often giant departments with. Cross-national comparisons might have provided a way forward, but in fact international bodies like the UN and the OECD have performed very poorly in addressing government productivity analysis (Van de Walle, 2008). Some countries and international organizations that at first seemed to have accepted the Atkinson Review (2005b) approach also backed off

when the onset of recession made it seem likely to adversely affect their perceived growth numbers (Van Dooren, 2010). In addition, different countries' tax systems, education systems and so on vary a lot, making comparison across their unique central departments additionally difficult.

However, the neglect implied by the assumption that government productivity is flat did not mean that internal efforts to improve what government agencies are doing went by the board, or were small scale – they were instead extensive, but quite differently focused. One key role of elected politicians in liberal democracies has been to inject periodic new guidance impulses, new values, different priorities and alternative policy prescriptions into an otherwise essentially rather static government apparatus. Even in one-party systems (like China), or in 'semi-democratic' authoritarian systems with not very meaningful elections (like Russia or Singapore), the same role is fulfilled by clan, faction and sometimes ideology battles within the essentially oligarchic power structure. However, politicians' efforts overwhelmingly focus on redesigning and redirecting public policy in order to improve what they see as the effectiveness of the government.

Effectiveness can be defined as the level of politically or socially desired outcomes achieved, divided by the level of inputs used to produce them. But this is inherently a much broader and deeper concept than productivity, for effectiveness is often largely in the eye of the beholder. What any of us will see as being effective public policy will depend heavily on the values and beliefs that we hold about the good society, about social organization and about human nature.

Inside the government machine itself, two groups of people have devoted effort to the narrower tasks of making policy-making and implementation better. Some politicians (but still only a large minority at best) have been seriously committed to improving how the machinery of governance operates, especially a series of more reflective or 'out of the ordinary' prime ministers and presidents and their supporting officials. Second, many senior service public managers and unelected officials (both at senior and more junior levels) have long recognized that how well things are done matters a lot, and that it varies a great deal over time and across different government organizations. Inside government systems, one more persistent impulse for improvements has tended to come from finance ministers or treasuries who are anxious to save money, conserve national resources for the most urgent tasks and stem annual increases in the relative price of government outputs. Less commonly, personnel or human resources departments at the central level have played a role. So while the national statistics have counted government productivity as permanently flat, some politicians and most senior civil servants have struggled hard to

improve how public policies are delivered and how administrative tasks have been accomplished.

Undoubtedly too, many of these improvement efforts have borne fruit in cutting costs or introducing new ways of working. But again the primary internal vehicle has tended to be a separate concept of government *efficiency*, which is primarily defined in terms of minimizing the amount of resources used to produce a given set of outputs. Inherently 'efficiency' measurement is very 'case by case' and it does not produce the kind of over-time data for whole-organizational performance that productivity series do for industry sectors or for private firms.

Indeed, the three characteristic ways in which public sector agencies have tended to improve their methods of working are both little concerned with outputs or output measurement:

1. *Efficiency drives* are special purpose exercises, occurring irregularly, often undertaken by new governments or by a government facing more than usually acute immediate fiscal pressures. They involve reviewing one or all departments' ongoing activities to see which might be pruned or cut back, often concentrating on areas where needs or technologies have changed since the last review, but policy commitments and delivery methods have not yet adjusted. Efficiency drives now typically involve finance ministries setting out in a top-down way a set of reduction targets for departments to achieve. How the targeted reductions are achieved in practice tends not to bother the finance ministry, so long as the financial numbers come out right. In practice, some proclaimed 'efficiency' drives are only retrenchment exercises that just involve departments or agencies stopping doing some of their existing activities ('real cuts'), rather than improving the way in which they do them. Others may achieve genuine productivity improvements, typically in recent decades by stripping out staff from administrative processes that can either be streamlined or automated more completely using IT.
2. *Mandatory efficiency dividends* are automatic annual reductions in the amount of money that finance ministries give to spending departments, usually fixed at a level of around a 2 or 3 per cent reduction per year across all government sectors. Each department knows at the start of any given year that they must be able to shave 2 or 3 per cent off their costs by the year end, largely irrespective of their individual situations. The common justification of such dividends is that they help introduce into the public sector a new discipline, one where continuously increasing productivity improvements are always expected. Instead of the old 'cost plus inflation' assumptions of officials in

earlier times, a given parcel of activities is now always expected to get cheaper to administer over time – for instance, because IT costs have fallen, or because improvements in delivery and procedures have been achieved. This message may or may not apply in different policy areas.

But it is important to note that the dividends can in fact be met in many different ways, many of which have no connection with improving productivity or even efficiency. A department where efficiency and productivity are actually stagnant can normally still shave its costs by the finance ministry's required amount – for example, by simply reducing its service quality (e.g., not answering phone calls, or piling up more unresolved cases) or by stopping doing some valuable activities that it previously undertook. And because dividends are cross-government they are just a priori funding changes with minimal impact in affecting how any given organization is managed. Dividends are not based on any individual analysis of how productivity levels are in fact changing across different departments or agencies, so for some agencies they are easy to meet, while in others they are far harder to achieve.

3. 'Value for money' (VFM) analyses are the typical kind of 'performance audit' undertaken by public sector audit agencies like the USA's Government Accountability Office (GAO), the UK's National Audit Office (NAO), the French Cour des Comptes and the European Court of Auditors (ECA). Across the OECD countries most other 'Supreme Audit Institutions' (SAIs, as they call themselves) look like or follow one or other of these models. The Anglo-American auditors – that is, GAO, NAO and the Canadian, Australian and New Zealand equivalents of NAO – are clear leaders in the development of 'performance audit' and VFM work. At the LSE Public Policy Group we have worked closely with the NAO and ECA over many years on improving VFM studies, and we have also undertaken some analysis for auditor-generals' offices in other countries (including Canada, Ireland, New Zealand and Hong Kong).

None of these audit agencies systematically includes analyses of government sector productivity in either their regular VFM work, or in their financial audit analyses. The key reason why not is a turf issue – productivity is rather squarely seen as something that lies within the purview of *internal audit and control* units in finance ministries and within national departments. Internal audit has been very little studied (but see Buratti et al., 2012 for a pioneering analysis). These government staff work closely with SAIs, but they jealously guard their zone of influence (following codes of conduct developed by the Institute of Internal Auditors). Under their existing legislation, SAIs

feel that they cannot legitimately take on a function that is associated with the regular, month-on-month and year-on-year improvement of government services. This restriction applies even when internal auditors and improvement teams are clearly not themselves studying productivity series and trends, and have little idea of how they could or should do so.

