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Public policy, complexity and rulebase technology

Howard Pender

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Glossary

Administrative burden	Public and private sector costs incurred administering and complying with legislation, regulations and rulings. In the case of taxes and transfers often expressed as a percentage of revenue or 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. 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	Government Accounting Office, US.
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	The 'pathological condition of a state with an overactive law making gland' (Manning, 1977).
Income from labour	Any remuneration paid by an employer to an employee for work. It includes salary, fringe benefits and superannuation contributions.
Income from capital	Earnings from accumulated savings which may take the form of interest, rent, dividends or capital gains.

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IT	Information technology
LRT	Legislative rulebase technology
MEB	Marginal excess burden: The ratio of the deadweight 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	Rulebase technology
Schedular	Under schedular treatment, income from capital is taxed at different rates from 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 members determine the way in which the rules apply in a particular circumstance. The process may be highly automated in regards the following:

- 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	Veterans' Benefit Administration, a part of the US Department of Veterans' Affairs

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Howard Pender is a director of SoftLaw, a company listed on the ASX which owns and implements RBT.

Summary

In recent years the volume and complexity of laws and regulations in Australia have grown substantially. For example, it is estimated that the number of pages of tax law has increased from 120 pages in 1936 to about 7000 pages currently (Banks 2003b). A result of burgeoning complexity has been a deterioration in accuracy. For example, an audit of accuracy in Centrelink, the Commonwealth agency responsible for the distribution of welfare payments, has recently revealed that an estimated one million mistakes had been made by the agency over a four month period.

This paper considers public policy in areas such as tax, social security, immigration, corporations law, local government and superannuation, which are implemented through a set of 'rules' (law, regulation, administrative guideline, private or public ruling system etc). Its principal aims are to:

- describe the forms complexity takes;

- demonstrate that it is often an expensive 'bad';

- examine both the problems it causes and 'rulebase technologies' which, in some situations, enable it to be better dealt with; and

- explore the relationships between public policy objectives, complexity and rulebase technologies.

Complexity is often treated as a hidden free good in discussions of public policy and public administration in Australia and many other Western countries. An architect commissioned to design a new building might consider criteria such as visual appeal, energy efficiency and materials availability 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. Further, architects considering renovations to a house would be derelict in their responsibility if they proposed second storey extensions that could not be supported by the foundations of the original building. But that is what policy makers do.

In much public policy discussion and formulation the feedback loop between the architects of public policy and the practitioners who implement it is very weak or broken. Political, bureaucratic and academic discussions of public policy often deal with criteria such as economic efficiency, social equity, 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 and obligations 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 of public policy complexity has increased to such an extent that the impact of sections of some bodies of legislation can no longer be described as 'the rule of law'. In particular

situations, this impact comprises a random element potentially as capricious as the decisions which would result from the delegation by law makers of a high level of discretion.

Two recent developments are beginning to introduce a small measure of feedback into the legislative cycle. First, attempts are being made to measure accuracy in a statistically valid manner. Secondly, information technology (IT) has developed a class of product, 'rulebase' technology, to enable a set of private or public rules to be modelled and then administered with very high standards of accuracy.

The paper has three sections:

- Complexity in public policy. Section 1 briefly describes rulebase technology (RBT) and the areas of public policy covered in the paper. It goes on to discuss the major criteria, spanning the economic, financial and administrative law dimensions of public policy, by which public administration is evaluated. This section also deals with the frequently neglected negative impact of complexity on the rule of law and its strong potential to erode citizens' goodwill toward the law.

- Trends in legislative complexity. Section 2 deals with recent trends in the rate of change in the volume of legislative provisions and observed levels of accuracy in the administration of legislative provisions. It describes relationships between various public policy objectives and complexity. By way of illustration it also describes complexity in Australian income tax law by examining the way in which high-level tax design has chosen to rely on increasingly more complex tax bases.

- Electronic rulebase technology. Section 3 describes RBT and the major motivations for its use. It further outlines the dimensions of the cost-benefit analysis of implementing electronic RBT and describes the possibility of a 'Factor-4' productivity benefit stemming from this technology if implemented as the foundation of an integrated approach to all stages of public policy development and administration.

