THE AUSTRALIA INSTITUTE

Public policy, complexity and rulebase technology

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Discussion Paper Number ??
December 2003

ISSN 1322-5421

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Glossary

Administrative Burden	Public and private sector costs incurred administering/complying with legislation/regulations/rulings. In the case of taxes/transfers often expressed as a % of revenue/expense.
ARC	Australian Administrative Review Council
ATO	Australian Tax Office
Base	The base of a tax is the variable against which the rate is multiplied to determine the revenue.
BRE	Business Rule Engine
CGT	Capital Gains Tax. It can be levied on an accrual basis or a realisation basis. Under a realisation basis it is only levied when assets are sold. Under an accrual basis it is levied on increases in the value of assets whether those increases are realised or not.
CIT - Comprehensive Income Tax	A tax on all forms of income whether it is used to augment wealth or for consumption purposes. . A CIT would require an accrual based CGT. (It is sometimes referred to as a Haig/Simons income tax)
ESOP	Employee Share Ownership Plan
FBT	Fringe Benefits Tax
GAO	US Government Accounting Office.
Global	Refers to a situation where income from capital is taxed in the same manner as income from labour (as opposed to schedular).
GST	Goods and Services Tax
Hyperlexis	"pathological condition of a state with an overactive law making gland" see Manning, B 1977
Income from labour	Any remuneration paid by an employer to an employee for work. It includes salary, fringe benefits, and super contributions.
Income from capital	Earnings from accumulated savings which may take the form of interest, rent, dividends, capital gains, etc.

LRT	Legislative Rulebase Technology.
MEB	Marginal Excess Burden – The ratio of the dead weight loss (DWL) which results from a small increase in a tax to the increase in revenue raised. The DWL is an economic efficiency opportunity cost.
PRT	Payroll Tax
Rawlsian Justice	John Rawls was an American philosopher who suggested the following thought experiment to evaluate the fairness of proposed public policy options. Imagine you have to evaluate policy through a veil of ignorance. That is, imagine the attitude you would take to a particular policy at a hypothetical meeting to decide on its adoption which took place prior to your birth. Rawls highlights the hierarchic precedence of these considerations over issues of economic efficiency and equity.
RBT	Rule-Based Technology
Schedular	Under Schedular treatment of income from capital it is taxed at different rates to income from labour (as opposed to global).
SGC	Superannuation guarantee charge
Traditional Technology	This term is used to refer to conventional practice in public administration. The dominant relevant feature is that individual staff determine the way in which the rules apply in a particular circumstance. The process may be highly automated in regards – assistance with the decision as to which part of the rules to apply, collection from a database of relevant factual circumstances and numeric calculation of obligations and entitlements.
VBA	Veteran's Benefit Administration, a part of the US Department of Veteran's Affairs

Acknowledgments

This document was written with the benefit of a grant from The Australia Institute, my thanks to Gary Banks, Richard Denniss, Clive Hamilton, Fiona Humphris, Sam Hunt and Peter Johnson.

My thanks also to Julian Disney who sparked my interest in some of these issues whilst I was a Visiting Fellow in the Centre for International and Public Law at the Australian National University during the mid 1990's.

Summary

Complexity is often treated as a hidden free good in discussions of public policy and public administration in Australia and many other Western countries. The main purposes of this paper are to describe the forms complexity takes, to illustrate it is often an expensive bad, to describe both problems it causes and 'rulebase' technologies which, in some situations, enable it to be better dealt with. This paper also analyses the relationships between public policy objectives, complexity and rulebase technologies.

The paper will deal with public policy in any area where policy is implemented through a set of "rules" (law, regulation, administrative guideline, private or public ruling system etc). Examples of such areas are tax, social security, immigration, corporations law, local government and superannuation.

An architect commissioned to design a new building might consider criteria such as visual appeal, energy efficiency, materials availability etc when producing a design but as the architect increases the degree of structural complexity of the building the client, potential tenants, the client's quantity surveyors and civil engineers will, at some stage, say no. An architect whose designs become progressively too complex will likely go out of business.

In much public policy discussion and formulation this feedback loop is very weak or broken. Political, bureaucratic and academic discussions of public policy often deal with criteria such as economic efficiency, social equity and justice, environmental impact and administrative cost (sometimes simplicity as a desirable goal) but traditionally they have dealt with complexity and accuracy in a cursory, anecdotal fashion, if at all. Accuracy, in this context, means the determination of benefits/duties/obligations etc in accord with valid legal application. The ability of administrative agencies to hide inaccuracy (which inevitably results from complexity) has contributed to the lack of feedback.

In some areas complexity has increased to such an extent that the impact of parts of some bodies of legislation can no longer be described as "the rule of law". The impact of the legislation in particular situations has a random element potentially as capricious as decisions which would result from the delegation by law makers of a high level of discretion.

Two recent developments are starting to introduce a small measure of feedback into the legislative cycle. Firstly, attempts are being made to measure accuracy in a statistically valid manner. Secondly a class of IT product – "rulebase" technology has been developed which enables a set of private or public rules to be modelled and then administered with very high standards of accuracy.

The paper has four sections:

- Scope. This section describes rule based technology and the areas of public policy dealt with in the paper;

- Public Policy Environment. This section describes the major criteria by which public administration is evaluated. These criteria span the economic, financial and administrative law dimensions of public policy. This section also deals with the oft-neglected negative impact of complexity on the rule of law and the strong potential for complexity to erode citizens goodwill toward the law;
- Policy objectives, accuracy and complexity – trends, patterns and relationships. This section deals with issues such as recent trends in the rate of change in the volume of legislative provisions and observed levels of accuracy in the administration of legislative provisions. The section describes relationships between various public policy objectives and complexity. By way of illustration it also describes complexity in Australian income tax. It describes the way in which high level tax design has chosen to rely on forseeably more complex tax bases;
- Cost Benefit analysis of the introduction of rulebase technology. This section outlines the dimensions of the cost benefit analysis of implementing electronic rulebase technology. This section describes the possibility of a "Factor-4" productivity benefit stemming from rulebase technologies if rulebase technology is implemented as the foundation of an integrated approach to all stages of public policy development and administration.

The main benefits from public sector use of rulebase technology in particular areas are:

- Substantial reductions in public administrative costs over the life-cycle of bodies of legislation which have been represented using rulebase technology. (On the basis of private sector experience with rulebase technology it is likely it can result in substantial reductions in the private costs of accurately complying with laws as well);
- Substantial improvements in accuracy resulting in more equitable and just application of law.

The main benefits likely to result from wide-spread public sector use of rulebase technology in future are:

- A greater focus on the problems complexity is causing at present (for example, high levels of inaccuracy) in public administration;
- Better informed discussion prior to the introduction of new legislation of the costs and benefits of higher levels of complexity and the impact of complexity on public policy performance criteria – efficiency, equity, administrative law values etc.

1. Scope

This paper deals with two related problem areas which arise from the administration of legislation/regulations/public agency rulings. The two problem areas are complexity of the rule set and inaccuracy in its application. The paper also deals with a technology – legislative rulebase technology – which can address these problems by automating the intellectual core of the administrative process. Section 2.1 below describes this technology and its recent history. Section 2.2 describes the diverse range of areas of public sector administration where it has potential applicability. Section 3 goes on to discuss accuracy and complexity in the context of public policy design criteria. Section 4 deals with the benefits of utilising rulebase technology.

1.1 Rule-based technology

A legislative rulebase is a declarative body of rules reflecting the precise terms of legislation. This body of rules can be driven by an external, computer-based engine. The engine can investigate and apply the rules (whether from a database or through an interview with a user), repeatedly inferring conclusions about which provisions of the legislation do or do not apply from the data collected, and finally coming to a conclusion as to the overall satisfaction or non-satisfaction of a goal, explaining the legislative basis for this conclusion. A legislative rulebase is thus a comprehensive logical model of a piece of legislation, capable of being reliably investigated and applied by a computer.

In the public administration context, engines which use natural language and parse in accordance with the rules of English grammar have a very significant advantage over tools which model rules using symbolic representation. For further discussion see Dayal et al, 1994 and Softlaw, 2002, page 4[1].

Within government rulebases can also be used to model rules whose authority does not derive from legislation. For example, the wording of regulations and internal operating procedures can be modelled. Rulebase technology can also be used outside government. LRT (Legislative Rulebase technology) tools are a sub-set of a broader market in RBT (Rule-based Technologies). The 'shell' of an RBT application is a 'business rule engine' (BRE).

Worldwide there are about a dozen software vendors who supply business rule engine software. In the late 80's/early 90's problems emerged around this industry as a result of a number of bad experiences with applications which didn't live up to their promises. In the last few years, however activity in this industry has grown rapidly and concerns have dissipated.

Usage by government in Australia of rulebase technology is now extensive and growing. ARC (2003) describes 13 Commonwealth and State agencies currently using rule-based technology.

[1] The advantage stems from a much greater potential for an isomorphic relationship between the legislation and the rulebase.

Like decision-support systems and management information systems, RBT is just another IT tool. But, it is a tool with implications for public policy goals which extend well beyond administrative agency procedures and costs.

It is important to distinguish RBT from "decision support systems". The latter is a term used to encompass a number of approaches and technologies which assist human decision making without actually indicating outcomes. By contrast, use of LRT in a specific situation results in a verifiable legal argument based on reference to provisions of the legislation.

1.2 Relevant areas of public policy

This paper deals with areas of public policy where rule-based technology is applicable. LRT is likely to be applicable to a particular area of public policy if it is about the determination of entitlements or obligations. These areas include:- the administration of taxes (as well as fees and charges), areas of public expenditure where there are rules governing financial entitlements (for example social security, veteran's affairs, access to business welfare payments), areas where non-financial entitlements and obligations are determined by rules (migration regulations, environmental obligations of proposed developments, access to public housing).

But there are also areas where there is no need for RBT. They include:

- Public policy situations where there are no rules (for example defence strategy considerations or areas with absolute ministerial discretion)
- Situations where the relevant rules are deep, conflicting and open to argument (for example, constitutional law)
- Situations where the rules are quite simple. For example, almost all children receive primary education. By contrast there are more extensive rules which govern private school entitlement to Commonwealth and State grants and loans so there is potential for application of RBT.

This paper also does not deal with private sector use of RBT. Use of RBT is already extensive and growing particularly in financial services and insurance.

2. Public policy environment

The intent of this section is to broaden the scope of conventional discussion of public policy goals and the trade-offs involved in policy design. Academic discussions of policy design typically allow for administrative costs and the costs of complexity but neglect them.[2] Implicitly it is assumed they are fairly minor. Administrative practitioners, by contrast, typically focus on the post-legislative phase of the policy cycle. They take policy aims and levels of complexity as given and focus on public sector administrative costs. Their approach is akin to that of a private sector manager. By contrast, lobbyists, politicians and other participants in the pre-legislative phase of the political process often tend to down-play administrative costs and complexity as minor subordinate factors in their grand policy schemes.

Evidently, of these three approaches the academic one is the most accurate and complete. Still, it is inaccurate and incomplete to the extent of being misleading for three reasons. The first reason is a simple numeric one. Every year administrative costs consume a fraction of social resources which is significant in proportion to the opportunity cost of the inefficiencies which result from changes in behaviour. Secondly, complex rules stymie productive change so they have a dynamic efficiency cost. Thirdly, complex rules compromise the rule of law.

There is an unstated presumption in the discussion that follows that the legal expression of public policy does have some semi-autonomous capacity to produce intended social and economic consequences. It might be that law is wholly ineffective or only effective in certain cultural contexts. This discussion ignores these possibilities. Bogart (2002) considers a number of such formulations of the capacity of law to produce intended consequences and concludes in favour of this 'semi-autonomous capacity' formulation above.