Some elements of productivity analysis are incorporated into how SAIs in the 'advanced' OECD countries do performance audit, however, but chiefly on a 'case by case' basis. VFM studies are typically quite long documents, mainly using qualitative methods, put together because somebody politically powerful (usually in the legislature) is unhappy with an aspect of performance. Often, perhaps government ministers, executives or managers are also unhappy, and sometimes they welcome an external audit report in order to help bring about an internal agency change. Hence public auditors doing VFM work will often try to put together either an effectiveness analysis of how a particular policy is being implemented, or a limited comparison of performance in the target area X with other look-alike areas Y and Z. The auditors almost invariably find that the data available on outcomes is of worse quality and less extensive than statistics for outputs or activities undertaken. And because auditors are conservative and evidence-based people they tend to follow the better data, and hence to produce a VFM study that is something quite like a productivity analysis in at least comparing output or activity levels with inputs. But it is a one-off exercise. It does not form part of a continuous series, and does not culminate in any lasting gains in knowledge. It is only rarely expressed in the explicit ratio of outputs/inputs that defines productivity. In short, VFM analyses usually employ ad hoc methodologies that cannot be replicated across different government agencies or sectors. Thus, they do not provide a framework for comparison across the public sector.

Typically, then, the systematic and evidence-based analysis of government productivity has been neglected behind a cloud of 'confuser' practitioner discourses, Table 1.1 summarizes the key differences between productivity and the range of other concepts often used instead of it, or confused with it, inside the government services sector.

Looking more broadly at whether or not the 'productivity' label appears in or is systematically omitted from public management discourse, there are often two apparently opposed, but actually quite congruent, tendencies – both of which marginalize genuine productivity analysis. Sometimes for short periods the word 'productivity' will feature

Table 1.1 What productivity in government means, and how it differs from alternative performance concepts

Key Term	Defined As:	Used For:
<i>Productivity</i>	The ratio of outputs produced divided by inputs used	Assessing how a given organization is succeeding in progressively developing its performance of activities and accomplishing of outputs, either over time, or by comparison with other similar organizations
<i>Economy</i>	Using the minimum feasible inputs in sustaining the organization's activities and producing its outputs	Ensuring that an agency's activity mix does not contain 'waste' or other avoidable costs. For instance, an economy drive might terminate services that are no longer well used, or whose rationale has diminished, or which duplicate offerings by other government agencies
<i>Efficiency</i>	(a) <i>Technical efficiency</i> is about minimizing the resources used in producing a given level of output (b) <i>Allocative efficiency</i> is about choosing the right mix of inputs and outputs, given their prices	Both terms can be used to identify the minimal amount of inputs (technical efficiency) or the right mix of inputs (allocative efficiency) that an organization needs to use to produce services
<i>Effectiveness</i>	The ratio of socially desirable outcomes achieved by a department, divided by its inputs. Any worthwhile effectiveness analysis must try to separate out and control for the impacts of all other causal factors that influence policy outcomes – a stage that is rarely achieved in public management contexts	Evaluating how far government organization is going about trying to achieve the outcomes within its 'mission' in the socially optimal manner. For instance, an agency might be doing good, but in a way that is more old-fashioned or not as socially relevant as it could be

Table 1.1 (continued)

Key Term	Defined As:	Used For:
<i>Value for money (VFM)</i>	Given the range of activities that the agency is undertaking, and the policy objectives that it has been set by policy-makers, is the agency going about implementing its goals and targets in an appropriate and cost-effective manner? This is a general or over-arching criterion and it may incorporate some reference to elements including productivity, economy and effectiveness. VFM analysis is a form of 'performance audit' where the assessment is normally qualitative, although informed by some systematic evidence. Analyses may (or may not) culminate in a clear overall 'VFM judgement'. For example in the UK the National Audit Office defines VFM as the economy, efficiency and effectiveness with which departments and other bodies have used their resources to achieve given policy goals	A broader concept than productivity or effectiveness, VFM analysis is useful in providing a rich, overall picture of whether politically defined 'desirable' societal outcomes are being achieved through agency activities in a 'lean' or cost-effective manner. VFM studies may also assist public managers, ministers, legislators and other stakeholders in determining what corrective or improvement actions could help improve performance

prominently on the lips of government executives, especially those who have newly come in from the private sector. But normally this fashion occurs without triggering or being based on any systematic data assembly that actually relates government organizations' outputs to their inputs. Instead, some officials and agencies will refer to productivity in ways that greatly over-enlarge the concept's scope, so that it becomes equivalent in meaning to just 'everything conventionally seen as good or worthwhile about agency performance'. For instance, in 1970 President Nixon created a National Commission on Productivity, covering both the public and private sectors. It published early works on improving productivity in local governments (Hatry and Fisk, 1971), but the scope of its government-related activities quickly enlarged to encompass a huge range

of potentially efficiency-related matters. In fact it collected no systematic data at all on government sector productivity and was abolished in 1979.

Often the tendency to over-inflate a 'productivity' label is closely linked with the recurring 'management myth' that somehow better 'leadership' by top managers is always an essential or easily implemented answer to problems of poorly performing organizations. For instance, a 2010 online guide by the UK's official Local Government Improvement and Development body entitled *Productivity: Getting the Best Out of Your People* argues that:

In an organisation that delivers many different services, it can be difficult to measure the impact of individual people or processes on complex, multidimensional outcomes. In recent years, local government performance monitoring has focused on inputs and outputs. As the regulatory regime moves towards a focus on outcomes, the measurement of productivity will become even more challenging. A number of approaches and tools are available to leaders and managers to improve the productivity of their organisation. This is not simply about making employees work harder. It's about:

- the people you employ
- the skills they have
- the goals they are set
- the systems and processes they use
- how motivated they are.

Although initial lip service is paid to something called 'productivity' here, it quickly becomes apparent that it actually denotes no more than 'good organizational performance, in all its aspects'. Little or nothing relevant to any aspect of organizational performance is missing from the list above. In 2011 another UK think-tank broadened the concept even further, proclaiming that local councils should maximize what it termed 'social productivity' – a concept so apparently inclusive that it means only 'everything good' (Kippin and Lucas, 2011).

Alternatively, and far more often, the restrictive 'outputs divided by inputs' view of productivity is often rejected by public managers and politicians. Historically this stance has been strongly supported by most academics in 'public administration', who regard it as an inappropriate, 'economistic' concept to apply in the public services. A vehement denunciation of productivity analyses as reductionist and inadequate has especially predominated in US academic public administration, where a strong tradition runs from political scientist Dwight Waldo (1948) (who saw productivity analyses as 'anti-individual') to Mark Moore's (1995) defence of 'public service value'. These scholars argue that both the democratic governance and the impartial, egalitarian administration of public

services require a qualitatively different style of services management to be adopted from those in the private sector. In this view how public services are delivered – in fair, democratically accountable and citizen-responsive ways – is every bit as politically and operationally important as the efficiency or efficacy of its implementation.