Public sector use of RBT in particular areas will afford several benefits including substantial reductions in public administrative costs over the life-cycle of bodies of legislation which have been developed using the technology. On the basis of private sector experience with RBT, an additional likely result will be a notable reduction in the private costs of accurately complying with laws. Considerable improvements in accuracy will result in a more equitable and just application of law.

The main benefits likely to result from wide-spread public sector use of RBT in future are twofold. A greater focus on the problems currently caused by complexity (for example, high levels of inaccuracy) in public administration is a likely outcome. In addition, better informed discussion of the costs and benefits of higher levels of complexity and the impact of complexity on public policy performance criteria such as efficiency, equity and administrative law values can take place prior to the introduction of new legislation Legislative changes aimed at reforming areas such as tax and social security are essential

to the development of a modern society. However, the process of incremental change cannot be pursued indefinitely without regard to the impact on the complexity and, in turn, the accuracy and fairness, of the legislation. RBT is an important technological development in this regard.

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1.   Complexity in public policy

1.1   Complexity and rulebase technology

In recent years the volume and complexity of laws and regulations in Australia have grown substantially. For example, it is estimated that the number of pages of tax law have increased from 120 pages in 1936 to about 7000 pages currently (Banks 2003b). And one result of burgeoning complexity is a deterioration in accuracy. An audit of accuracy in Centrelink, the Commonwealth agency responsible for the distribution of welfare payments, has recently revealed that an estimated one million mistakes had been made by the agency over a four month period (Australian National Audit Office 2001b).

As the number of factors that need to be taken into consideration when making a decision increases, and the number of pieces of legislation that interact with each other increases, the potential for errors in administration increase. In SoftLaw's[1] experience there is a clear and significant relationship between the complexity of legislation and the accuracy with which legislation can be administered. The application of law can be complex in two ways: a large number of difficult to identify circumstances may be required (factual complexity) or the assembly of a long chain of ill-assorted sections may be necessary to obtain a determination (logical complexity). Rulebase technology (RBT) creates a comprehensive logical model of a piece of legislation which is capable of being reliably investigated and applied by computer. It is described in more detail in Section 3.

This paper deals with areas of public policy where RBT is applicable. Legislative rulebase technology (LRT) is likely to be applicable to the particular areas of public policy which deal with the determination of entitlements or obligations such as:

- 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, veterans' affairs, access to business welfare payments); and

- areas where non-financial entitlements and obligations are determined by rules (migration regulations, environmental obligations of proposed developments, access to public housing).

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); and

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[1] Howard Pender is a director of SoftLaw Corporation Ltd, a company specialising in the application of RBT to private sector decision making.

- situations where the rules are quite simple, for example, the receipt of primary school education by almost all children. By contrast there are more extensive rules which govern private school entitlement to Commonwealth and State grants and loans, a circumstance where there is potential for the application of RBT.

It is sometimes argued that increased policy complexity reflects increased social and economic complexity including more heterogenous family structures, the rapid pace of technological change and a more ethnically diverse population. Though 'social complexity' is inherently difficult to measure, there are a significant number of social factors that have worked in the opposite direction. For example, variability in individual life expectancy and health outcomes has significantly diminished, the amplitude of the 'boom/bust' economic cycle has declined, the Australian economy is less dependent on the vagaries of the weather, and more than 100 years of public-education has eliminated the bitter sectarian divisiveness that gave rise to pressure for secular education. Even if social complexity has increased such that the benefits of policy complexity are greater than in the past, the costs of policy complexity still need to be understood and accounted for.

1.2   Assessing public policy

In the author's experience, academic discussions of policy design typically allow for administrative costs and the costs of complexity but neglect to incorporate the full extent of the trade-off between the complexity of policy design and the accuracy of policy implementation.[2] Implicitly it is assumed that the costs of additional complexity 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. On the other hand, 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.

Of these three approaches the academic one is the most accurate and complete but it remains 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.