Section 2.1 below sets out the main criteria/ultimate objectives by which policy expression and administration are commonly assessed. The next section (2.2) describes the absence of benchmarks by which to measure levels of complexity despite its significance. The third section (2.3) deals with the impact of legal complexity on two intermediate policy objectives – "citizen goodwill" and "accuracy of administration".

The broad range of public policy objectives is relevant because the administrative tool – rulebase technology – has the potential to significantly alter the terms of the trade-offs between the various public policy objectives which have resulted in current legislative expression. As a consequence as the use of RBT grows it is likely that pressure for policy revision will also grow. Advocates for new or revised legislation will observe a capacity to achieve some goals at less cost to others because of RBT.

[2] One exception is in the tax area. See for example, Yitzhaki, 1979, p 475 or Kaplow, 1996, page 135.

2.1 Policy Criteria

Across a broad range of public agency functions, the social, economic, financial and legal criteria by which the impact of the administration of the law is currently assessed can be categorised under the four headings set out below.

Economic Efficiency

Some spheres of public administration have a clear economic efficiency cost (for example, revenue collection). In tax literature the economic cost of an additional $1 of revenue is known as the marginal excess burden (MEB). Areas of social security expenditure which, for example, are income tested have a work disincentive effect with very similar economic efficiency costs to income tax. Some areas of law are intended to have a positive impact on economic efficiency, for example, the Trade Practices Act 1974. For some areas of law the immediate impact on economic efficiency is a fairly low priority (for example defence procurement or immigration) or, rarely, an irrelevancy.

It is important to note that these economic efficiency costs are opportunity costs. They are costs measured against a benchmark of "a would that would have been: in the absence of the increased tax. Unlike administrative costs described below they are not actually incurred.

Administrative Costs

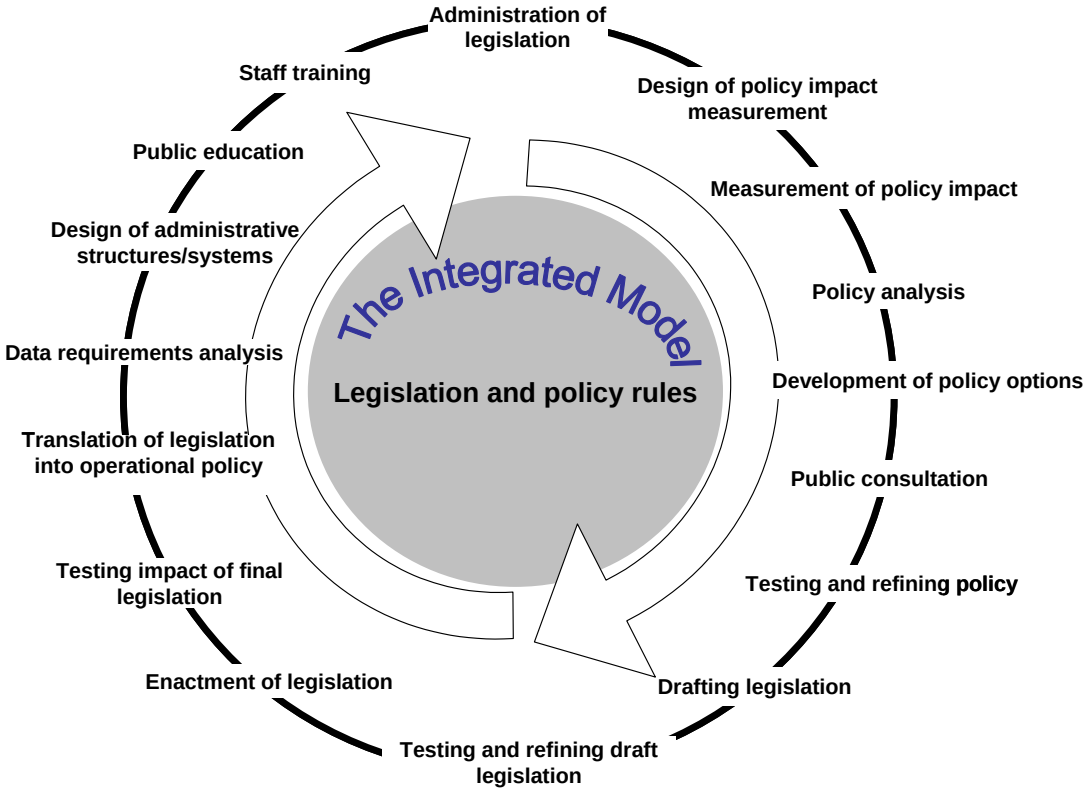
The societal administrative costs of the administration of a body of law is the sum of the private sector and public costs devoted to tasks such as – record collection, assessment of how specific factual circumstances fit within the general framework of the law, application of the law (and regulations, rules, precedents etc) to particular hypothetical or actual circumstances, attempts to improve or change the law. Administrative costs at a social level encompass all costs which do not result from changed economic behaviour, though these two categories can blur. The time taxpayers spend filling in interest and dividend receipts in their tax returns is clearly an administrative cost. The lower wealth stemming from lower saving resulting from lower after tax returns to saving is an economic efficiency cost. Time devoted to figuring out "I'm going to avoid that savings instrument, it's tax treatment is too complex" sits in the blurry part in the middle.

Administrative costs are incurred in the private and public sectors at each stage in the life cycle of a particular body of legislation. Those stages typically include:

- The development of policy;
- The drafting and enactment of legislation;
- The design of service delivery/compliance/audit structures and methods to administer/comply with the legislation;
- The delivery of services/determination of duties and obligations based on the legislation.

Some of the key steps in this cycle are illustrated in the diagram below, which also emphasises the primacy of the legislation and policy rules in this cycle of activity.

Figure 1 Integrated Legislative/Policy Cycle



It is important to assess administrative costs over the whole of the life-cycle of the legislation because decisions taken at early stages can have a significant impact on later stage costs. Table 1 below sets out the sort of costs incurred and the main determinants of these administrative costs at various life-cycle stages of a body of law.

Table 1 Nature & timing of administrative costs through life-cycle of a body of law

Lifecycle Stage	Public & Private Sector Costs	Determinants
1. Design of Policy through to Enactment	Policy advice, lobbying	Extent of political consensus, eg regarding impact
2. Testing Impact through to Staff Training	Capital costs & 'human capital' costs of setting up to understand/administer and comply with new rules	Novelty, complexity, duration of transition
3. Administration	Recurrent costs	Staff turnover, complexity

Net government expenditure

This is easier to measure than economic efficiency and administrative cost above because it generally appears in the government accounts as revenue or expenditure (or perhaps, at worst, an estimated Tax Expenditure). In the case of a regulatory agency (for example, the Therapeutic Goods Administration – TGA) this criteria might be of minor significance.

Equity and Social Justice

Equity is commonly discussed in horizontal or vertical terms. Vertical equity deals with the impact of the law on the distribution of socio-economic resources, for example, post-tax income distribution. Horizontal equity deals with the principle that like persons are treated in like manner. Black-letter law often sacrifices horizontal equity for clarity. Rawlsian Justice deals with the likelihood a particular policy would be supported at a hypothetical meeting of unborn persons who do not know into which generation or in what circumstances they will be born.

Table 2 below sets out the common indicators and estimates of their value for each of these criteria for progressive rate scale tax on income for labour. (Some tax on income from labour in Australia has a flat-rate scale, eg FBT, superannuation contributions tax – surcharge aside, PRT, but most is raised by the progressive rate scale.)

Table 2 Tax on income from labour (progressive rate scale)

Criteria	Common Indicator	Estimate of Value
Efficiency Cost - opportunity cost	Marginal Excess Burden (% of Revenue)	A quarter of revenue raised
Administrative Cost	Public & private administrative compliance burden(% of revenue)	A tenth of revenue raised
Revenue	$	½ Federal & state total tax revenue pre GST
Vertical Equity Impact	Fraction of contribution to difference between Pre & post tax/transfer income inequality (eg GINI coefficients)	A third, other two-third's due to Social Security

Source: In general, see Pender, 1997, Chapter 8. For a discussion of US estimates of administrative costs see also Gale and Holtzblatt, 2000 who estimate US personal income tax (from all sources) costs of between 10 and 17%, page 2.

2.2 Absence of Complexity metrics for a body of rules

Complexity has the potential to significantly influence all four of these public policy criteria. The application of a body of rules can be complex in two fashions:

- Factual Complexity covers the number of circumstances which have to be established ("numeric factual complexity") and the difficulty in identifying, defining and independently verifying each of those circumstances ("issue resolution factual complexity);
- Logical Complexity deals with the breadth and structural depth of reasoning necessary to apply the body of law. Appendix A further describes some of the determinants of logical complexity.

Though many practitioners will be able to point to laws or parts of laws which are more simple or complex in each of these dimensions there is a lack of formal metrics with whish to measure such complexity. The absence of metrics is a significant contributor to the very poor quality of feedback to law makers of the levels and costs of complexity. Draftsmen and policy makers have no benchmark.

Regulation Impact Statements (which are often prepared prior to tabling new or amended bills and instruments) lack credibility. The Productivity Commission which assesses RIS's states "at present RIS's usually contain a relatively brief and typically qualitative assessment of the compliance cost burden of regulatory proposals" (Productivity Commission, 2002, p xviii).

Part of the reason for the absence of metrics and benchmarks is the absence of systematic evaluation with the benefit of hindsight of the economic and social costs imposed by bodies of public sector rules. Policy makers and draftsmen happily add complexity, increase public administrative costs (or decrease accuracy) and impose extra private sector administrative costs with no regard for these consequences. Increasing complexity has an additional more insidious and potentially serious impact than these economic costs. The goodwill of the citizens and their respect for the rule of law in the particular domain and in general is readily compromised. Section 2.3 goes on to describe this impact.

2.3 Complexity, Good Will and Administrative Law Values

The administration of a body of law by a specific agency over a period of time can be evaluated according to three further criteria – citizen goodwill, accuracy and compliance with administrative law values. These criteria are intermediate objectives of policy. They are not good in themselves but good to the extent they facilitate achievement of the ultimate objectives discussed in section 2.1, for example Rawlsian Justice or lower administrative costs.

Thought Experiment

Increased complexity can have more wide-reaching consequences than the economic efficiency costs commonly discussed. To illustrate this proposition, consider the following thought experiment. Suppose some arena of social behaviour is currently characterised by an absence of legal process. Power in that arena is exercised in a capricious, random or negotiable fashion. It is proposed to "start the policy cycle on virgin ground". There are two purposes. Firstly, purposes specific to this arena. Secondly, the desire to promote the rule of law. Rawls (1971) p206-213 sets out the characteristics and rationale for "the regular and impartial administration of public rules" as part of the conception of justice.

> A legal system is a coercive order of public rules addressed to rational persons for the purpose of regulating their conduct and providing the framework for social cooperation. When these rules are just they establish a basis for legitimate expectations. They constitute grounds on which persons can rely on one another and rightly object when their expectations are not fulfilled. If the basis of these claims are unsure so are the boundaries of men's liberties. (Rawls, 1971, p207)

Now suppose a body of rules is introduced which have the force of law and there is an authority with some power to influence their content and take action against transgressors (which action may or may not be effectively contestable in court.)

Now consider the impact of progressively making the rule set larger and more complex. (Also assume there is a strong emphasis on "black-letter interpretation" of the rule set over interpretation in accord with the spirit of the meaning. This assumption clarifies and strengthens the argument but is not essential because multiple expression is likely to result in multiple assertions of "spirit of the relevant intent".)

At first the establishment of a body of rules should result in cheaper, easier, more transparent, fairer situations. (For example, a tax on the number of windows is a step up on a tax set at the whim of the collector assessing his capacity to extract revenue from the appearance of the household occupants.)

Now continue to increase the complexity of the body of law – there will be more specialisation and less wide-spread knowledge of the arena specific policy intent. As the complexity continues to grow there will reach a point where everybody is always violating some clause – no-one is ever satisfying every clause they should. Of course no-one knows which clause they are violating, nor which clause, upon an audit the administrative agency might feel they are violating[3]. Accurate determination is impossible. Well before this point citizen goodwill lessens.