US federal agencies' personnel have often claimed a double uniqueness, not only pursuing 'public values' without private sector counterparts, but also being the only such organization in a country, having no worthwhile comparator organizations, except for overseas counterparts (Kelman, 2010). US public administration is also strongly ethno-centric, often making no reference to other countries' experiences, or treating them strictly as marginal phenomena (see, for instance, Wilson, 1989). Hence the use of productivity analyses has seemed both inapplicable and rather threatening (especially at the federal macro-level) – even though comparisons across the USA's 50 states have spawned far more systematic and quantitative academic analyses than anywhere else in the world. A similar hostile stance found a more limited endorsement amongst public administration conservatives in the UK and Europe. In addition, few analyses have covered technological change as a key dynamic in public administration (Pollitt, 2011). But in some countries (such as the Netherlands and Scandinavian countries) a more multi-disciplinary concept of public administration assigned economics more of a role in understanding government, and hence did not see productivity analyses as inapplicable (Van Dooren and Van de Walle, 2008).

Public services are also commonly seen by civil servants and other officials, and by their many allies in academic life, as inherently much more 'complex' to administer than those delivered in the private sector. Officials in government agencies must answer to many more 'principals' than private sector managers, and take account of many more (and often contested) public values. And government organizations cannot exclude 'difficult' or costly-to-serve groups from their client base, unlike private sector firms that can tailor whom they serve so as to attract profitable or low-cost customers and to repel unattractive business. For the many thousands of politicians, officials and academics who have adopted such unquestioned beliefs as articles of faith, it has been an easy step to reject any relevance for productivity analysis (outputs divided by inputs) within the public sector.

Such a restrictive focus on only one narrow aspect of organizational performance is instead seen as mechanistic and objectionable in a multi-factor government context. Looking at outputs/inputs offers only a ridiculously impoverished, 'bean-counting' view of public management – one that ignores all the democratic and citizen-responsive process benefits that make the sphere of government production and public services so separate

and distinctive. Only a small minority of public management work has questioned whether public and private organizations are not in fact quite comparable in the range of pressures acting upon them (Bozeman, 2004). After all, many private firms and industries also operate in intensely regulated environments that are politically sensitive and subject to strong scrutiny by shareholders, competitors, market analysts, consumer groups, media commentators, trade unions and a wide range of campaign groups and charities espousing green and social causes.

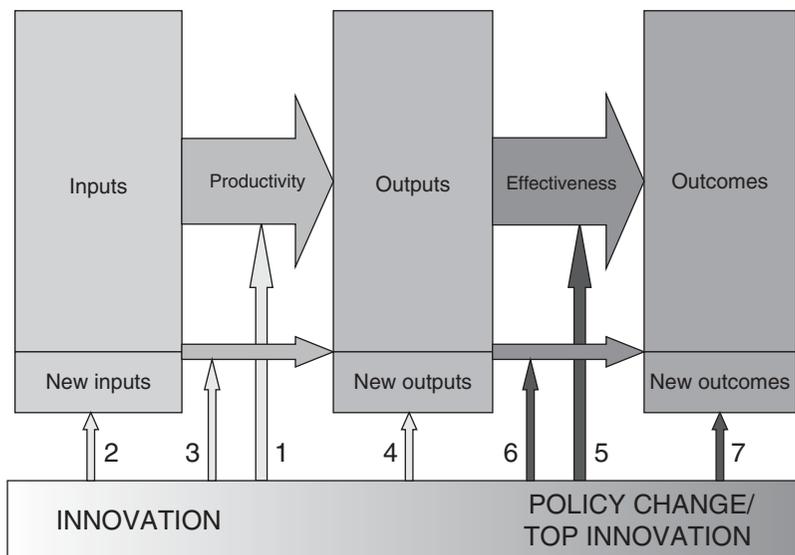
Our approach here rejects both the tendency to inflate productivity so that the concept becomes vacuous, and the effort to declare it irrelevant *tout court* to the government sector. In our view neither strategy is at all helpful. Public sector productivity is (and must remain) a single, deliberately limited measure, focusing solely on how many outputs are produced for a given level of inputs (see Figure 1.1). It especially needs to be carefully separated from the quite distinct concept of policy *effectiveness*, which is much more broadly concerned with how the outputs produced translate (or not) into desired policy outcomes. It also needs to be kept largely separate from discussions about efficiency or value for money, which are distinct concepts unlinked to the systematic accumulation of data on organizational performance that is our focus here.

Figure 1.1 also brings out one of the most important and distinctive aspects of a focus on organizational productivity in the government sector, namely the close connection between it and the adoption of innovations inside government organizations. Just as technological change has been a strong and vital driver of productivity improvements in private corporations and industries, so we should expect that innovations will play key roles in government sector productivity changes in several ways:

- improving the conversion of inputs into outputs for established activities, for example, by reducing the staff numbers needed to accomplish a task;
- introducing new inputs into the production of established outputs, as with the successive waves of back-office computer automation of record-keeping;
- improving productivity using qualitatively new inputs, for instance, pervasively deploying networked automatic cameras on roads to catch speeding motorists; and
- introducing new outputs, for instance, creating electronic tax forms that are simpler and quicker for people or firms to submit.

Yet against ‘maximalist’ views, Figure 1.1 also makes clear that many macro-innovation or political or policy-level factors in the public sector

Figure 1.1 How innovation influences productivity improvement via the introduction of new inputs, outputs and outcomes in government organizations, and why the analysis of productivity improvements need to be clearly separated from the analysis of effectiveness



- ↑ Types of innovation impacts: included in productivity analysis
- 1 improving the productivity of existing inputs;
 - 2 introducing new inputs;
 - 3 improving productivity using new inputs;
 - 4 introducing new outputs.

- Effectiveness analysis, excluded from productivity analysis
- 5 improving the effectiveness of existing outputs;
 - 6 increasing policy effectiveness via new outputs;
 - 7 introducing new outcomes.

cannot be incorporated into the study of productivity. So productivity analysis does not address at all the effectiveness changes labelled, 5, 6 and 7 in Figure 1.1, concerning improving the effectiveness of outcomes or devising new outcomes. Critically important though they may be for how the government sector performs, the politically driven changes in effectiveness fall outside the scope of our analysis.