In the discussion that follows, there is an unstated presumption 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. Bogert (2002) considers a number of such formulations of the capacity of law to produce intended

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

consequences and concludes in favour of the 'semi-autonomous capacity' formulation above.

Section 1.3 outlines the main criteria and ultimate objectives commonly used in the assessment of policy expression and administration. Section 1.4 describes the absence of benchmarks against which to measure levels of complexity, despite its significance. Section 1.5 examines 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 RBT has the potential to alter significantly the terms of the trade-offs between the various public policy objectives which have resulted from current legislative expression. Consequently, 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.

1.3   Policy criteria

The impact of the administration of the law, across a broad range of public agency functions, is currently assessed according to social, economic, financial and legal criteria which can be categorised under the following four headings.

Economic efficiency

The implementation of some areas of public administration has had a substantial impact on economic efficiency. For example, the costs of complying with the law require individuals and companies to divert a considerable amount of effort away from their productive activities and towards administrative compliance. Alternatively, laws may be designed in such a way that they encourage individuals or firms to engage in activities that, while not ultimately productive for the economy as a whole, are made worthwhile for the individual by the design of the rewards and sanctions built into legislation.

Some spheres of public administration, such as revenue collection, have a clear economic efficiency cost. In the analysis of taxation, the economic cost of an additional dollar of revenue is known as the marginal excess burden (MEB) (see for example Pender 1997, p. 24). Areas of social security expenditure which are income-tested can have a work disincentive effect with very similar economic efficiency costs to income tax. Some categories of law, such as the *Trade Practices Act 1974*, are intended to have a positive impact on economic efficiency; for others the immediate impact is a fairly low priority, and sometimes, although rarely, irrelevant (for example defence procurement or immigration).

It is important to note that these economic efficiency costs are opportunity costs. They are costs measured against a benchmark of the world that would have been had the tax not been increased or the regulation changed. Unlike administrative costs, described below, opportunity costs are not actually incurred.

Administrative costs

The administrative cost of a body of law is the sum of the private and public sector 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 (including regulations, rules, precedents and so on) to particular hypothetical or actual circumstances, and attempts to improve or change the law. These costs would have been incurred even if there had been no changes in behaviour as a result of the law, for example no changes in labour market participation as a result of labour income taxes. The categories of administrative costs and economic efficiency costs can blur. The time taxpayers spend filling in interest and dividend receipts in their tax returns is clearly an administrative cost. Any fall in wealth as a result of lower savings resulting from lower after-tax returns to saving is an economic efficiency cost. Time devoted to figuring out how to avoid a savings instrument where the 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 and typically include:

- development of policy;

- drafting and enactment of legislation;

- design of service delivery, compliance and audit structures and methods to administer the legislation; and

- delivery of services or determination of duties and obligations based on the legislation.

Some of the key steps in this cycle are illustrated in Figure 1, which also emphasises the primacy of the legislation and policy rules in this cycle of activity.

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 sets out the sorts of costs incurred and the main determinants of these administrative costs at various life-cycle stages of a body of law.