In this situation respect for the particular body of law and the rule of law in general suffers. If the law imposes penalties then social resources will be devoted to appearance with the letter of compliance and away from consideration of the spirit and intent. If it confers reward then resources will be devoted to contesting decisions of the authority. Inevitably the administrative authority will seek changes to the law to strengthen the sovereignty of its interpretation of the complex rules, interpretations which typically aggrandise its power. Further, and for no good reason patterns of social and economic behaviour will be distorted away from areas where the law is more uncertain.

Administrative mechanisms symptomatic of excessively complex legal rules which result in a failure of the "rule of law" will develop. Two good examples of these mechanisms are "private rulings" in tax and "privative clauses" in migration. Each is discussed below.

Private rulings

The need for rulings is well-illustrated in an experiment conducted by an American magazine "Money". It gave 46 qualified tax accountants a "hypothetical" set of tax circumstances of an individual seeking the preparation of a return. It got 46 different answers.[4] In the circumstances it is exceptionally imprudent to proceed without a tax ruling from the tax authority. It is the interpretation by that authority which will determine the future liability of the taxpayer. Of course a taxpayer who disagrees with that interpretation has recourse to the courts but they may well have to bankrupt themselves to achieve that recourse. Rulings are a constructive solution to excessive complexity but they are also symptomatic of a failure of the rule of law taxpayers and their very highly paid advisers can't rely on their own interpretation and cannot form expectations in order to plan their actions.

Privative clauses

[3] Appendix A describes the meaning of "accuracy" in this context.

[4] Not one tax preparer got the answer the magazine thought was right. The highest liability was double the smallest. Around the world tax administrations have undertaken similar tests internally. Understandably the results are rarely publicized, but they obtain similar results. The US 'Money' study is described in Keating, 2003, p8. See Caplin (1998) p 104.

Ruddock's (1999) description of the recent history of migration law and subsequent developments provide a similar example. Prior to December 1989 the relevant Act provided a broad general discretion to the Minister to grant and refuse visas and entry permits. Departmental manuals fleshed out policy and provided guidance to decision makers.

Reflecting criticism the law was vague the *Migration Act* was amended and the manuals were placed by the "migration regulations". Current regulations contain about 1250 pages of rules mostly dealing with requirements for the grant of one of the numerous classes of visas.

The Government grew concerned by the increasing number of appeals against migration decisions and their cost. In 1998 the Government introduced a "privative clause". This clause (section 474 of the *Migration Act* 1958) severely restricts access to and exercise of powers of review. When it is effective, administrative decisions under the Act or regulations are incontestably validated by this clause. There is no contest of capricious, random or corruptly negotiated decisions.

It may be that the narrow economic interests of Australia are best served by a high level of discretion as applied prior to 1989 or privative provisions as may well apply in future because it doesn't matter much which migrant applicants are accepted and rejected. Still, the combination of 1250 pages of migration rules and effective privative provisions would result in a lessening of "the rule of law" as compared with the pre 1989 situation. The carefully laid-out complexity[5] of the 1250 pages of rules would seem to have served no social purpose whatsoever if privative provisions are effective. The tax equivalent would be a new class of non-contestable ruling.

The bounds of the effectiveness of the privative clauses in the migration area have not yet been fully tested in the High Court. However, in a recent case[6], the commonwealth argued the Migration Act might "validly be re-drawn to say, in effect, (again) here are some non-binding guidelines which should be applied", with the "guidelines" being the balance of the statute[7]. The majority judgement rejected this extreme claim for the effectiveness for the privative clause approach to legislation.[8]

Conclusion

Administrative Law values are characterised by ARC 2003 (see p 9) as, "Lawfulness, fairness, rationality and openness – that is transparency, efficiency"

Mechanisms to deal with excessively complex rules like private rulings and privative clauses clearly compromise administrative law values resulting in a further erosion of citizen goodwill. A stop-gap solution is to amend the mechanisms. For example, making

[5] Testifying before a current Senate Inquiry, Mr Clothier, a former senior member of the Immigration Review Tribunal, told the committee "…laws are so complicated it was impossible to give reasoned advice to clients…" Lawson, K, Canberra Times, 19 November 2003.
[6] Plaintiff S157/2002 v Commonwealth of Australia [2003] HCA2.
[7] Id Clause 101 Majority Judgement.
[8] Id Clause 102

the private rules public[9]. The root cause of the problem is the complexity of the rules themselves. Often, at the time increasingly complex provisions are drawn up, no thought is given to the quite foreseeable corrosive subsequent impact on citizen goodwill and administrative law values.

[9] After many years of criticism the ATO has made a register of private binding rulings though it is only searchable by ruling number. (See AFR, 13/11/2003, page 8).

3. Policy objectives, accuracy and complexity – trends, patterns and relationships

The discussion in section 2.1 grouped public policy objectives as ultimate (for example, vertical equity, low administrative cost) and proximate (for example, citizen goodwill, accurate administration). This section describes, where feasible, trends in and levels and patterns of the "forgotten" proximate objectives – accuracy and simplicity. It also deals with likely theoretical and observed relationships between these "forgotten" objectives and those more commonly emphasised.

Finally this section deals with the causes and sources of complexity in Australian income tax. The purpose of this section is to illustrate growth in complexity and the links between complexity and high-level policy design issues.

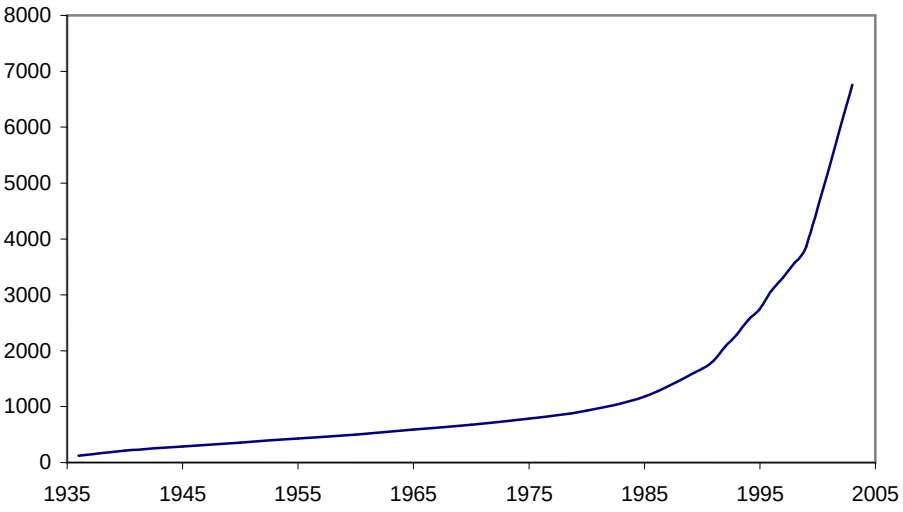
3.1 Levels, Trends and patterns

Complexity

Australian policy makers' taste for complexity seems to have increased in recent years. The average number of pages of legislation produced by the federal parliament significantly increased in the 1990's by comparison with the 70's and 80's. In the 1990's nearly 55,000 pages of legislation were passed by the Commonwealth Parliament, an average of 30 pages per Act. This was about twice the average page count for Acts passed in the 1980's, and almost three times that for the 1970's. The number of Acts passed per year (about 170) was steady during the 1980's and 1990's but that level was well above previous decades. (Banks 2003 a & b). There has been a similar long-term increase in the number of subordinated instruments at the Commonwealth level in the last decade.

In the Income Tax area the quantum of legislation has increased exponentially. Figure 2 sets out the number of pages in the ITAA over the last 70 years.

Figure 2 Australian Income Tax legislation – no. of pages



Source: Banks, 2003 b, some figures derived from Kobetsky and Dirkis (1997)

Increasing complexity can also be observed in United States tax legislation. The first CCH US federal tax loose-leaf service, the *Income Tax Service*, had 400 pages containing the tax law and related documents in 1913. By 2003 the equivalent service, the *CCH Standard Federal Tax Reporter*, required 55,000 pages and 25 binders (CCH 2003).

One exception to this trend would appear to be attempts by State governments to take stock and where feasible abolish regulatory instruments. The NSW Parliamentary Counsel's Office reports (Parliamentary Counsel's Office of NSW 2003) that statutory rules in force in the state have reduced from over 15,000 pages in 1990 to around 8,200 in 2003 as a result of staged repeals under the Subordinate Legislation Act 1989. The number of statutory rules in force has decreased by more than half over this period. In Queensland 78 instruments are due to be repealed in 2004 under the Statutory Instruments Act 2002 (Office of the Parliamentary Counsel of Queensland 2003).

Table 3 below sets out the number of pages for particular areas of Australian law and, where figures are available estimates of the number of rules. Though it is not easy to draw international comparisons, Australia's taste for complexity is probably higher than the average OECD country. For example, the Canadian income tax legislation is only 2000 pages (see Krishna 2003). However in the UK the direct tax code is over 7000 pages of legislation.

In the corporate tax area there is strong indirect evidence suggesting a much higher taste for complexity in Australia than the OECD average. Though, in 1999, the Australian corporate tax rate was average by OECD standards, the corporate tax revenue in the same year was, by a wide margin the highest in the OECD as a fraction of GDP. Though the revenue burden comparison is misleading (because of full imputation in Australia) the Australian base is clearly the largest fraction of GDP in the OECD in that year. Though

it would be feasible to combine a large base with simplicity (for example by denying depreciation deductions) it seems likely the unusually large base is associated with an unusually high degree of complexity. See OECD 2001 p 34.

Table 3 Scale of parts of various Australian laws

	Pages	Rules	Source	Note
ITAA 1936 & 1997	7000	NA	Banks 2003a	1
Social Security	1200-1500	30000	Vardon 2003	2
Veterans Affairs	1500-2000	9250	SoftLaw	3
Family Payments	800-1000	5250	SoftLaw	4

Notes

1. Entire Acts.

2. Rules administered by Centrelink, relevant page count is a conservative SoftLaw estimate.

3. This is the number of pages of delegated legislation, the Statements of Principle, which are currently modeled in one large rulebase system used by the Department to process compensation payments. It is not the entire Act.

4. Covers Tax and Social Security payments administered by Centrelink.

A 2001 OECD study involving a survey of small and medium enterprises (SMEs) in 10 countries reported an estimated average cost of almost US$27,500 per year for compliance with the administrative requirements of tax, employment and environment regulations (OECD 2001). This equates to almost US$4,000 per employee. The estimated average cost of administrative compliance for Australian SMEs was about US$25,000, which equates to US$3,600 per employee.

Accuracy

Table 4 sets out measured error rates for a number of legislative areas. Error rates are, in general, far higher than most public policy commentators care to admit. Error rates in particularly complex sub-sets of law (for example, the tax treatment of some superannuation payments) probably render the impact of the law as almost random.