It might be argued by critics here that some policy changes should be

recognized as top-level innovations, and hence appropriately incorporated into any analysis of productivity. But which should these be? No clear methods exist for distinguishing genuine innovations from the many top-level changes that only represent a ‘churning’ of policy solutions, often because of the alternation of one political party in power followed by another. Similarly, many policy changes just ‘recycle’ earlier approaches that cannot be usefully seen as innovative. (For example, think of the domestic and international strategies of supporting birth control or urging teenagers to sexual abstinence pursued by Democrat and Republican presidents in the USA since the 1980s.) This difficulty strengthens the rationale for focusing narrowly on productivity as the conversion of inputs into outputs within departments and agencies.

The next objections to counter are those of officials or academics who argue that productivity analyses are inapplicable in government agencies because services generate intangible ‘public value’; or because national government departments are unique – or, if not unique, they are far more ‘complex’ to administer than private sector processes. Advocates of this view argue that these factors must somehow be taken into account in calculating any valid measure of the productivity of government services. Yet, the counter view might be that government organizations that opt for complex-to-administer and hence high-cost alternatives when simpler alternatives exist have simply chosen to be less productive, and such decisions should not be compensated for in determining public sector productivity. Similarly the objections of uniqueness or lack of comparators, and of government sector complexity, can all be simply met by studying government productivity changes in more sophisticated ways that are fully adapted to the public services context. In Chapter 2 we outline the key considerations here and show how new developments in the field in the last decade have resolved or ameliorated many of the traditional objections to deploying rich organizational productivity analyses in the public sector. Productivity analyses always need to be informed by an in-depth understanding of what public agencies do, what their policy goals and missions are, and what counts as service quality in their sphere of operations.

1.2 KEY FACTORS SHAPING PRODUCTIVITY CHANGES IN THE PRIVATE SECTOR

The concept of productivity has developed a great deal, from its initial origins in the engineering analysis of particular machines, to its economic conception and wide application at the firm and industry sector level. A common thread running through these different stages is a strong linkage

between productivity and the analysis of technological change, which is now consensually seen as one of the primary drivers of modern economic and social advances.

The engineering concept of productivity is:

$$\frac{\text{Volume of total output}}{\text{Volume of total inputs}}$$

where volume is denoted in terms of units of output (for example, widgets produced by a machine tool in a time period) and in terms of units of input (for instance, hours of labour involved, units of material consumed, or power used etc.). The engineering approach assumes that at the level of an individual machine (say) the outputs all have a pretty homogeneous quality – for instance, because any given machine (set up in a particular way) produces a largely undifferentiated stream of products in the short term.

This simple engineering approach is then easily scaled up to the scientific study of the performance of the same firm or even the same industry over a long period of time, so long as the simple formula above is adjusted to take account of product differentiation, and of differentiation in the inputs used up in producing outputs. The formula now becomes:

$$\frac{\text{Total output} * \text{quality of output}}{\text{Total inputs} * \text{quality of inputs}}$$

The engineering concept as a fully specified idea has long been attractive to industry analysts (and to governments seeking to improve national technological performance) because it seems to get rather directly at technical change. It places central importance on technology innovations and reorganizations of production in expanding national economic performance.

In *the economic concept* of productivity, however, the focus shifts to outputs that can be sold to customers in a market and are competitive with other alternative products by offering consumers a welfare gain compared to other products (Tinbergen, 1942; Solow, 1957). The economic concept of productivity also has to recognize that the number, scope and variety of quality permutations in modern economies are all vast, while continuous quality changes in outputs are now pervasive to the point of being universal. The older engineering conception of homogeneous products measured in volumetric terms hence has almost no applicability, except on the most micro of scales. Economists solve this apparently huge extra difficulty in a characteristically simple fashion, by letting the price at which outputs

are sold become the key indicator of how complex and high quality these products are. In the same way, the non-comparabilities of inputs (such as labour, material costs and capital equipment usage) can be simply dealt with by multiplying input volumes by their prices. As a result the productivity formula shifts again, to become:

$$\frac{\text{Outputs volume * output prices}}{\text{Inputs volume * input prices}} = \frac{\text{Total value of outputs}}{\text{Total value of inputs}}$$

This approach is not quite as simple as it may appear. A range of assumptions need to be made to allow these ‘price-weighted’ measures of outputs to be used, about the relatively uniform production mode across a given industry and about the strength and effectiveness of market competition.

In a perfectly competitive market all firms are ‘price-takers’ in a single, well-integrated system of exchanges, so that a firm will only be able to charge a higher price for its product if in fact its goods embody extra value for its customers compared to the products of rival companies. In pure economic theory terms, the benefits of our knowledge gain here are tremendous, because we can be certain that if a firm upgrades its products at a constant price then social welfare has unambiguously increased. However, if markets are oligopolistic or monopolistic, or consumers are not autonomous and discriminating, then firms may have the power to fix prices and to load their products with unwanted features at higher cost to consumers that in fact have little value for them, but allow prices to be raised (Galbraith, 1969). Here the linkage between higher prices and increased value to customers is no longer necessarily applicable, and the social welfare implications of technological changes and product ‘improvements’ may become more problematic to assess.

In the private sector *the key drivers* that make productivity grow over time operate at two levels – first, at the level of the industry taken as a whole, and second, at the organizational level in response to technological, logistic and structural changes within firms themselves. Given competitive capital markets and competitive product markets, the more efficient producers can expand their outputs. Accordingly they should sell more of their goods by drawing away the market share of less efficient, less technically dynamic or slower-moving competitors. Hence over time, production shifts from inefficient to more efficient producers. In study after study, across a wide range of industries, around half of all industry productivity growth can be attributed to this changing market share effect.

The remaining part of productivity change (which we may think of as around half in the private sector) is due to technical changes and improved organization, management practices and logistics inside firms and their

delivery chains. In manufacturing firms, where the outputs are goods, technology changes often reflect research and development investment in new (or newly adopted) applications of science-based or engineering-based knowledge, as well as improved design and product development processes. Traditionally much of the literature on innovation led by R&D has concentrated on manufacturing, where changes can be tracked by such well-developed metrics of innovation as the numbers of patents and trademarks, or the incidence of initial public offerings (IPOs) by technology start-up companies. Improvements in the storage and use of information within firms have been very important in IT (information technology)-intensive industries, especially since the mid-1990s. Information and communication technologies (ICTs) have been the catalysts for some of the most important developments, including the advent of flatter hierarchies in large corporations, so-called ‘disintermediation’ (or ‘cutting out the middle man’) processes in e-commerce, and the development of new methods of marketing and identifying and reaching customers in the pervasively digital, post-internet modern era.

A strong feature of modern ICT-led productivity growth is that it has extended strongly from manufacturing into major private sector services industries, such as banking, insurance, accounting, retailing and the commercial delivery of a wide range of professional services. Yet services, defined in contrast to goods by *The Economist* as ‘anything sold in trade that could not be dropped on your foot’ (Quinn, 1992, p. 6) are harder to study than goods manufacture. Some key modern services (such as mobile phones and computing, low-cost aviation and healthcare) are strongly technology based and driven, often with new products acting as keys for consumers to access a flow of continuing services. Some observers have even noted a tendency for many more, perhaps almost all, goods to be packaged and redefined as flows of services.