Figure 1 Integrated Legislative/Policy Cycle
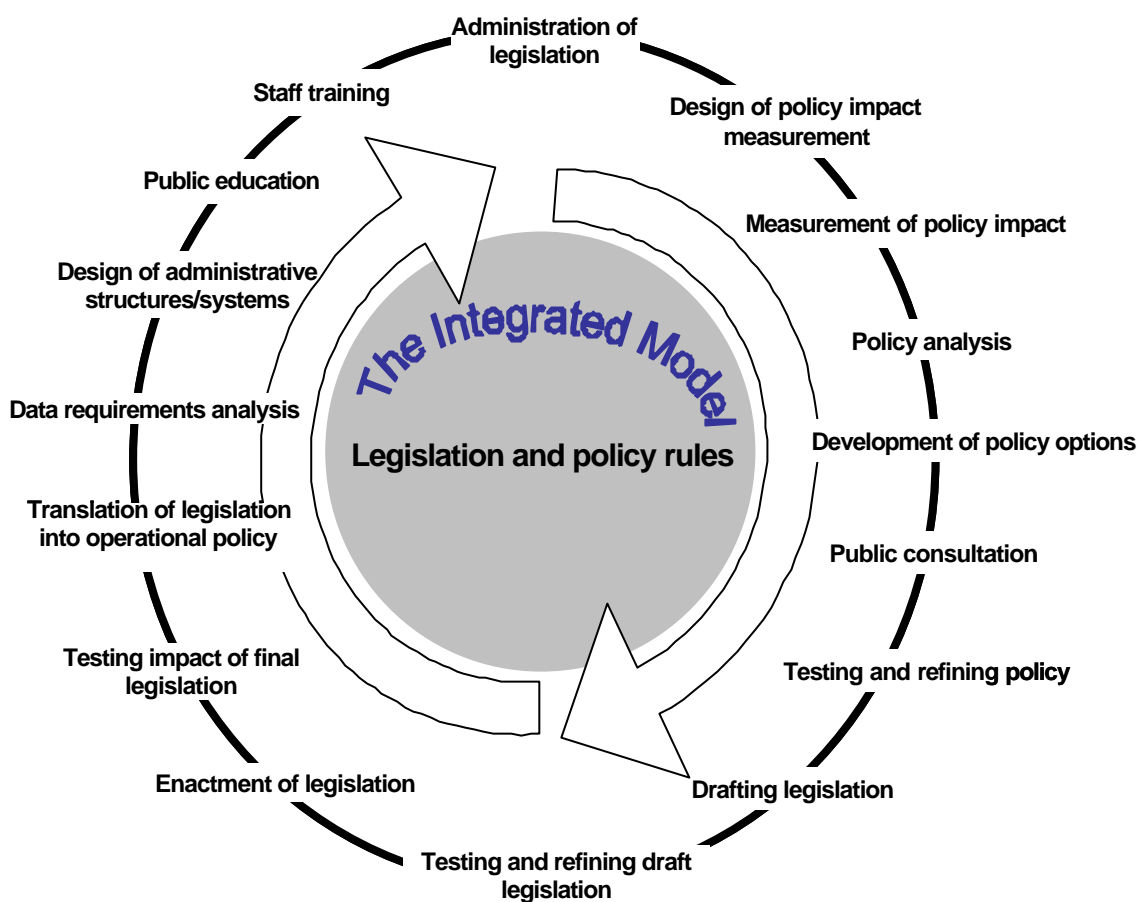
Source: Johnson (2003, p. 4).

Table 1 Nature and timing of administrative costs throughout the life-cycle of a body of law

Lifecycle stage	Public and private sector costs	Determinants
1. Design of policy through to enactment	Policy advice, lobbying	Extent of political consensus regarding impact, for example
2. Testing impact through to staff training	Capital costs and 'human capital' costs of setting up to understand, administer and comply with new rules	Novelty, complexity, and duration of transition
3. Administration	Recurrent costs	Staff turnover, complexity

Net government expenditure

This is easier to measure than economic efficiency and administrative costs because it usually appears in the government accounts as revenue or expenditure or perhaps, at worst, an estimated tax expenditure. In the case of a regulatory agency such as the Therapeutic Goods Administration, this criterion might be of minor significance because, although the TGA incurs large administrative costs, it does not itself administer a big budget in the way that Centrelink does, for example.

Equity and social justice

Equity is commonly discussed in terms of horizontal or vertical equity. Vertical equity deals with the impact of the law on the distribution of economic resources, for example post-tax income distribution. Horizontal equity refers to the principle that like persons should be treated in like manner. Black-letter law often sacrifices horizontal equity for clarity. Rawlsian justice (RJ) deals with the likelihood that 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.

Using a progressive scale tax on labour income as an illustration, Table 2 sets out the common indicators and estimates of their value for each of the four criteria discussed above. Some taxes on income from labour in Australia have a flat-rate scale – for example fringe benefits tax, superannuation contributions tax (surcharge aside) and payroll tax – but most revenue is raised by income tax levied at a progressive scale of rates.