Table 4 Measured Error Rates in Public Administration

Agency	Law	Error Rate	Source	Note
DVA	VEA	38% of appeals to VRB	(ANAO 1996:15)	1
Centrelink	SS, Age Pension provisions	52.1% of sample	(ANAO 2001, 63)	2
US VA	VCAA	41%	(GAO, 2001, 3)	3
Canada HRDC	EIA	$6 per $100	(OAGC, 2000)	4
UK Child Support Agency	Child Support Acts	28% of receipts and 76% of maintenance assessment debts	(NAO 2003c)	5
UK Department for Work and Pensions	Income Support, Jobseeker's Allowance	6.8% of expenditure	(NAO 2003a)	6
US IRS	US tax code	25.6% of total EITC claims	(Herd & Bronchi, 2001)	7
US Department of Housing and Urban Development	Rental housing assistance program	US$1.3b overpayment errors, 6.6% of total assistance.	(GAO, 2003)	8
UK Veterans Agency	War Pensions Scheme	4% of claims	(NAO 2003b)	9

Acronyms

DVA =	Department of Veteran's Affairs, Australia
VEA =	Veteran's Entitlement Act 1986
VRB =	Veteran's Review Board
SS =	Social Security Act, Australia
VA =	United States Department of Veteran's Affairs
VCAA =	US Veteran's Claims Assistance Act
HRDC =	Human Resources Development Canada
EIA =	Employment Insurance Act, Canada
OAGC =	Office of the Auditor General of Canada
NAO =	National Audit Office, United Kingdom

IRS = Internal Revenue Service, United States

Notes

1. The 38% reported for DVA is a result of an internal review of claims conducted by DVA.

2. The 52.1% reflects the rate of "actionable" errors from a sample of 354 age pension claims scrutinised by the Auditor-General. Actionable errors range from false positives, ie claim accepted when it should have been rejected – 4.9%, false negatives – claim rejected when it should have been accepted – 5.9%, to less serious error eg wrong payment rates (13.5%). The 52.1% does not include "non-actionable" assessment errors, eg wrong form, inadequate documentation supplied etc. The ANAO found "almost all claims assessments contained at least 1 of the administrative errors listed in table 4" (ANAO 2001, p 64).

3. The 41% error rate is a figure calculated by a part of the US Department Veteran's Affairs, the Veteran's Benefit Administration (VBA) for fiscal year 2000. This figure is internally determined. In the years 1993 to 1997 the VBA reported only a 5% error rate based on a very small sample size. In 1998 they introduced an improved accuracy measurement (Systematic Technical Accuracy Review, STAR) the first year of its use resulted in an overall error rate of 36% for regional office initial decisions. These figures are based on a review of a sample of approximately 7,400 cases, about 1.5% of the number of cases processed per year.

4. The $6 per $100 error rate is calculated by HRDC's Comprehensive Tracking System, the most probable error in benefit payments is estimated by statistical inference from a sample of Employment Insurance claims processed. Inaccurate payments include both overpayments and underpayments.

5. The 28% error rate is the proportion of incorrect receipts in a sample examined by the National Audit Office during their audit of the Child Support Agency for the year ended 31 March 2003. Of £586m receipts, overpayments were estimated to be £4.5m and underpayments were estimated to be £21.9m.
   The 76% error rate for maintenance assessment debts is the proportion of errors in a representative sample of maintenance arrears balances examined by the National Audit Office during their audit of the Child Support Agency for the year ended 31 March 2003.

6. The 6.8% is the over-expenditure for the year ended 31 March 2002 on Income Support and Jobseeker's Allowance due to both fraud and error so it is not directly comparable with the other figures. It was estimated by the Department for Work and Pensions based their program of reviews covering around 27,000 cases each year. The Department estimates the annual loss from these two benefits to be about £1.15b.

7. The 25.6% error rate is the percentage of total EITC claims that were erroneously paid in the 1997 tax year. Errors are generally associated with family status issues, for example taxpayers claiming children who do not meet the eligibility criteria such as residency requirements.

8. The $1.3b estimate for total overpayment of rental assistance is for fiscal year 2000, and is the result of a quality control review of rent determination errors made by public housing agencies, owners, and agents responsible for program administration. The review was conducted by the Department of Housing and Urban Development.

9. The 4% error rate for processing claims is for the 2001-2002 fiscal year. The error rate had not changed since the last examination by the NAO in 1992.

Example: Ever increasing Complexity in social security

Sue Vardon, CEO of Centrelink, in a recent address, (2003) states as "three certainties in life, that you will die, you will pay taxes, and despite everyone's best efforts the social security system will get more complex"

It is not true that the social security system has always increased in complexity. For example during the period 1970/71 to 77/78 the age pension became more universal. (See Mitchell *et al.* 1994, page 326). The age pension arrangements became less complex because there was bipartisan support for reduction or abolition of the means tests.

Whitlam (1985) states:

"Like every MP I was aware of the subterfuges to which constituents went to avoid the means test and the bureaucratic cost of administering it" (p 359)

Since that period Social Security complexity does seem to have increased fairly steadily. The brief period of universalism in the mid-70's gave way to a move back to targeting – for example re-introduction of the income and asset tests for the pension (see Barber *et al*. 1994, p 34). The level of targeting in Australian Social Security had traditionally been high by international standards (see for example Mitchell *et al*. 1994, p 332, table 2).

3.2 Interrelationships

For each heading the discussion below first sets out likely theoretical relationships between complexity and some of the other variables discussed above then it goes on to discuss examples.

The claimed potential for efficiency to increase with complexity is often a chimera

Theoretical issues

Claimed efficiency benefits from more complex construction of existing bodies of law are often dubious for two reasons. This is most easily seen in the tax area.

Firstly, in the absence of knowledge about economic behaviour, uniform taxes are preferable to complex taxes because the welfare cost of a set of taxes increases more than proportionally with differences in individual tax rates (Pender, 1997 p24).

Secondly, even if a complex set of taxes improves economic efficiency (for example taxing goods most which are in inelastic supply), complex taxes will stymie desirable experimentation in patterns of economic activity because they increase uncertainty.

Though arguments asserting "increase complexity to improve efficiency" are often dubious, a tool which reduces the uncertainty cost of a given level of complexity may well result in a positive contribution to efficiency. For example, suppose private sector

compliance costs are high[10]. In that case indeterminate application of different parts of a body of law often act like differences in tax rates in their impact on differing potential economic behaviours.

Example

A good example of the Australian taste for complexity with a dubious efficiency motivation is the GST treatment of financial services in Australia. In most countries with a GST financial services are input taxed. That is, financial services business get no credit for GST levied on inputs they buy and in turn charge no GST to their customers, for example, bank depositors or mortgagees. Australia is alone in not treating financial services in this fashion.

There was concern during the course of the introduction of the GST in Australia that input taxing financial services would result in a bias against out-sourcing. An out-sourcing supplier of financial services (likely to have a large wage component) would have to levy GST for which no credit would be available. By contrast, no GST would apply to the in-sourced wage bill. The Australian solution to this problem was two-fold:

- Firstly, careful, extensive 'shopping lists' were drafted, itemising current financial services "outputs". Arbitrarily some were deemed to be input-taxed and others were not;

- Similarly extensive itemised lists of current out-sourced product descriptions were drawn up for which a 75 per cent "Reduced Input Tax Credit" is available (75 per cent being an estimate of the percentage of value added at the final stage of production).

The bureaucratic discussion which resulted in this "uniquely Australian" GST structure extensively discussed the productive efficiency costs of discouraging out-sourcing[11]. By contrast there was very little discussion of the administrative costs of implementing this tax structure. They appear to have been ignored as were the dynamic efficiency costs which now face a financial services firm which wishes to innovate its production structure in a manner which doesn't sit well with the "shopping lists" provided in the GST schedules. Unlike income tax there are no rules or principles which determine these "shopping list" schedules. These arrangements are now an anti-innovation force in Australian financial services

The extent to which administrative costs increase with complexity is undocumented.

While it is intuitively plausible and generally accepted that – administrative costs increase with complexity – the nature of the relationship is undocumented. It is only fairly recently that scrutiny has been applied to accuracy in public administration and statistically valid error rates have been calculated. See Table 4.

[10] For more detail see Appendix A – Determinants of Administrative cost burden
[11] See Australian Treasury, 1999

Theoretical Issues

There are three major theoretical relationships to note in regards administrative costs.

First, the sensitivity of public sector staff productivity to factual complexity depends on levels of accuracy desired and technologies chosen. See Appendix A. Because the calculation of accuracy is a relatively recent development specification by policy makers of desired levels of accuracy is rare. Rulebase technology, for a given level of accuracy, is likely to significantly reduce the costs of increased factual complexity as compared with traditional technology.

There is a significant "disconnect" between a statistical and a legal approach to this issue. Some level of inaccuracy is likely to be inevitable and, from a cost-benefit perspective, desirable. However, from a legal perspective monies can only be paid with legal justification. The CEO of a private insurance company can make a choice "I'll accept X% of claims are Y% over-paid in order to reduce claims processing costs Z%". However, a similar decision cannot be made as readily by a government body. This asymmetry has significantly contributed to the increase in administrative complexity. Staff at government bodies are likely to be unwilling to acknowledge inaccuracy and discuss trade-offs because, for example, over-payment of claims is payment of monies without legal basis.[12]

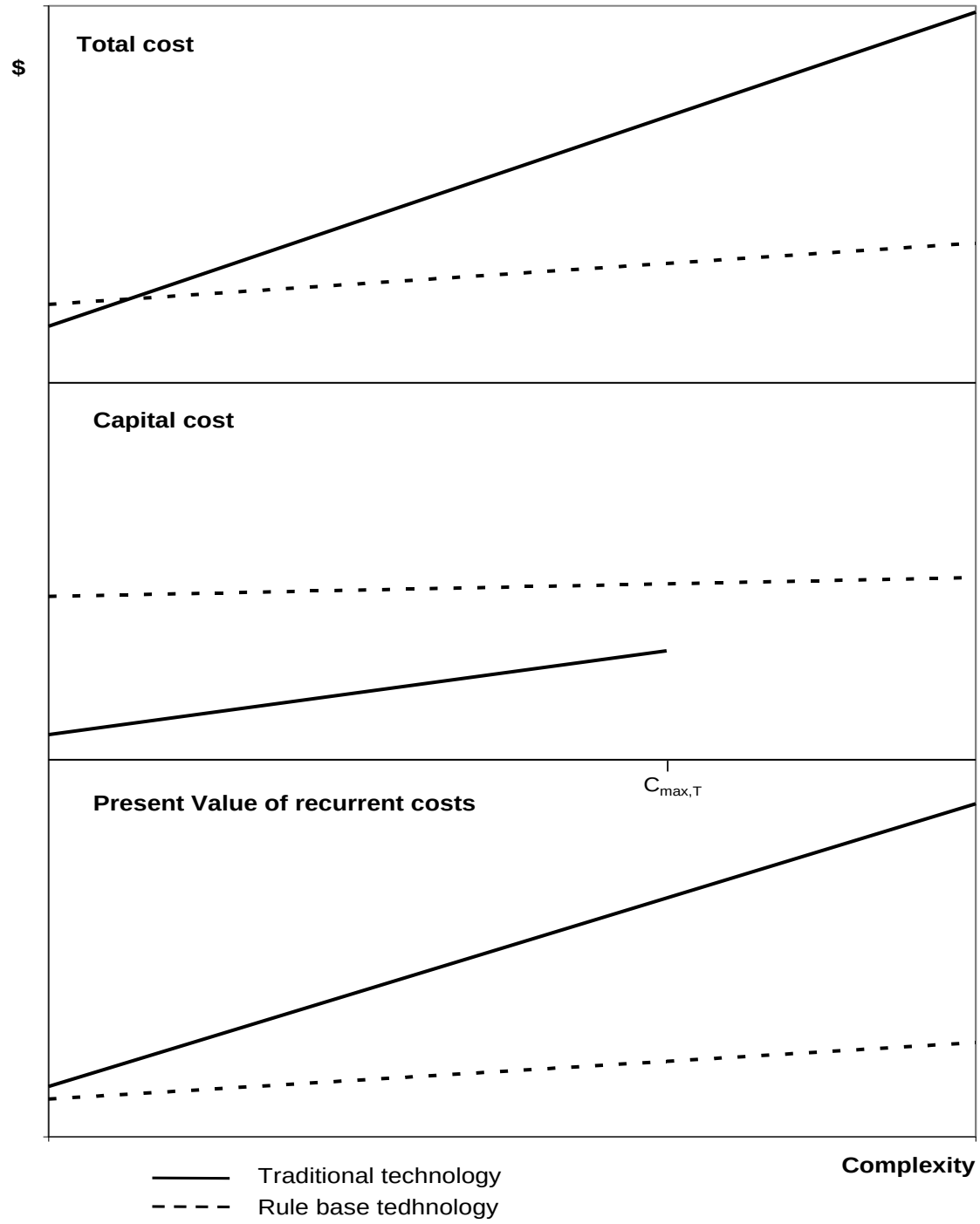
Secondly the time cost of public sector staff "traditionally" administering a "unit rule" increases very rapidly as logical complexity increases. Additionally, there is likely to be more appeals against decisions and time devoted to review. In addition capital costs increase rapidly as increased training, checking and verification are required. By contrast recurrent costs are much less sensitive to logical complexity when rulebase technology is used. Capital cost increases as a result of increased logical complexity start from a higher level with rulebase technology but progress at a much slower pace. For more detail see Appendix A[13].