Yet across the service sector many productivity-enhancing changes are at root organizational or procedural innovations, and they can be only very poorly tracked by conventional innovation metrics. In areas such as banking or insurance, new products rarely involve physical goods changes that can be patented, but instead work by finding new combinations of ‘characteristics’ that appeal to customers at feasible costs. Similarly, quality factors are much more integrally and yet intangibly or diffusely bound up in the development of services than they are with goods, especially in complex services that depend strongly on personal interactions between providers and customers.

For all these reasons it is often much harder to identify product improvements in services except by noticing shifts in the observed pattern of customers’ demands – often in response to what some observers term ‘hidden

innovations' (Harris and Halkett, 2007). Similarly, quality improvements or deteriorations are often harder to track in service industries – for instance, the extent to which the growth of low-cost airlines has been achieved by substituting lower-quality standards in civil aviation services for previous formats. Yet still the prices paid by customers allow us to index (however imperfectly) the quality of private sector services, a key saving grace in an otherwise much fuzzier area.

In an influential analysis of 'relative price effects', William Baumol (1967) and others (Baumol et al., 1989) argued that the economic importance of low productivity sectors would tend to grow over time. This effect reflects the tendency of goods prices to fall fastest in high productivity sectors, where capital intensity increases, organizational improvements are most rapid and physical technological changes are concentrated (Jorgenson et al., 2007) – as in the Moore's Law prediction that the cost of handling a given amount of information in IT processor chips would halve every two years (Moore, 2006). By contrast in low productivity sectors, factor prices (especially the wages for staff) will tend to rise at least at the overall rate of inflation in the economy as a whole, but without delivering comparable levels of productivity increases – so that these services become relatively more expensive to produce over time. The strong implication is that the share of the economy absorbed by low productivity sectors will tend to expand, unless there are strong countervailing developments.

Amongst countervailing factors possible here, major technology changes may unlock a revolution where whole new areas of higher-tech production start up, as in the 1930s with electric goods. Here then high productivity industries may either grow or at least maintain their overall share of the economy. Alternatively, efficiency may also rise strongly in formerly low productivity sectors, as some observers claim happened in many US service industries through modern e-commerce disintermediation effects – so much so that 'Baumol's disease' was declared 'cured' by Bosworth and Triplett (2003). Nonetheless, the Baumol effect tends to reassert itself ineluctably over time. For instance, Baumol pointed out that the number of orchestra players needed for a Beethoven symphony performance cannot change over time, so that concert tickets will tend to rise in relative price over time. Similar barriers may apply quite widely. So IT-led productivity surges in services can reduce the imbalances for a time, but they may not redress the long-term growth in the services sector's share of GDP, generally seen as partly reflecting productivity lagging changes in manufacturing.

Looking in more detail at what specific factors drive modern productivity changes, private corporations have invested heavily in improving their

ICT and management practices. Yet, how these two factors specifically interplay has often been subject to some controversy. The largest literature analyses the role of ICT in the private sector. Here scholars have usually followed an approach where they estimate a production function in which ICT capital is considered as a separate input (the 'parametric' approach discussed in Chapter 2). Using regression analysis, these works then attempt to test whether ICT expenditure is statistically related to output. Early analyses following this approach found no clear evidence that ICT investment was significantly and positively related to output, coining the idea of an 'IT paradox' – where 'You can see the computer age everywhere but in the productivity statistics' (Solow, 1987, p. 36; Bailey and Gordon, 1988).

However, later research since the 1990s has reversed the position, finding strong evidence of a statistically positive relationship from ICT on productivity at the firm level (Lichtenberg, 1995; Brynjolfsson and Hitt, 1996). Earlier studies may not have found a significant relationship due to measurement problems caused by relying on very aggregated data. So the modern consensus largely attributes the 'IT paradox' problem to this approach (Lichtenberg, 1995; Lehr and Lichtenberg, 1998; Bloom et al., 2005; Aral et al., 2007). European studies were slower to find the same positive IT effects, but a recent compilation of relevant evidence shows similar patterns (O'Mahoney et al., 2010).

Also transcending the apparent 'IT paradox' of the 1980s and early 1990s, Brynjolfsson and Hitt (2003) found that computerization makes a contribution to measured productivity and output growth in the short term (using one-year time lags for new technology to have an effect). This is consistent with normal commercial expectations of quick returns to computer investments. However, they also found that the productivity and output contributions associated with computerization were up to five times greater over long periods (using five-year to seven-year time lags to look for impacts). Thus, investment in ICT may pay off most significantly after a certain 'adaptation period', an insight also successfully tested by Bartel et al. (2007) in their analysis of firms in the valve manufacturing industry.

A partly alternative explanation holds that a dialectic of ICT advances in recent years in networking (which foster organizational centralization, especially of control functions) and in databases (which support decentralized work processes) may have substantially improved the contribution that ICTs can make to productivity, when allied with other organizational and business process changes (Bloom et al., 2009b). Following a production approach, Bresnahan et al. (2002) analysed a sample of 300 large US firms and they found that ICT investment contributed strongly to

increased output and productivity. The study also employed survey data on organizational changes and management practices and was one of the first to demonstrate that ICT investment *combined with* changes in management practices leads to increased productivity. This key contribution is often referred to as the ‘organizational complementarity’ hypothesis. A similar approach has been followed by Caroli and Van Reenen (2001) and Bloom et al. (2005) in their analysis of manufacturing firms, who also find support for the complementarity hypothesis about ICT and management practices.

More recently, in an analysis with panel data from 680 small and medium-sized (SME) Italian manufacturing firms, Giuri et al. (2008) found that ICT positively affects output and productivity. However, they did not find that ICT and organizational changes are related to increased productivity, contrary to the organizational complementarity hypothesis. The authors explain their finding on the grounds that compared with large firms, SMEs face greater difficulties in managing different inventions at the same time – especially in finding and retaining highly skilled personnel and re-engineering their business processes to fully integrate ICT into their organization. Accordingly, they argue that the interaction between ICT and management may be more complex than perhaps analysts initially thought.