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

Criteria	Common indicator	Estimate of value
Efficiency cost - opportunity cost	Marginal excess burden (per cent of revenue)	A quarter of revenue raised
Administrative cost	Public and private administrative compliance burden (per cent of revenue)	A tenth of revenue raised
Revenue	Dollars	Half Federal and state total tax revenue pre GST
Vertical equity impact	Fraction of contribution to difference between pre- and post tax/transfer income inequality (e.g. gini coefficients)	A third; the other two-thirds 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, p. 2) who estimate US personal income tax (from all sources) costs of between ten and 17 per cent.

1.4 The lack of measures of policy complexity

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

- Factual complexity covers the number of circumstances that have to be established (known as numeric factual complexity) and the difficulties involved 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.

Although many practitioners will be able to point to laws or parts of laws that are more or less complex in each of these dimensions, formal metrics with which to measure such complexity are lacking. The absence of metrics is a significant contributor to the very poor quality of feedback on the levels and costs of complexity to law makers.

Draftspeople and policy makers have no benchmark for complexity. Regulatory Impact Statements (RIS) which are often prepared prior to tabling new bills, amendments and regulatory instruments lack credibility. The Productivity Commission which assesses RISs 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 for complexity is the absence of systematic evaluation, with the benefit of hindsight, of the economic and social costs imposed by public sector rules. Policy makers and legislative drafters can easily increase complexity, raise public administrative costs (or compromise accuracy) and impose extra private sector administrative costs with little or no regard for these consequences. However, increasing complexity has an additional, more insidious and potentially more serious impact than these economic costs. The goodwill of the citizens and their respect for the rule of law, in both the particular domain and in general, are readily compromised by legislation that is judged unintelligible with apparently random or illogical implications. Section 3 discusses these issues.

1.5   Complexity, goodwill 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,[3] accuracy and compliance with the values of administrative law. These criteria are intermediate objectives of policy. They are not intrinsically good but are useful to the extent they facilitate achievement of the ultimate objectives discussed in Section 2.1, for example Rawlsian Justice or lower administrative costs.

A 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 – those specific to this arena and those aimed at promoting the rule of law. Rawls (1971, pp. 206-213) 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

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[3] Much of the work done at the ANU's Centre for Tax System Integrity deals with the significance of, and the influences on, 'citizen goodwill' in the context of tax administration. It does not, however, focus on complexity in this context.

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, p. 207).

Suppose a body of rules is introduced which has the force of law and there is an authority with some power to influence the content and take action against transgressors (which may or may not be effectively contestable in court). Now consider the impact of progressively making the rule set larger and more complex. [4] 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 determined by the whim of the collector assessing his capacity to extract revenue from the appearance of the household occupants. As the complexity of the body of law increases there will be more specialisation and less wide-spread knowledge of the specific policy intent. In time complexity will be such that a point will be reached where the majority of the population may inadvertently be violating some clause and where no one is ever satisfying every clause they should. Neither does anyone know which clause they are violating nor which clause an administrative agency might feel they are violating. [5] Accurate determination of tax liability is impossible in this situation. Well before this point is reached citizen goodwill will begin to decline.

In this situation respect for the body of law in particular and the rule of law in general will suffer. If the law imposes penalties, then social resources will be devoted to ensuring the appearance of compliance with the letter of the law and away from consideration of the spirit and intent. If it confers rewards, 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 consolidate 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.

Under such circumstances, the development of administrative mechanisms that are symptomatic of excessively complex legal rules leading to a failure of the 'rule of law', will occur. Two contemporary examples of such mechanisms are 'private rulings' in tax law and 'privative clauses' in migration. These are discussed below.

Private rulings

The need for private rulings is well illustrated in an experiment conducted by the American magazine *Money*. It gave 46 qualified tax accountants a 'hypothetical' set of tax circumstances belonging to an individual seeking the preparation of a return. It received 46 different answers. [6] It is imprudent, in this situation, to proceed without a tax

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[4] 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 expressions are likely to result in multiple assertions of 'spirit of the relevant intent'.