These relationships are set out diagrammatically in Figure 3.

[12] For example, in Australia, the Commonwealth Department of Family and Community Services has a "Business Partnership Agreement 2001-2004" with Centrelink which delivers social security payments. The current agreement specifies a 95% level of correctness of payments. It is difficult to reconcile the apparent aim for this level of accuracy with the findings of the ANAO described in table 4.

[13] These assertions presume the rulebase itself is an accurate representation of the law. Though the need for review of individual decisions is likely to be significantly reduced there is still a need for a review of the rulebase

Figure 3 The relationship between capital and recurrent costs and complexity for administration using "traditional" and "rulebase" technologies (required accuracy level held constant)



$c_{max, T}$ = ceiling level of complexity traditional technology can deal with and achieve required accuracy.

Thirdly these relationships (and their graphical depictions in Figure 3) assume accuracy is specified, measured and constant. In fact as complexity increases with traditional technology the more likely outcome is costs are maintained and accuracy suffers.

Comparisons across time and country of costs involved in administering specific areas of law have to be treated carefully because it is very hard to know what is happening to levels of accuracy.

Empirical evidence

Because no metrics have been developed for assessing complexity it is very difficult to find evidence which would allow the hypothesised theoretical relationships above to be tested.

There is a pressing need for development of complexity metrics so that analyses such as those described in Table 4 can be meaningfully compared. Such metrics would allow analysts to determine the extent of inaccuracy that was present and compare that performance to an acceptable level of accuracy given the level of complexity inherent in the rules being implemented. Such analysis would provide a meaningful foundation for analyzing administrative performance and allow conclusions an agency is performing well/poorly given the complexity of the rules the political process has delegated them to administer."

Until complexity metrics are developed, and used in regulatory impact statements prior to the passage of legislation it will be impossible to effectively assess the performance of administrative agencies. At present, however, it appears from Table 4 that levels of inaccuracy are relatively high in public administration. It is not clear they are at politically unacceptable high levels or that any particular agencies performance is worse than might be expected given the levels of complexity.

Some gauge of the sorts of complexity which most significantly increased administrative costs might be obtainable from cross-country comparisons of administrative burdens and the nature of social security arrangements. Mitchell *et al*. 1994 show estimated average administrative cost estimates for 10 OECD countries. They show estimates for the average administrative cost of public transfers as a percentage of total transfers for each country over the 1980's, the figures range from 1.9 per cent for Norway to 7.0 per cent for Switzerland, with the remaining countries in the range 2.4 per cent to 4.9 per cent. Administrative costs were greater for countries with social security systems with a significant earnings-related component (such as Switzerland), suggesting such systems are more expensive to administer. The authors note that administrative costs for Australia, which has an income-tested transfer system, were on par with administrative costs for countries with a universal system.

The results suggest that increasing complexity by the introduction of income-testing does not significantly increase administrative expense, but an increase in complexity due to an earnings-related component does increase administrative costs. Thus administration costs as a fraction of expenditure don't necessarily increase with complexity.

A more recent study (Access Economics 2000) reports similar findings for the administrative costs of social security spending for several countries in the period 1990-96. It also sets out US social security administrative costs as a fraction of expenditure by program area for the same period. Costs range from 1% (old age) to 13.2% (unemployment insurance). The latter is an area where establishing and monitoring eligibility is more complex.

Targeting - Net expenditure can fall with complexity – government acting like a price-discriminating monopolist.

Theoretical Issues

Many government agencies enjoy a monopoly-like position in relation to the citizens they deal with. Further they face budgetary pressures to spend less, cost less or earn more

The micro-economics of monopoly pricing suggests that a monopolist who can price discriminate can increase revenue. Price discrimination involves setting prices for various quantities or to various people which do not vary with costs. The main barrier to price discrimination is the possibility of resale. To successfully engage in price discrimination a monopolist has to be able to cost-effectively establish and maintain segmentation of the market. It is important to note that perfect price discrimination is as efficient as perfect competition. A monopolist who sets her charges in a fashion that better distinguishes amongst her potential customers capacity and willingness to pay not only improves profit but economic efficiency as well. Though, equity might suffer if the less well off have a high willingness to pay.

Government agencies are often in a position to act like a price-discriminating monopolist. The main barrier in their case, however, is not resale capacity. Rather, it is the legal and administrative problems which arise from discrimination and complexity.

To illustrate, it is contrary to the Constitution for the Commonwealth of Australia to impose taxes which vary geographically. However, taxes which vary geographically by virtue of variance in some underlying factor may not be unconstitutional. For example radio communication license fees (which include a tax element) vary geographically but the variance is a result of variances in levels of congestion which, when combined with variances in topography result in varying levels of spectrum scarcity.

The quantum of revenue the Commonwealth can earn as “landlord” of the spectrum will depend on:

- Whether legal barriers to price discrimination exist;
- If they do not, the extent to which the Commonwealth can discriminate amongst spectrum users according to their varying degrees of willingness to pay;
- The administrative costs of dealing with complex arrangements intended to differentiate amongst large numbers of potential spectrum users (with differing levels of willingness to pay).

Electronic rulebase technology can reduce the lifecycle administrative costs of complexity. As a consequence, when a body of law or accompanying regulations is amended higher levels of revenue (or lower outlays) may be feasible if rulebase rather than traditional technology is used.

In the spectrum example above the scarcity value is a result of the interaction of technical constraints and nature. Many government agencies also have a capacity to socially contrive scarcity values and their capacity to extract revenue similarly depends on legal barriers and administrative costs to "price" discrimination. For example, ASIC levies charges on the public for the use of its services. ASIC earns the Commonwealth revenue more than double its costs of operation[14]. Though these exactions often have the character of a charge, for example, the cost to lodge a prospectus they are legally charged as taxes. The *Corporation(Fees) Act* is "an Act to impose, as taxes…". ASIC could earn more revenue if it could target willingness to pay. For example, instead of having a flat cost for the lodgement of a prospectus it could charge according to the – proposed scale of distribution, quantum of monies to be raised, level of compliance with ASIC policy statements setting out the ASIC interpretation of the law.

Examples

There are numerous examples of governments introducing more complex arrangements to increase revenue/decrease outlays (with less compromise to economic efficiency) in the tax and social security area. It is the most common rationale for targeting in Australian Social Security. In the corporate tax area virtually every Asian country has experimented with various forms of rate or base concessions to attract footloose capital. (See Pender & Ross, 1995). At the state level in Australia and the US tax concessions may be granted in return for locating facilities in particular areas. In the current Australian Immigration regulations, in some circumstances the capacity of an Australian Citizen to sponsor a migrant is higher if they live in a regional area[15]. Presumably this reflects a view that migration imposes a lesser burden on the Commonwealth and on Australia if the migrants locate in these areas.

To date there have been to our knowledge no significant public sector implementations of rulebase technology primarily intended to increase revenue or decrease expenditure by differentiating better between citizens' circumstances. However, this has been a significant motivation for the implementation of rulebase technology in commercial situations. For example, in marketing material for it's Aion product, Platinum Technology (now owned by Computer Associates) describes the use of rulebase technology in two commercial situations[16]. Firstly, in regards direct marketing portfolio management advice by Robeco Groep, secondly by World Financial Network in regards credit card delinquency call management. In both these cases rulebases are intended to improve private revenue/reduce expenses by better distinguishing between customers. In

[14] See ASIC Annual Report 02/03 p 10
[15] See Visa Sub Class 119 Regional Sponsored Migration Schemes *Migration Regulations 1994.*
[16] Platinum Technology White Papers "How Insurance companies are automating core business policies" and How banks are automating core business policies" 1998

the Robeco case rulebase systems enabled the company to economically deal with clients with less money to invest than they were previously able to.

Pursuit of improved horizontal and vertical equity results in increased complexity and so increased administration costs.

The horizontal equity dimension of this relationship is well covered by existing public administration literature (see for example, O-Faircheallaigh *et al* 1999, p 221- 223). O-Faircheallaigh *et al* discuss various Australian "citizen-based accountability" developments since the Coombs Royal Commission 1976 (such as Freedom Of Information, the Administrative Appeals Tribunal, ombudsman's offices etc). O-Faircheallaigh *et al* assess the aggregate costs of various administrative review provisions as in excess of $150m per annum. In their conclusion they cite horizontal equity as the main benefit which has resulted from the introduction over the past 25 years of these various administrative review bodies and procedures.

For a given level of accuracy, public sector administrative costs decrease with goodwill. Goodwill decreases with complexity, particularly logical complexity.

Theoretical Issues

The "goodwill" of the citizens subject to a body of rules encompasses a commitment to comply firstly with the spirit and secondly the letter of the rules. One view particularly common in the tax literature ignores goodwill. It construes decisions to comply with the letter of the rules as part of a rational financial calculus. The citizen weighs up the risk of a failure to comply with the cost of the consequences – fines etc. This view ignores social and ethical determinants of individual behaviour. A broader view focuses in addition on social norms, trust and morality in describing citizens' behaviour. In this view goodwill is likely to be important[17]. Wenzel, 2001 sets out a list of references dealing with a related more specific proposition "…the finding that tax payers are less likely to be compliant with laws they consider to be unjust, unfair and thus illegitimate".

Consider a situation where "goodwill" is a significant determinant of citizens behaviour. It seems likely that in order to achieve a given ex-post level of compliance with rules/accuracy of determinations levels of public administrative expense will fall as goodwill improves.

There are two ways in which goodwill of individual citizens will manifest itself. Firstly, in regards instructions to their agents (for example, tax agents) and their monitoring of their agents' determinations/filings etc. Secondly, in the extent of their preparedness to carefully and honestly self-determine the applicability of the rules to their own situation. The higher the levels of goodwill the less the need for public sector audit and the more attention individuals will give to accurate procedural determination of the rules to their own situations.

[17] See Wenzel, 2001 p 4 for a list of references describing each approach.

Complexity makes it more difficult and costly for citizens to monitor their own agents and/or self-determine. In turn this makes it more difficult to gain first-hand through experience of, and confidence in, the fairness of the rules[18]. At high levels of complexity it becomes increasingly difficult for citizens to gain a sense of the fairness of the rules from their own experience and observations.

Levels of complexity in some areas of law in Australia have reached an extent that it is not un-common to hear discussion by politicians or affected citizens premised on the assumption that it is beyond the reach of ordinary persons to deal with the complexity of a particular body of law.[19]In this circumstance the only way for the state to nurture goodwill will be through 'spin", advertising and promotion. It is unclear whether such an approach is sustainable in the long run.

Examples

The discussion above results in two propositions. Firstly, that citizens behaviour is influenced by their "goodwill" towards a body of rules and that improved goodwill will reduce public sector costs holding levels of accuracy constant. The second proposition is that increased complexity results in decreased goodwill.

The first proposition is difficult if not impossible to verify as "goodwill" is intrinsically difficult to measure. The second proposition is easier to assess. The discussion below assesses examples of these propositions in three contexts; firstly, tax; secondly, accounting standards; and thirdly, US environmental standards.