Most private sector studies have traditionally relied chiefly on measures of ICT expenditure to gauge organizational commitment to new computerization, automation or internet-based technologies. Yet while a firm may spend significantly on buying new IT equipment, the specific impact of ICT infrastructure will depend on how much it is used by the firm’s employees for productivity-enhancing activities. Especially since the advent of the internet and web era, the most advanced technologies are no longer necessarily the most expensive ones in equipment or staffing terms. The costs of web applications are generally far more modest than earlier mainframe computers or complex organizational networks. So the primary barriers to adopting web-based technologies may now be cultural and organizational conservatism, lack of appropriate expertise amongst staff, and perhaps similar gaps amongst customers or key stakeholders also. Accordingly, more recent studies have increasingly sought to employ more direct measures of ICT use. For example, in a study of a large recruiting firm, Aral et al. (2007) rely on innovative measures of actual ICT use, rather than on expenditure, to gain a much clearer picture of the impact of information technologies. They found that ICT use positively affects revenue and productivity in their detailed case study. Other studies in the private sector have adopted a similar approach (for instance, Bhansali and Brynjolfsson, 2008).

1.3 FACTORS SHAPING PRODUCTIVITY CHANGES IN THE GOVERNMENT SECTOR

There are two fundamental and well-founded reasons to believe that productivity advances in the public sector are inherently likely to be slower or of lesser scale than in the private sector. The first is simply that organizations rarely perform well in achieving goals to which they pay little or no attention. So over the last 80 years the widespread neglect of productivity analyses across the government sector itself makes it very unlikely that productivity growth there can possibly parallel those achieved in private sector firms and industries, where enhancing productivity has been the focus of sustained attention, careful analysis and multiple improvement efforts. We shall see in Chapter 2 that in at least some large national government agencies in some countries this position began to be rectified from the late 1980s. More recently, national statisticians have also sought to measure productivity across very large sectors within the public services (such as all of education, or all of healthcare as national systems). Recent academic work has also made considerable headway in analyses of performance across networks of decentralized public service agencies (Jones and Thompson, 2007). But these newer developments still do not even begin to compare with the huge weight of managerial expertise and academic attention devoted to improving the organizational performance of private sector firms and industries. So the probability seems high that the unexamined productivity of government organizations is not increasing as fast.

Second, in the absence of strong and vigorous industrial competition within the government sector, the transfer of outputs from unproductive to more productive firms (which accounts for around half of all productivity advances in private sector industries over any given time period) either may not happen at all in the government sector, or will happen only in very weak ways. Public services have traditionally been delivered in the form of comprehensive national, regional or local monopolies. Thus OECD countries at national level generally have one tax collection agency, one social security agency, one defence department, and so on. At regional level, each state or regional government again provides its range of services within its territory without any competitors or alternatives. Finally, urban or local governments or local-level quasi-governmental agencies are also local monopolists within their area, in supplying environmental or planning services, providing local policing, or running local schools and hospitals.

Many past administrative reforms have been devoted to removing any 'duplication' or 'overlaps' of government services, and to pruning

out any 'slack' capacity within them – although slack is exactly what is needed for any competition between providers to flourish. At best then there can be 'competition by comparison' between decentralized agencies in large public service networks at local level, but not even this is feasible at central or regional level. Government practices also usually encompass only modest rewards for those agencies performing well, and few penalties for those that are lagging in performance – whose clientele are largely locked into a single dominant supplier. Hence the 'ecological' or 'stay fit to survive' pressures on government sector organizations are likely to be very weak.

The root of the problem here was well captured by the US political scientist Herbert Kaufman in a 1976 book that asked *Are Government Organizations Immortal?* – to which his answer was 'Sort of'. Normally it takes a considerable amount of societal effort and political lobbying to get a new function inscribed on the restricted list of 'essentially governmental' functions that must be provided as public services, not least because of the strong initial 'gates' erected by finance ministries or treasuries. So once established, public services tend already to draw on strong support from beneficiary groups and stakeholders. New departments and agencies also prudentially tend to build out their political support amongst legislators and allied interest groups, typically by adding in protective layers through accreting extra functions to their original missions. Consequently, so long as agencies can survive the perilous first years after their initial creation, most established government departments and agencies are very long-lived organizations indeed, with relatively few complete organizational 'deaths' occurring.

Of course, depending on their institutional status, organizations in the public sector can be re-branded, de-merged from their current 'parent' department, or merged with neighbouring agencies. In 'Westminster system' polities such as the UK, this 'making and breaking of Whitehall departments' is an exceptionally frequent occurrence (White and Dunleavy, 2010). Also in the UK at the sub-Whitehall level the degree of organizational churn is (if anything) even greater, both in terms of the numbers of organizations affected and the costs of rearrangements. The National Audit Office (2010a) counted over 90 significant reorganizations in just five years 2005–09, at a minimum cost to UK taxpayers of £780 million. Other 'Westminster' systems (such as Canada, Australia and New Zealand) also reorganize more than the OECD norm, but not as much as the UK. At the other end of the spectrum, the US federal government has almost always maintained a relatively static structure of departments in the post-Hoover reorganization period from 1952 to now. The one giant exception was the creation of a new Department of Homeland Security (a

new mega-unit integrating 28 previous departments and agencies) in 2002 after the 9/11 attacks (Bullock et al., 2006). However, even in Washington there have been more frequent alterations at the sub-departmental (or 'Office') level.

The key sources of reorganizations and churning within the government sector are political, chiefly the advent of new governing parties, prime ministers, presidents or governors – who must seek to impose new priorities upon the administrations they inherit as soon as they gain office (DiIulio et al., 1993; White and Dunleavy, 2010). There are also longer-term or more 'cumulated' pressures on government systems to change their structures in response to new pressures in their wider organizational environments. Key factors here are new issues and political priorities creating 'acute' pressures; the onset of repeated crises in particular areas of social life needing highly focused political and administrative attention; or more drawn-out malaise ('incubated' problems) in how a set of public policies are operating (Polsby, 1985). These pressures for change mean that the more recent academic debate about Kaufman's 'immortality' proposition has tended to qualify further his picture of extraordinary stasis in public sector organizational arrangements (Peters and Hogwood, 1982; Lewis, 2002).

Some public choice theorists have even developed accounts of a 'governmental market' where bureaucracies tussle ceaselessly for budget and turf gains (Breton, 1998), where most contracts are strongly contested and old-style public monopolies are a thing of the past. Additional components argue for the efficacy of democratic control processes (Wittman, 1995) – for instance, the interest group process ensures that policy responds sensitively to the balance of costs and benefits in different policy technologies and proposals for subsidizing services provision (Becker, 2003, 2005).