[5] Appendix A describes the meaning of 'accuracy' in this context.

[6] Not one tax accountant provided the answer the magazine thought was right. The highest liability was double the smallest. Around the world, tax administrations have undertaken similar tests internally and

ruling from the tax authority for it is the interpretation by that authority which will determine the future liability of the taxpayer. Of course taxpayers who disagree with that interpretation have 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 highly paid advisers are unable to rely on their own interpretations and cannot form expectations in order to plan their actions.

Privative clauses

Ruddock's (1999) description of the recent history of migration law and subsequent developments presents a similar example. Prior to December 1989 the relevant Act provided a broad general discretion to the Immigration Minister to grant and refuse visas and entry permits. Departmental manuals contained context for both the interpretation of policy and guidance to decision makers. Reflecting criticism that the law was vague, the *Migration Act 1958* was amended and the manuals were replaced by the 'migration regulations'. Current regulations contain about 1250 pages of rules dealing mostly with requirements for the granting of one of the numerous classes of visas.

The Government became concerned about the increasing number and cost of appeals against migration decisions and in 1998 introduced a 'privative clause' (Section 474 of the *Migration Act* 1958) which 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 avenue for contesting capricious, random or corruptly negotiated decisions (Ruddock 1999, p. 8).

It may be that the narrow economic interests of Australia are best served either by a high level of discretion (as applied prior to 1989) or by privative provisions (as may well apply in future) on the basis that it matters little which migrant applicants are accepted and which 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[7] 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,[8] the Commonwealth argued that the *Migration Act 1958* might 'validly be re-drawn to say, in effect, (again) here are some non-binding guidelines which should be applied' with the 'guidelines'

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obtained similar results which are, understandably, rarely publicised. The US *Money* study is described in Keating (2003, p. 8). See Caplin (1998, p. 104).

[7] 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 (2003).

[8] Plaintiff S157/2002 v Commonwealth of Australia [2003] HCA2.

being the balance of the statute.[9] The majority judgment rejected this extreme claim for the effectiveness of the privative clause approach to legislation. [10]

1.6   Conclusion

Administrative law values are characterised by the Administrative Review Council (ARC) as, 'Lawfulness, fairness, rationality and openness – that is transparency, efficiency' (2003, p. 9). Mechanisms devised to deal with excessively complex rules, such as private rulings and privative clauses, clearly compromise administrative law values resulting in a further erosion of citizen goodwill. A stopgap solution is to amend the mechanisms, for example making the private rules public.[11] The root cause of the problem is the complexity of the rules themselves. It often appears as though, at the time complex provisions are drawn up, no thought is given to the predictable corrosive impact on citizen goodwill and administrative law values.

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[9] Id Clause 101 Majority Judgement.

[10] Id Clause 102

[11] After many years of criticism the ATO has made a register of private binding rulings although it is only searchable by ruling number (See Australian Financial Review, 13 November 2003, p. 8).

2.   Trends in legislative complexity

This section illustrates the growth in complexity of legislation and regulation in Australia and demonstrates the links between complexity and high-level policy design. It describes, where feasible, the trends in, and levels of, the proximate policy objectives of accuracy and simplicity and considers the theoretical and observed relationships between these 'forgotten' objectives and the more commonly emphasized ones. Finally the section deals with the causes and sources of complexity in Australian income tax.

2.1   Trends and patterns in the design and implementation of policy

Complexity

Australian policy makers' taste for complexity seems to have increased in recent years. In comparison with the 1970s and 1980s, the average number of pages of legislation produced by the Federal Parliament increased significantly in the 1990s when nearly 55,000 pages of legislation were passed, an average of 30 pages per Act. This was about twice the average page count for Acts passed in the 1980s, and almost three times that for the 1970s (Banks 2003b). The number of Acts passed per year (about 170) was steady during the 1980s and 1990s but that level was well above previous decades (Banks 2003a; Banks 2003b). 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 shows that the number of pages in the ITAA has increased from 120 to 7000 over the last 70 years. Table 3 sets out the number of pages for particular areas of Australian law and, where figures are available, estimates of the number of rules.