Wenzel (2001, pp 6-9), discusses a large number of studies which attempt to assess the impact of perceptions of procedural justice on tax compliance. Wenzel's own study addresses these issues in the context of a cross-sectional study of 2,000 taxpayers and finds compliance in some areas is influenced by perceptions of procedural and distributive justice.

The second proposition has also been addressed in the tax area in Australia. McKerchar, (2002), used two samples of 600 taxpayers to assess the relationships between complexity, commitment to compliance and perceptions of fairness. She found statistically significant relationships between decreasing complexity applicable to individuals and improved perceptions of fairness and between perceptions of fairness and level of commitment to comply. She notes:

[18] (Tyler, 2001, discusses the importance of these experiences in nurturing "law abidingness" in general).
[19] Implicitly there is an assumption the term p in equation (2) is infinite and it is inappropriate to expect any private time to be "wasted on the impossible task" of analysing the impact of the law. An "Op Ed" contributor to the Canberra Times who had to re-pay Austudy recently wrote
"I always thought my responsibility as an applicant was to fill in the form without lying; their job was to assess my eligibility… it's also time that departmental staff took responsibility for their processing mistakes. They should be the ones docked and they should have to give back the money they allowed to be paid out – with interest of course". (Canberra Times ? Feb 02 "Red-tape trips bureaucrats but welfare cheats blamed" Leesha Furse).

> "… reducing complexity, … would have the added positive effect of increasing the perception of fairness" (McKercher 2002, p 102).

The recent history of accounting standards, particularly US accounting standards, provides similar (though less rigorous) evidence of the second proposition, that is, that goodwill decreases with complexity.

> "… - the roughly 2,300 pages of FASB standards almost doubled to about 4,000 by 2002" (Healy and Palepu, 2003, p 1).

As Healy and Palepu describe, increased complexity has been associated with a failure of auditors to discharge their prime responsibility, namely to verify the auditors have made a broad judgement about the financial health of the company. Enron's auditors certified Enron's accounts satisfied the standards but failed to act in accord with the spirit of the rules – to provide accounts that depicted a true financial position. Further evidence of the decline in goodwill is a decline in the attractiveness of auditing as a profession described by Healy and Palepu (2003).

A third example of the negative relationship between complexity and goodwill is provided by a study of US environmental regulations. Ruhl and Salzman (2003), describe the very significant increase in the quantum amount and complexity of US environmental law that has been enacted over the last 25 years. They quote:

> "a 1996 survey of corporate counsel at major firms found that 2/3 believed their business had operated in violation of environmental laws at some time during the prior year, nearly 70% did not believe absolute compliance was achievable".

Ruhl and Salzman (2003) describe the results of a survey they conducted of 168 members of the US bar Association's environment section. The most significant identified causes of non-compliance were the "sheer number of regulations" and the "complexity of regulations" (Ruhl and Salzman, 2003 p 28). Ruhl and Salzman describe the impact of the inexorable increase in regulation on both regulatory legitimacy amongst the regulated and the decreasing capacity of the regulators to distinguish between deliberate and involuntary non-compliance.

3.3 Income Tax

This section considers the complexity in assessing income tax in Australia. It begins by detailing some conceptual issues underlying income tax design. It then describes the recent history of changes to Income Tax. Finally, it attempts to describe some of the major internal design "sources' of complexity and external causes. The aim of this section is to demonstrate the connection between high level choices to focus tax burdens on particular tax bases and the resulting complexity of the tax code.

Conceptual Issues

Five sorts of tax bases can be identified.

(1) *Labour*. PAYE tax on wage income earnt from time spent in the market economy is the most obvious example of this sort of tax.

(2) *Private wealth.* The state keeps extensive registers (for example land titles, mining tenements, and companies) of private property rights to extract, dispose and to claim income from the ownership of capital goods. On top of these underlying claims the financial system has its own registries (stock exchange, bank accounts) which re-parcel the risks associated with the underlying claims. There are three sorts of taxes on private wealth. They are:

- Taxes on income from "land" (all natural resources) and private capital (for example, CGT);
- Capital levies on assets or their value. Car registration, land tax and rates (to the extent they exceed the value of local government services) fall into this category in Australia;
- Taxes on transactions. Stamp duty on motor vehicle transfers, land title conveyances, mortgages and share transfers fall in this category as of gift duties and FID.

(3) *Public Wealth.* Many social 'assets', for example the urban road network, are not parcelled up. Instead, everyone has a right of use (or abuse), for example the "right of way" on public roads. But use of roads could be taxed as could greenhouse gas emissions, use of virgin materials or pollution etc.

(4) *Consumption.* There are two sorts of consumption taxes – general (like the GST or wholesale sales tax) and specific (for example tobacco, alcohol, petrol excises).

(5) *Business Inputs.* Some taxes (intentionally or inadvertently) alter the relative cost to businesses of using particular factors of productions. For example, payroll tax increases the cost of labour, petrol taxes increase the cost of transport. Taxes on disposal and extraction, (for example a forestry levy designed to increase the cost of logging) often fall into this category.

Income tax in Australia is, in general, intended to tax income from labour and income from land and private capital. There are two basic approaches to the tax treatment of income. Under a *schedular* regime income from wealth (land, capital) and income from labour are subject to different tax rates scales (schedules). Under a *global* regime all sources of income are added together and subject to the same rate scale. Until 1953 Australia had a schedular system whereby higher tax rates applied to dividend, interest and rent income. By contrast with the higher rates applicable to these forms of income there were a number of significant omissions from the base. Superannuation fund earnings were tax free and life insurance and superannuation contributions were tax deductible. Capital gains on shares and property were also tax free. In 1953 Australia moved from a schedular to a global system, though the base arrangements were broadly unchanged. In the early 1980's high inflation, wide spread tax avoidance and the absence

of capital gains tax prompted concern that the tax treatment of income from private wealth was unfair. This concern resulted in the imposition through the late 1980s by a Labour government of a number of base broadening measures.[20]

Current tax law reflects this history. It now reflects the result of many decades of piecemeal accretion of provisions of law which reflect particular concerns in vogue at the time. There has never been a policy commitment to any particular theoretic benchmark. That said, the benchmark which is most commonly used to judge tax arrangements in Australia is a 'comprehensive nominal income tax'.

Recent History

There are currently about 7,000 pages of Income tax legislation (Banks, 2003). This amount has grown rapidly in recent years. (In 1996 there were only 3,500 pages) (Inglis, 2002). One of the main results of this rapid increase is a tax simplification project. In addition to the tax law the ATO produces public and private tax rulings. In financial year 00/01 the ATO produced about 3,500 general public tax rulings.

In 1993 a project commenced to re-write the *ITAA 1936*. This project was intended to improve the expression rather than the substance of the law. It was intended the entire *ITAA 1936 Act* would be re-written in three years. The result was *ITAA 1997* which replaced substantial parts of the 1936 Act but the process was overtaken by the Ralph review of Business Taxation. As a result parts of both the *ITAA 1997* and *1936* now apply.

Causes

There are numerous explanations given for the inexorable increases in tax complexity. They can be grouped two-fold – firstly, those who argue it is intentional and secondly those who argue it is inadvertent, the second group focus more on the institutional process which results in the content of new law.

In the "politically intentional" category there are four main arguments:

- Complexity is a politically attractive way of raising revenue without raising rates. Just as a price discriminating monopolist can raise revenue by better targeting willingness to pay and introducing more categories in their price structure the Commonwealth can raise more revenue with the same rate structure by better differentiating between circumstances. As Yitzhaki (1979) demonstrates, theoretically, base complexity and rates should be set so as "to equate the marginal cost of raising the tax revenue through administrative cost with the marginal cost of raising the tax revenue through the tax rates". Rates are, however, highly visible whereas the costs of a more complex base are much more difficult to identify. Political greed dictates a lower rate, complex base structure;

[20] For discussion of these definitions and history, see Pender, 1997.

- The increased complexity is an attempt to improve vertical or horizontal equity. For example, it is only fair that businesses are taxed on a pay as you go basis because that is how income from labour is taxed. Equity can be assessed in two ways – 'procedural' or in terms of 'effective economic burden'. The former has a much greater complexity implication;

- Complexity reflects a deliberate move to shift administrative costs from the public to the private sector so that at constant revenue ATO administrative costs are lower than what they otherwise would have been.

The fourth "politically intentional" argument sees increased complexity as a response to avoidance and increased complexity in the financial and economic environment.

There are four variants of the "politically inadvertent/institutional design flaw" explanation.

The first which has been set out by Inglis (2002) is that it is an inevitable consequence of the move to self-assessment. Inglis argues that, prior to self-assessment, staff of the ATO had to understand the law and its workability. He argues the move to self-assessment in the late 1980s broke this feedback mechanism and has left the ATO free to draft more and more complex law without comprehending or bearing the consequent costs.

The second potential 'process' explanation (which is by no means conflicting or mutually exclusive to the others) is that there is a failure of political governance. This argument runs as follows. Staff at the ATO, Treasury and legal drafters assume they have been given a very high-level political instruction – implement a Haig Simons comprehensive income tax (CIT) in black-letter law. The instructors either – failed to understand the administrative complexity costs – or – were mislead by the predictions of the instructed. The implementation of a CIT is, conceptually complex and is likely to require more than 7,000 pages of legislation. Simplification projects at a bureaucratic level fail because fundamental conceptual simplification is required, for example tax wealth, not income from capital from now on.

The third explanation attributes complexity to the self-interest of "practitioners". This argument is common in the US. One in seven US tax returns is prepared by the publicly-listed H&R Block. Over the last 20 years the average H&R Block individual tax preparation fee has increased 77% in real terms despite the introduction of tax preparation software (Keating, 2003, p3). Clearly H & R Block has a strong interest in complexity.

The fourth argument focuses on the ATO's interest in the quantum of revenue. One of the ATO's annual report "outputs" is "provide revenue", more specifically "maintain the current standard for tax collections as a percentage of estimate" (ATO, 2002, page 30). The ATO can not easily affect the rate structure but it can influence the legislative expression of the base. Suppose, as an alternative, the ATO's "output" was re-cast as "collect the revenue determined by the current tax law whatever revenue results". Then,

decisions about the rate and the base would be taken at a higher political level simultaneously.

Sources of complexity.

While it is easy to find practitioner material bemoaning the inexorable march of complexity[21] such material is often short on specific identification of sources of complexity which might be remedied. This section deals with the "high-level conceptual design" sources of complexity within the ITAA. It does not deal with sources related to process, for example, new definitions which mesh poorly with existing ones.

Yitzhaki, (1979) describes a general theoretical approach to choosing tax rates and bases to raise a given level of revenue to minimise the social cost of taxation. The social cost is the sum of the actual administrative cost and the opportunity efficiency cost. Yitzhaki's process to solve this problem in general is as follows. For each potential tax base establish the function linking the rate to the efficiency cost (excess burden). In general the efficiency burden will increase with the rate. Now rank the bases according to these functions. Similarly rank the bases according to functions relating administrative cost to each base. Now the solution which minimises social cost is that combination of rates and bases which has the lowest total administrative plus efficiency burden.

With regard to conceptual design, it is useful to distinguish complexity in the tax treatment of income from each of labour and capital.

Income from Labour

The main source of complexity with regard to income from labour is work related expense deductions (WRE's). Australia is unusual by OECD standards in allowing extensive WRE deductibility.[22]

Baldry, (1998, p 59) estimates that the elimination of WRE deductibility would result in private sector administrative cost savings of about 2 per cent of revenue raised. This potential saving has to be weighed against the efficiency and equity impact of abolishing WRE deductibility. The average tax benefit for those who claim WRE's is in the order of 1 per cent of salary (see Baldrey, 1998, p 53). The average tax rate is about 25 per cent (see Pender, 1997, p 76) so the average tax benefit associated with WRE deductibility is about 4 per cent of revenue. If the efficiency cost (marginal excess burden) of labour income tax is 25 per cent the estimated efficiency cost of scrapping WRE deductibility would be 1 per cent[23] that is less than the estimate of private sector administrative costs.