The growth of governmental contracting may also have had some countervailing impacts, by enlarging the scope of government services that are at some level competed for. Famously the 'new public management' (NPM) period from the mid-1980s to the mid-2000s placed a premium on separating out within government the 'purchaser' roles of defining contracts and commissioning procurements from the 'producer' role of delivering services or undertaking contract supply (Dunleavy et al., 2006b; Christensen and Læg Reid, 2011; Halligan, 2011). Over nearly two decades the strong NPM countries (like the UK, Australia and New Zealand) brought in more and more mandatory competitive contracts. A substantial 'para-state' of government contractors developed in the private sector on a grand scale, accounting for 6.1 per cent of GDP in Britain by 2008 (BIS, 2008; Oxford Economics, 2008a and 2008b; CBI, 2009). The para-state chiefly has involved giant companies in areas like government IT

(Dunleavy et al., 2008), and in the much-extended zone of defence contracting. Some firms now operate on a transnational or globalized scale and claim ‘best in world’ expertise (Dunleavy, 1994). On a much smaller scale the para-state also began to involve many third sector organizations in areas like the delivery of social policy, but their overall share remained small. By 2007–08 total UK public spending on procured services reached £79 billion and on goods topped £67 billion. Taken together these areas almost matched public sector spending on wages and salaries, which was £159 billion (Oxford Economics, 2008a, Figure 2.1).

In a few countries, quasi-market systems inside major public services have also been pursued as a way of further enlarging the capacity for public services production to shift to more efficient suppliers (LeGrand, 2007). For instance, the Australian schools system sees public and private schools competing for children (customers) and associated public funding. In the UK National Health Service, and in Britain’s locally managed schools system, hundreds of local providers are bound together into an integrated public service delivery system. Here there is some capacity for ‘customers’ (and hence associated tax-financed budget parcels) to migrate from inefficient or poor-quality providers to other providers nearby with better services on offer. Adding in new rights for citizens to choose where they have a hospital operation carried out, or for groups of parents dissatisfied with current choices to set up their own ‘free schools’ and get public subsidy (as in Sweden and since 2010 in the UK) adds an additional element to internal competition in the government sector.

But historically even such quasi-market changes have normally only operated in a limited way, especially at the margins of neighbouring public authority areas in more densely populated urban areas. Typically also, competition processes must be incremental – they cannot go far without jeopardizing the organizational and financial stability of the overall system and the state’s ability to guarantee that services are universally available to citizens in a convenient and locally accessible manner. In particular, changes to run down or close poor providers or to expand good providers are usually quite slow and carefully regulated – because Western electorates will not normally tolerate structures for delivering public services that risk becoming chaotic or ineffective.

So the enhanced use of contracting, quasi-markets and intra-governmental competition between policy sectors, taken together with competition between alternative priorities and policy technologies, may have somewhat speeded up how the government sector moves the production of public services across from less efficient or productive providers towards better ones. But such moves have little of the *automatic and rapid reaction* to be expected in private sector industries. NPM changes have

at best put in place some very slow-operating analogies to the strong and quick-acting ecological competition (Hannan and Freeman, 1993) that occurs in the most dynamic private industry sectors, like the restaurant sector where many thousand new start-ups and closures of existing outlets occur every year. The scale of any demand shifts from less productive to more productive organizations and policy spheres within the government sector will be at best a tiny fraction of that in competitive private industries.

Hence it follows that across the government sector, we are normally (and probably inherently) far more reliant on within-organization factors to drive through productivity improvements and to generate innovations. In this regard a large literature on the virtues of profit-maximizing firms as innovators (such as almost all writing by property rights economists) already takes a deeply pessimistic view of the incentives for individual officials to promote innovation, compared to those in the private sector:

Government organizations do not benefit from the service of wealth-seeking entrepreneurs. Even if entrepreneurs were successful in initiating or restructuring government organizations for maximal productivity, there is no mechanism by which the entrepreneurs benefit more than other taxpayers, and there is no guarantee that taxes will be reduced as a result of increased efficiency. (Bozeman, 2004, p. 53)

Especially lacking are the strong incentive mechanisms – such as large ‘prize money’ salaries for chief executives, the lure of ‘initial public offerings’ (IPOs), or bonus schemes that capture any equivalent of improvements in ‘shareholder value’ for top executives’ pay. On the other hand, Bozeman (*ibid.*, p. 107) notes that: ‘Research organizations of immense importance to national productivity, innovation and security are found in both government and industry’. And in recent times one of the effects of new public management reforms was to increase senior government officials’ pay (for a time, before austerity conditions returned), and to link it via ‘performance pay’ to the achievement of wider organizational goals, and of cost reductions in particular.

Especially important influences on innovation rates are likely to be differing organizational or bureaucratic ‘cultures’, formed by formal and informal rules, mores and long-term values, which can determine and reflect members’ values, beliefs and attitudes (Kerr and Slocum, 1987):

Virtually all organizational changes involve changes in the behavior of organizational members. Employees must learn and routinize these behaviors in the short term, and leaders must institutionalize them over the long haul so that new patterns of behavior displace old ones. (Fernandez and Rainey, 2006, p. 172)

Organizational cultures are often expressed most starkly and completely in the production of artefacts (Schein, 2010, Ch. 2), including the internal organizational architecture of a department or agency, and (crucially for our current analysis) the codification of its business processes inscribed in its IT systems. In what Mintzberg (1983) calls ‘machine bureaucracy’ task areas (like social security, taxation and the control of immigration) the centrality of ICT investments for administrative change and policy capabilities has been strongly manifest since the later 1960s (Margetts, 1998). Here ‘legacy’ IT systems built up over decades created immensely cumbersome ‘artefacts’ whose internal complexity and accumulated characteristics then severely constrained both policy change and organizational performance (Dunleavy et al., 2008).

Yet, it is also possible to change public sector organizations through at least three different mechanisms:

1. *‘Political’ or top-down reorganizations* are important, as discussed above. In centralized countries, like the UK, one of the most typical consequences has been that waves of ‘inorganic’ change occur in agencies and departments – grounded in and responding to the ideology of newly elected governing party and their allied interest groups, and not in the ‘organic’ development of innovations in each agency and department separately.
2. *Changes in purely managerial ideologies and policy ‘fashions’* have a great deal of influence within the public sector, partly because there the external control of professions is typically far less than in the private sector, and the level of professional autonomy far greater (Dunleavy, 1982). Cycles of public management change – such as the transition from post-war ‘progressive public administration’ models to NPM models – can thus have speedy and wide reverberations in many disparate organizations. Organizations’ performance is so poorly monitored that executives rely on agencies performing ‘rituals of modernization’ to gauge which are well managed and which are hidebound (Meyer and Scott, 1992). Under NPM, many impulses for reorganization reflected belated responses to waves of fashionable management practices in the private sector.
3. *Technological impulses from the private sector and more recently from civil society* can also have strong effects, as in the development of business computing since the advent of personal computers from around 1976, and the development of the internet and online services since 1995. Often public sector organizations respond after substantial time lags in ‘catch up’ mode to private sector changes that they initially resisted or stood aloof from (Dunleavy et al., 2008, Chs 2, 6–8). But

perhaps these adoption delays have tended to reduce in duration. In a period of rapid technological change it may be unavoidable that both government internal architectures and complex IT systems will need to be comparable to those operating in private sector organizations. Indeed the IT development of some parts of the public sector has seemed to even up with those of comparable business sectors at some periods, especially in the largest-scale government organizations, before relapsing again, as since the advent of social media (Dunleavy and Margetts, 2010; Margetts and Dunleavy, 2012).