Figure 2 Australian income tax legislation (number of pages)
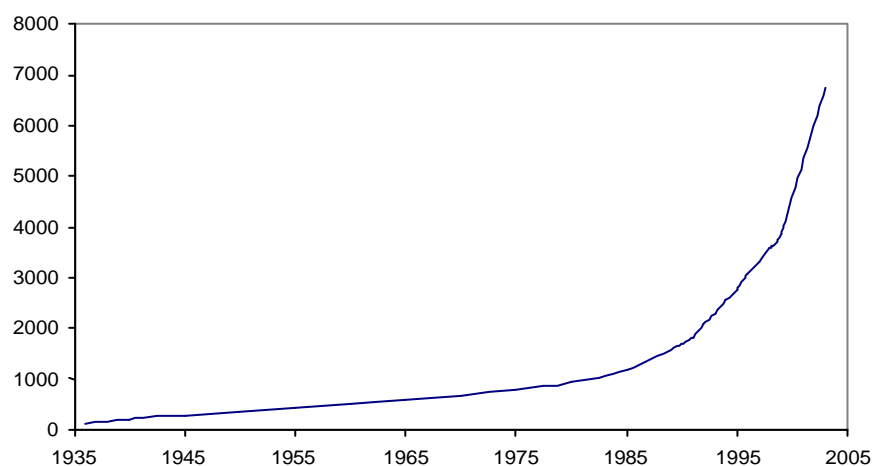
Source: Banks (2003b); some figures derived from Kobetsky and Dirkis (1997)

Table 3 Scale of parts of various Australian laws

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

Notes:

1. Entire Income Tax Assessment Act.

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 modelled 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.

Although it is not easy to draw international comparisons, Australia's taste for complexity appears to be higher than the average OECD country. For example, the Canadian income tax legislation is only 2000 pages (Krishna 2003). However in the UK the direct tax code is over 7000 pages of legislation. Increasing complexity can also be observed in US tax legislation. In 1913 the first CCH US federal tax loose-leaf service, the *Income Tax Service*, comprised 400 pages containing the tax law and related documents. 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 the attempt by various 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 8200 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 under the *Statutory Instruments Act 2002* in 2004 (Office of the Parliamentary Counsel of Queensland 2003).

In the corporate tax area there is strong indirect evidence suggesting a much higher taste for complexity in Australia than is usual in the OECD. In 1999, the Australian corporate tax rate was average by OECD standards; however, the corporate tax revenue in the same year was, by a wide margin, the highest in the OECD as a fraction of GDP (OECD 2001, p. 34). Although the revenue burden comparison is misleading because of full imputation in Australia, the Australian base clearly made up the largest fraction of GDP in the OECD in that year. While it would be feasible to combine a large base with simplicity

(for example by denying depreciation deductions), it seems likely that the unusually large base is associated with an unusually high degree of complexity (OECD 2001, p. 34).

An OECD study involving a survey of small and medium enterprises (SMEs) in ten 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$4000 per employee. The estimated average cost of administrative compliance for Australian SMEs was about US$25,000, which equates to US$3600 per employee (OECD 2001).

Accuracy

Table 4 sets out measured error rates for a number of legislative areas. 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	HRDC	Human Resources Development Canada
VEA	Veteran's Entitlement Act 1986	EIA	Employment Insurance Act, Canada
VRB	Veteran's Review Board	OAGC	Office of the Auditor General of Canada
SS	Social Security Act, Australia	NAO	National Audit Office, UK
VA	US Department of Veteran's Affairs	IRS	Internal Revenue Service, US
VCAA	US Veteran's Claims Assistance Act		

Notes

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

2. The 52.1 per cent 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, i.e. a claim accepted when it should have been rejected; 4.9 per cent, false negatives, i.e. a claim rejected when it should have been accepted; 5.9 per cent, to less serious errors, e.g. incorrect payment rates (13.5 per cent). The 52.1 per cent does not include 'non-actionable' assessment errors, e.g. wrong form, inadequate documentation supplied etc. The ANAO found 'almost all claims assessments contained at least one of the administrative errors listed in table 4' (ANAO 2001a, p 64).