There are also potential equity issues from abolishing WRE deductibility. As the use of WRE deductibility significantly increases with income, vertical equity would be

[21] For example, Wolfers, 2002, p 520 extrapolates recent growth in tax laws to forecast 158,600 pages by 2050.
[22] Baldry, 1998, page 49.
[23] 25% burden times 4% extra revenue = 1% efficiency cost

improved by abolishing WRE deductibility[24]. There might still be horizontal equity benefits in allowing WRE deductibility, but such an argument is weak. After- tax pay rates should, in the long-term, adjust to compensate those who ply a trade which is unable to claim consumption benefits as WRE's or which incurs productive costs which cannot be claimed. (This argument is set out in more detail in Baldry 2002, p 55 and Kaplow, 1996, p7).

Income from wealth – the influence on complexity of the quantum of burden on mobile capital

With regard to income from wealth, Yitzhaki's (1979) method can also be applied. Table 5 below sets out an indicative ranking of efficiency and administrative costs for the main potential tax bases in Australia aside from consumption.

Table 5 Ranking of administrative and efficiency costs of main, actual and potential tax bases (excluding consumption)

	Labour	Business Capital(2)	Property	'Green' taxes(1)
Administrative Burden	1	4 – 7	3	3
Efficiency Burden	3	5 –10	1	-5

(1) For example, Tax on urban congestion, Greenhouse Gas emissions
(2) Ranges given for potential variation in rate, eg efficiency burden 5 for lower rates increasing to 10 as rates will exceed those in other countries.

Source: See discussion in Pender (1997) chapter 8. A discussion with a similar premise in the US context can be found in OECD, 2001.

It is possible to identify from this table three very high level political/social "decisions" which are the main sources of conceptual design complexity in the Australian Income tax area. They are:

- Firstly, we choose not to tax activities which cause social and environmental damage (where taxes would result in an efficiency gain). Examples of such taxes include a carbon tax or taxes on urban motor vehicle congestion. Such taxes are potentially significant sources of revenue but they have been ignored or ruled out at the political level;

- We do not tax owner occupied residential property and we grant concessional income tax treatment to agricultural and rental property owners. Property taxes (levied on income or wealth) have a much lower efficiency costs than taxes on business capital because property is immobile.[25];

[24] The highest claimants of WRE deductions (20%) of average salary) is claimed by occupational code "legislators and government appointed officials including judges" Reference needed
[25] The level of "recurrent taxes on immovable property" as a fraction of GDP is low in Australia by anglophone standards though not by overall OECD standards. See OECD (2001, p27).

- Thirdly, having ruled out significant tax burden on property and production of social bads we constrain the tax rate on labour and business capital to be equal if possible. That is, we have a global income tax system. There has been very little discussion in Australia of the merits of the alternative – a schedular system with lower rates on mobile business capital.[26] Because business capital is mobile and fungible the efficiency and administrative burden of taxes on this base are high and increase significantly with increased rates. (For example, if Australia taxes business capital at effective rates higher than other potential locations the base will simply migrate.)

The income from capital base has to be defined assuming the high rates of tax which it is necessary to apply to income from labour will also be applied to significant portions of the income from capital base.

Table 6 below sets out the composition of the main chapters of the ITAA 1997 to illustrate the dominance of income from wealth in the content of that Act. If income from wealth was taxed at lower rates there would be efficiency and administrative cost benefits.

Table 6 ITAA 97 – Relevant conceptual 'base' Parts of – Chapters 2 &3

	Parts	**Pages**
Income from Labour	2-5, 2-20, 2-42	243
'Land' in particular	3-45	244
'Land' and Capital	2-10, 2-25, 3-1, 3-3, 3-5, 3-25	1051
Other Taxes/Benefits – interaction	2-15	120

Other sources of conceptual complexity in regards the income from "land" and capital bases.

In the case of deductibility of WRE's the increased complexity (and associated increased administrative costs) need to be balanced against the reduced efficiency cost of the tax burden on income from labour resulting from more careful definitions of the base. In fact, it appears empirically the efficiency saving is not worth the administrative burden but there is an issue of empirical judgement.

It is useful to categorise sources of complexity within the income from wealth base two-fold. Firstly, there are areas of complexity where, like the WRE deductibility case, the increased administrative burden of complexity is likely to result in a lower efficiency cost of tax over all. Secondly, there are sources of complexity where simplification would reduce efficiency costs and administrative costs.

[26] The Nordic countries were the first to adopt schedular tax systems in the late 1980s and early 1990s. They have since started to "spread" through Europe particularly in regard tax on interest income and capital gains. Despite the explicit inclusion in its terms of reference of lighter taxes on capital gains the Ralph review completely ignored the possibility of moving to a schedular tax design.

Two examples of the first set are tax loss quarantining provisions and specific industry agricultural concessions. Unless companies in tax loss receive a full refund, the company tax system will reduce the amount of entrepreneurial and innovative activity in the economy[27]. One way of mitigating this efficiency cost is allowing trade in tax losses. However, rather than promoting tax-loss trade there are numerous provisions quarantining tax loss[28]. These provisions result in significant administrative costs. For example, tax loss carry forward is only allowed if there is a continuity of ownership so companies have to keep careful track of their shareholder base.

Special industry concessions, likewise, fall in this category. For example, though, in general expenditure on planting trees is capital and non-deductible there is a special four-year write-off for grapevines[29]. A concession like this has an efficiency cost; too much planting of grapevines (to the extent the concession is not simply capitalised into the value of land well-suited for grapevines) and a complexity cost; rules for setting out which expenditure will qualify and which won't.

Failure to abolish these sorts of complexity is a governance failure. That is a failure to administer the tax system in the interest of all Australians. Complexity in general serves some purpose for those groups seeking additional special consideration because their own concession is obscured in the general mire.

The second set involves base complication which may well improve efficiency for given tax rates. An example is the R&D concession. If private R&D has a spin-off value which cannot be privately appropriated then there will be insufficient R&D. One solution would be to ensure other parts of the tax system do not discourage innovation – for example, allowing tax-loss trading. In the absence of these measures the level of R&D is doubly inadequate.

Conclusions

The discussion of causes of complexity above identified four specific arguments under each of two headings – "politically intentional" and "politically inadvertent/institutional design flaw". Simply because of the volume of complexity it is possible to point to particular areas which reflect any of these explanations. Nevertheless, viewed over a reasonable period of time at a design level it is possible to rank the strength of the arguments. The discussion of the sources of complexity illustrate it results from design decisions to eschew simpler tax bases in favour of those which are more complicated. This observation weakens the "politically inadvertent/institutional design flaw" arguments. It may be that the institutional processes compound the problem but process can't explain the high-level design complexity identified.

Amongst the "politically intentional" arguments the fourth, the "gaming" argument is the weakest. It is abundantly clear that some tax bases are far more prone to "gaming" than others. Decisions could have been taken, but explicitly have not been, to avoid reliance

[27] See Head and Krever, 1997, p 8
[28] See CCH 2003, p 51
[29] See CCH 2003, p 1007

on these bases. Similarly, there is inadequate consideration of public and private administrative costs likely to result from tax changes or sustain an argument that a deliberate cost-shifting exercise has taken place on a large scale.

My conclusion is that the first two politically intentional arguments are the main causes of complexity:

- Complexity is a politically attractive way of raising a given level of revenue at a higher social cost than is necessary;

- The pursuit of equity has been interpreted in a procedural rather than an "effective burden" sense.

3.4 Conclusion

This section can be summarised in four propositions:

- There appear to be very strong forces in public administration which ratchet up complexity without regard for the consequences;

- Levels of inaccuracy and indeterminacy in public administration are at levels far higher than most commentators care to admit;

- Much academic and bureaucratic discussion of public policy design and effectiveness is flawed by a failure to incorporate consideration of the relationships between conventional policy criteria (efficiency, equity etc) and "forgotten" criteria – accuracy, complexity and citizen goodwill. A good example of the consequences of this failure can be seen in the complexity of the income tax code which is substantially the result of high level design decisions repeatedly taken without consideration of accuracy, complexity and citizen goodwill issues.

Two categories of action flow from this discussion:

- Firstly, measures to halt/roll-back complexity might be taken. The first step would be to establish complexity and accuracy benchmarks;

- A second approach is to reduce the inaccuracy/indeterminacy cost of complexity. Legislative rulebase technology offers this opportunity and the next section describes the benefits it can bring.

4. Benefits of the introduction of electronic rulebase technology

This section draws on the discussion above to evaluate the impact of the introduction of electronic rulebase technology. An assessment of impact is made against the four criteria set out in section 1. The discussion is phrased as if polar extremes are under consideration – ie traditional "manual" assessment of the application of circumstances to a particular situation as opposed to integration of rulebase technology into all phases of the policy design cycle. It is important to note the distinction here is in the degree of automation of the actual decision making, "traditional" decision making may be combined with very high levels of automation of associated processes (for example, electronic lodgement of factual data). The direction of many of the arguments will be the same if a marginal change is under consideration though the amount of benefit, particularly in regards administrative cost is far greater for complete adoption of the electronic technology.

In "green technology" literature this situation is often known as "factor-4" or "factor-10". That is, the productivity benefit from the introduction of some new technology if the technology is fully integrated into the process is fourfold or tenfold greater than if it is restricted to one step. (See Von Weizsacker, *et al* 1997). The four criteria are efficiency, changes in administrative costs, impact on net expenditure and equity and social justice. These will now be discussed in turn.

4.1 Efficiency

Economic efficiency has not to date been a strong motivation for the introduction of rulebase technology. There is a potential for its use where private sector time costs are high and levels of logical and factual complexity are such that well informed public and private sector staff analysing particular situations often come up with different, "inaccurate" conclusions. In this case the potential benefit of the introduction of rulebase technology is the potential for a reduction in uncertainty if both groups can use the same technology. Alternatively private sector implementation may reduce costs of appeal and dispute.

4.2 Changes in administrative costs

Appendix A – Determinants of Administrative cost burden describes algebraically the impact on private and public sector administrative costs of changes in decision making technology. It describes the extent of the social benefits resulting from a move from traditional to electronic rulebase technology. That benefit is greater:

- If the benefit of lower recurrent costs associated with rulebase technologies will continue for a long number of years;

- If the higher capital costs associated with rulebase technology introduction are amortised over a greater number of years;

- The more frequently the rulebase suffers changes in logical and factual complexity. The upgrade costs associated with traditional processing, to maintain a given level of accuracy, will likely be higher than with a rulebase implementation;

- The higher the costs of inaccuracy.

- In the event political or bureaucratic tastes are likely in future to change in favour of higher levels of accuracy;

- If relevant private sector time costs are less than public employee wages and the introduction of rulebase technology can significantly improve the capacity of affected citizens to self-determine some or all of their situation thus shifting costs from government to citizens and saving social costs;

- The higher the levels of logical or factual complexity in the ruleset;

- The greater the degree of integration of rulebase technology into all stages of the policy cycle;

- The greater the extent to which public and private sector procedures are re-designed to best incorporate rulebase technology.

The organizational structure and consequent financial calculus of public sector agencies will often result in a failure to consider some of these factors. For example, private sector costs, appeal body costs, current costs of error rectification will generally be ignored.

The possibility of a factor four productivity benefit.

At present core knowledge of legislation is generally "expressed" and held in three media, and in a multitude of versions. The three media are text (whether paper or electronic), the memories and intellects of staff (or agents) of the agency and legacy IT systems which will often represent the more numeric rules the agency administers. These "calculators" will, generally, have been very carefully verified themselves.