In many professionalized service delivery areas it appears reasonable to assume that productivity changes occurring in the private sector will tend to be generalized quite quickly to public sector counterpart activities. For instance, it seems deeply unlikely that productivity should increase consistently in private sector hospitals, but not in analogous public sector ones, carrying out very similar tasks with similar technologies and common professional staff. Similarly, we might expect improvements in office IT to positively affect productivity in file-moving public sector occupations (van der Torre et al., 2007). The multiplier expectations in (1) and (2) above also provide some grounds for expecting public sector changes to be particularly rapid and blanket, if 'critical mass' in adopting new innovations can only be achieved.

UK government especially shows a strong track record of responding to external pressures for modernization, especially to long-run changes in how private sector business operates, and to multiple short-term political impulses. However, if the leaders of government departments and agencies have long operated within (and hence internalized) a conservative culture resistant to change, then even if top political decisions impose major organizational reforms the detailed ways in which changes are implemented may have little impact on organizational performance and rather minimal change in productivity over time.

A significant management literature supports this expectation. Schein (2010) has argued that the reason so many change efforts run into resistance or outright failure is traceable to the inability of senior managers and leaders to effectively unfreeze resistances and create readiness for change before attempting a change induction. In a similar vein, Cooper (1994) earlier argued that an inertial conservative culture often strongly affects the implementation of new IT systems across different organizations. More recently, Ashworth et al. (2009) have shown that formal and informal institutional arrangements within an organization may mediate, and thus deviate from, the original objectives of performance-enhancing change measures. The phenomenon of 'permanently failing organizations'

that survive for long periods in protected private sector niches adds weight here (Meyer and Zucker, 1989).

In the specific field of public management, Dunleavy et al. (2008, Ch. 9; Margetts and Dunleavy, 2012) have noted how public managers whose approaches were shaped during the heyday of the NPM may resist the implementation of significant organizational changes aiming to simplify procedures and move services online, which they describe as part of a new 'quasi-paradigm' style of public management change, called digital era governance (DEG).

How do these rather broad-gauge or top-level considerations come into specific focus on government productivity here? Thirty years ago, Jackson (1982, p. 196) asked 'What do the studies that have been conducted reveal about public sector productivity?' and responded cautiously: 'This is not an easy question to answer. Many of the studies are of varying quality, and of those which have been conducted in a careful and scientific manner, the majority conclude with the warning that their results are tentative and highly qualified by the assumptions made'. The early difficulties of measuring government outputs created barriers to measuring productivity change for many decades (Jackson, 1982, pp. 192–4), which were slowly overcome first in decentralized policy systems where comparative analysis became more feasible with improving output measures (Jackson, 1995 and 1997; Simpson, 2006).

Subsequently, however, an improved literature has grown up that employs similar approaches to those used in the private sector to measure productivity and its determinants in specific government agencies. As output measurement in the public sector became better developed in the 1990s, partly as a result of new public management and partly reflecting earlier progress in cost accounting and budgeting systems, so it became apparent that organizational productivity within government could be measured by weighting an agency's different outputs by the costs of producing them. In this sense, it could be possible to control for the varying values and significance of diverse public sector outputs. This cost-weighted output measure could then be divided by a measure of total inputs to obtain a productivity ratio. In the UK, this approach was first developed by the ONS from 1998 and it was then endorsed by the Atkinson Review (2005b). In other words, the public sector counterpart of price-weighted outputs (volume of units * unit price) could be cost-weighted outputs. In Chapter 2 we explore in detail how the cost-weighting of outputs can be accomplished. We need only note here that this was the critical breakthrough that allowed interest in measuring how far government productivity does grow, first amongst scholars and later national statistics agencies, and later at the organizational level amongst some public managers.

By this stage the increased focus on IT investments in large national organizations in private sector firms elicited efforts to replicate similar studies in the government sector. For example, Lehr and Lichtenberg (1998) found a positive relationship between IT capital and output in their study of a number of US government agencies from 1987 to 1992. Likewise, Mukhopadhyay et al. (1997) also found a positive impact between IT capital and productivity in the US Post Service.

As in the private sector, recent scholars have also focused on the role of organizational changes, which have always been best studied in decentralized agencies carrying out common functions, where both regression analyses and data envelopment approaches can be applied (see Carrera et al., 2009, Ch. 1). For instance, Garicano and Heaton (2010) applied measures of organizational changes to a large panel of US police departments and found that management changes were positively related to partial productivity and output estimates. They especially noted that increasing IT investments on its own had little effect. Only when IT investments were accompanied by managerial and business process changes did positive performance improvements result.

Conclusions

Transposed to the public sector, productivity has been seen as valuable in indicating how efficiently public resources are employed in providing government sector services. The measurement of productivity has been seen as an important way in which elected politicians can hold government sector organizations accountable for their performance (Van de Walle, 2008). It can additionally provide managers with some key data they need to improve performance. Charting productivity changes also helps citizens and customers judge the value that government creates for them (Behn, 2003).

Yet for a very long period the study of government productivity at the organizational level has been neglected, attracting very little attention compared with that expended on private sector industries and firms. Most managers in the public services have little experience with productivity analysis, even though they may have some extensive efficiency-orientated or effectiveness-orientated datasets. This difference has persisted amongst academic analysts and public managers although in the modern period the public and private sectors often provide similar services. For example, if we expect private sector healthcare to grow its productivity each year, should we not expect at least somewhat similar processes to be occurring in public hospitals doing the self-same tasks? The business processes of government bureaucracies have also been extensively reviewed and

transformed on private sector lines – at least, as understood by many advocates of new public management and many academics, both those for and against such changes.

From the 1990s onwards, and especially since the early 2000s, efforts to study government sector productivity have become more substantial in some countries. They utilize the fundamental innovation of cost-weighted measures of agency and department overall outputs, a development strongly advanced in the UK by the Atkinson Review (2005b) and some subsequent work by the ONS. In the next chapter we turn to examine in more detail the methodological debates about which concepts of productivity are most useful in the analysis of national, central or federal government agencies, which have no direct comparators. We show there how over-time productivity series are the most useful approach at this level. We also consider what qualitative and quantitative analysis methods can best help us to understand and enrich the analysis of patterns in the productivity series at an organizational level.