There can be multiple versions of the text, which can present problems. There are certainly multiple intellectual models among the agency staff who use this knowledge. Each person who "knows" the legislation will have developed their own model, from the domain specialist in the legal or policy area to the front-line staff-member who directly administers the legislation.

The first two of these media are flawed. The paper medium is incomplete: it must be complemented by intellectual effort for the effect of the legislation to be coherent. The intellectual models are flawed because they rely for their accuracy on the talent, memory and continuity of staff (or the capacities of clients or agents).

The last medium is often a 'mill stone' dictating work flow be arranged around those numeric parts of the law expressed in legacy code.

If core knowledge of the law is instead held in a complete, authoritative, dynamic, electronic format, functions – many agency processes can be radically improved. Staff have a consistent, shared point of reference which is currently lacking. They have a shared, accessible model that they can each rely on and contribute to. And the electronic model is capable of all sorts of functions that the current media don't provide.

The creation of such a model – a legislative rulebase – enables an agency to integrate these functions in a way that previously has been unimaginable. The scale of improvement possible in each function exceeds what is currently possible. But the overall improvement, and the capacity for an evolving spiral of improvement, is far greater than the individual improvement, because each function can interact and contribute far more effectively than before

Measured Benefits

Despite the fairly wide-spread recent adoption of LRT in Australia, (See ARC, 2003), there is little publicly available material on the investment return on LRT projects. Information will often only become publically available through an ANAO report. Understandably, agencies are reluctant to measure, let alone publicise levels of inaccuracy.

Pender, H and Johnson, P 1996 assessed the benefits of the introduction of rulebase technology at DVA based on figures extracted from the auditor-general's report (ANAO, 1996 a).

"The efficiency improvements generated by CCPS are impressive: a 30 percent reduction in processing staff and a 40 percent reduction in processing time. This has occurred during a period in which veterans' policy has grown substantially more complex with the introduction of special rules for hundreds of medical conditions claimed by veterans. In addition to the efficiencies, the consistency of staff decisions and the quality of management information has improved while the number of appeals against decisions has been almost halved. Even ignoring these and other intangible benefits, the internal rate of return on the project was in excess of 25 percent"

4.3 Impact on net government expenditure

In many circumstances the choice of technology will not influence public sector revenue or expenditure (aside from administrative costs). However if rulebase technology is introduced at a time when legislation or regulations are being changed then an increase in revenue associated with increased "price discrimination" may be feasible.

4.4 Equity and Social Justice

Rawlsian Justice

In situations where the cost to the individual of inaccurate determination is severe or punitive the Rawlsian justice arguments for the introduction of rulebase technology can be compelling. The strongest case arises where:

- Traditional technology results in high levels of inaccuracy;
- The consequences of inaccuracy are significant and difficult or impossible to reverse;
- Either inaccuracy stems from logical complexity which rulebase technology can always very substantially ameliorate or it stems from those kinds of factual complexity which rulebase technology can also ameliorate.

The situations in which rulebase technology will reduce the inaccuracy consequences of factual complexity are:

- Public sector staff involved in traditional determination practice illegal, statistical discrimination eg based on race, gender etc;
- The sheer breadth of factual issues strains the capacity of staff given the time provided. This is a significant issue. Making an assessment of Centrelink's administration of age pension payments the ANAO observed many Centrelink staff 'noted that managers had encouraged them to 'cut corners' on matters that did not present a risk of incorrect payment in order to improve the timeliness of customer service' (ANAO, 2001a p 68);
- There is a large body of readily assimilated precedent decisions which are, however, poorly integrated into a traditional process because they cut across logical structures.

In some circumstances rulebase technology will be of little benefit in dealing with factual complexity. They include:

- Where factual circumstances are difficult to verify and have a straightforward influence on obligations/entitlements;
- When there is little precedent or policy helping to map verifiable factual circumstances to "the factual parameters" required by the body of law.

Horizontal and Vertical Equity

Inaccuracy may result in horizontal or vertical inequity. But equally it could unwittingly improve equity. Rulebase technology could be used to deal with vertical issues at potentially finer levels of "granularity" than traditional approaches. To date that has not been a significant motivation for the introduction of LRT. By contrast the horizontal inequities which can result from claimants in similar situations receiving very different treatment by different offices or officers has been a significant motive for the introduction of LRT. Often more significant than specific inequities will be the adverse impact on administrative costs which stem from a loss of goodwill. There is insufficient experience with LRT applications to assess their impact on goodwill. LRT though it

reduces the cost of complexity may serve to increase its visibility and so increase resentment at the complexity of the underlying rules.

5. Conclusion

In 1977 the Dean of Stanford Law School, Bayliss Manning coined the term "hyperlexis" defining it as the "pathological condition of a state with an overactive law-making gland".[30] Manning saw hyperlexis as an American disease. In Australia since that article the pace of gazettal of law appears to have increased. Manning's observation of the problems caused by hyperlexis have become relevant in Australia. A lot of whingeing about complex voluminous law has ensued, but little by way of concrete solution. Academic consideration and contribution to this issue is fairly minimal and limited to tax. Probably as a consequence bureaucratic discussion of the links between complexity, administrative costs and other public policy goals is even more limited.

Two recent developments have resulted in some attention being focused on these issues.

Firstly, statistically valid audits of the accuracy of the administrative procedures of public agencies have been undertaken and published. In many cases the results have been frightening. In some years time, if these audits continue to be taken it will be possible to conduct analyses of the causal links between complexity in the rules being administered and the observed levels of accuracy.

Secondly, a class of IT product – "legislative rulebase technology" has become available which can automate the process of determining the applicability of a set of rules to a given set of circumstances.

It is likely over the next two decades these two developments will have a profound impact on the "modus operandi" of many public agencies administering large bodies of rules. Certainly, they will direct attention towards the links between accuracy, complexity and administrative cost. Likely, they will also cause a re-think of policy design in many areas. This will happen for two reasons. Firstly, they will result in a focus of attention on the costs of complexity which go beyond administrative costs, for example its impact on citizen goodwill. Secondly, the balance of the trade-off between conflicting policy objectives will be altered. As inaccuracy becomes more visible, the premium on accuracy will increase. Perhaps, if LRT reduces the cost of complexity, so complexity will increase. Alternatively it may crystallise the true cost burden of adequately dealing with complexity and so become a force for decreased complexity.

[30] See Manning, B, 1997

6. Appendix A – Determinants of Administrative cost burden

This appendix describes algebraically the administrative cost burden of a particular set of rules. That cost burden depends on economic factors, (for example, wage levels of public and private sector staff involved in the implementation and use of the rules) and characteristics of the rulebase, (for example, no. of rules, their logical complexity etc).

To better describe these factors it is useful to imagine a thought experiment in which an omniscient agent like Maxwell's Demon or Say's invisible hand is able to costlessly and perfectly determine a single application of a particular set of rules valid or most valid to a particular set of circumstances. Accuracy of human application can then be defined relative to this benchmark. "Inaccuracy" can express itself in multiple fashions:

- Determination without knowledge of all the many requisite circumstances (which might result from "numeric factual complexity");
- Determination based on incorrect assessment of some circumstances (which might result from "issue resolution factual complexity");
- Logically invalid application (which might result from logical complexity);
- Multiple, apparently equally valid applications resulting in indeterminacy.

The appendix is split into two sections – the first deals with the characteristics of the rulebase, the second with the determinants of administrative cost.

5.1 Characteristics of the rulebase.

The algebra below models a rulebase as a network.

Let:

N = no. of rules in rulebase

$j < N$ = no. of rules which deal with validity of links

PV = set of potentially valid arguments

An argument is a sequence of rules linked in accord with one or more of the j link rules or by formal logic operators.

V = set of valid arguments, a sub-set of PV as determined by omniscient justice machine

m = no. of arguments in V

v = av. no. of rules in the arguments in the set V

$v = \sum_{i}^{m} {}_{=1}\, d(a_i)$ where a is an argument in V, $d(a_i)$ is no. of rules in argument a_i.

Four determinants of Logical complexity (LC) can be identified. Evidently, complexity increases with the sheer number of rules and the average number of rules used in valid arguments. However, it decreases if the rules are tightly compartmentalised.

LC = LC(n-j, Cl, OS, v)
+ - + +

Cl = measure of the extent of clustering of rules. For example, a set of local government regulations might be highly clustered – all the rules about dogs refer to all the other rules about dogs. By contrast a set of call centre rules might be clustered very little – just a sequence of embedded menu choices with a few, haphazard internal references.

$0 \leq Cl \leq 1$

If a rule r has k_r rules linked to it then at most $k_r(k_r - 1)/2$ links between these k_r rules can exist. Let Cl_r be the actual no. of links as a fraction of the maximum feasible then Cl = av Cl_r over all rules. See Watts & Strogatz (1998)

Structural complexity also increases when the number of links is more than that which a random network with a similar number of nodes would need to be just connected.

OS = measure of extent to which rulebase is overstrung, ie linked by more than the natural no. necessary to join all rules in a network
= h/ln(n-j)

where h = actual no. of links and ln(n-j) is no. necessary to ensure a random graph is connected.

5.2 Determinants of administrative cost.

Benchmarked against the "omniscient justice machine" the 'life-cycle' administrative cost burden for a given body of "private citizen application" law is described by equation (1). Table A1 links the terms in equation 1 to the 'life-cycle' stages described in section 2.1.

Table A1 Impact of accuracy and technology on administrative costs over life-cycle of legislation

Life-cycle stage	Term	Definition
1. Development and Implementation	K(A,T)	Capital Cost
2. Administrative Use for L years	RC(A,T)	Recurrent Costs
Total	C(A,T)	Present value of all costs

$$C(A, T) = PV(RC, d, L) + K(A, T) \qquad (1)$$

Where:

C = social costs calculated over the 'policy-cycle' lifetime of the law, $

A = level of accuracy desired ex-ante or manifest ex-post (inaccurate applications/all applications), %

T = degree of implementation of rule based technology (%), at the one extreme T = 0 (traditional) at the other T = 100% (complete electronic rulebase implementation)

d = discount rate, %p.a.

L = lifetime of the particular body of legislation, years

PV = present value operator

RC = recurrent costs, $

K = Capital costs associated with introduction of the new body of legislation, $

In general, for given accuracy, time costs (ie g and p and therefore recurrent costs RC) are considerably higher with traditional rather than rulebase technology. Rulebase technology assists citizens and public sector staff deal with logical and factual complexity. On the other hand, capital costs K for a given level of accuracy are typically higher with rulebase technology. However, reasonable levels of accuracy may simply be unachievable with traditional technology.

$$RC = [w_g\, g(A, T, RBC) + w_p\, p(A, T, RBC)] \,.\, r \qquad (2)$$

Where:

w_g is the cost in $ per unit of time of public administrative and review staff

w_p is the cost in $ per unit of time of private citizens and their advisers eg lawyers, accountants

g is the inverse of a productivity measure – the amount of time per unit rule public sector staff require to achieve accuracy level A with technology T

p analogously represents the time it takes a member of the general public to deal with a unit rule at accuracy level A with technology T.

$$r = \sum_{i=1}^{m} p\,(a_i) d(a_i) \qquad (3)$$

Where:

$p(a_i)$ = probablility of use of valid argument a_i

For given A and T, p and g vary with rulebase complexity (RBC), ie logical and factual complexity.

$$RBC = RBC\,(\,LC, FC\,) \qquad (4)$$

Social administrative cost (C in equation 1) is the cost of human rule application as compared to the benchmark zero cost "Omniscient Chief Justice" legal machine. Inaccuracy (as compared to this machine) results in false negative and false positive costs. Accuracy can be construed in equation 1 either ex-post or ex-ante. Ex-ante it can be construed as a level of accuracy desired. Higher levels of desired accuracy will necessitate increased time spent per unit rule and increased capital costs of training. Alternatively accuracy can be construed ex-post as the level of accuracy manifest which results from decisions taken in regards technology, training, logical and factual complexity etc.

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