3. The 41 per cent 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 five per cent error rate based on a very small sample size. In 1998 when an improved accuracy measurement (Systematic Technical Accuracy Review, STAR) was introduced, the first year of its use resulted in an overall error rate of 36 per cent for regional office initial decisions. These figures are based on a review of a sample of approximately 7400 cases, about 1.5 per cent 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 per cent 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 £86m receipts, overpayments were estimated to be £4.5m and underpayments were estimated to be £21.9m.

   The 76 per cent 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 per cent 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 on 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 per cent 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 four per cent 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.

Complexity in public policy

Ever increasing complexity in social security

In a recent address, Sue Vardon, CEO of Centrelink, stated there are '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' (2003, p. 1). But it is not true that the social security system has always increased in complexity. For example, during the period 1970-71 to 1977-78, the age pension became more universal (Mitchell *et al.* 1994, p. 326) and, because there was bipartisan support for reduction or abolition of the means tests, the age pension arrangements became less complex. 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 70s gave way to a move back to targeting, for example the re-introduction of the income and asset tests for the pension (Barber *et al.* 1994, p. 34). The level of targeting in Australian social security had traditionally been high by international standards (Mitchell *et al.* 1994, p. 332, Table 2).

2.2   Interrelationships

This section considers a range of theoretical relationships between complexity and policy objectives such as economic efficiency and administrative cost. Each conceptual issue is illustrated with an example.

The relationship between complexity and efficiency

In the author's experience it is often claimed that increases in complexity result in an increase in economic efficiency because more complex legislation is better able to take account of individual circumstances. However, such claimed efficiency benefits may not eventuate for two reasons, illustrated most clearly in the area of tax. 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, p. 24). Of course, complex taxes may serve other objectives, for example equity, as discussed further below. Secondly, even if a complex set of taxes improves economic efficiency, for example taxing goods which are in inelastic supply, such taxes will inhibit desirable experimentation in patterns of economic activity because of the increase in uncertainty.

Although arguments asserting the need to '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.[12] In that case multiple inconsistencies in the application of different parts of a body of law often act like differences in tax rates in their impacts on differing potential economic behaviours. Consequently, a tool like RBT, which

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[12] For more detail see Appendix A Determinants of the administrative cost burden

extensively reduces the burden of complexity, has an economic efficiency value
analogous to harmonizing tax rates.

Example: GST and financial services

The GST treatment of financial services in Australia provides a good example of the
Australian preference for complexity with a dubious efficiency motivation. In most
countries with a GST, financial services are input taxed, that is, financial services
businesses receive no credit for GST levied on the inputs they buy and in turn charge no
GST to their customers such as bank depositors or mortgagees. Australia is alone in not
treating financial services in this fashion.

During the course of the introduction of the GST in Australia there was concern,
especially among some of the minor financial institutions, that the GST regime added an
additional cost where a financial institution outsourced some of its activities. The smaller
financial institutions considered that, as they were obliged to outsource more, the increase
in their costs would be greater than those of the larger financial institutions which were
able to conduct more of their activities inhouse. A supplier of financial services would
have to pay GST on outsourced services for which no credit would be available. The
same service provided inhouse would attract no GST. The Australian solution to this
problem was two-fold:

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

2. Similar extensive itemised lists of current outsourced 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 debate surrounding the taxation of financial services, which resulted in
this 'uniquely Australian' GST structure, discussed extensively the productive efficiency
costs of discouraging outsourcing.[13] By contrast, there was very little discussion of the
administrative costs involved in implementing such a structure. They appear to have been
ignored, as were the dynamic efficiency costs which now face a financial services firm
wishing to innovate its production structure in a manner which sits awkwardly 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 impediment to innovation in the Australian financial services industry.

The undocumented relationship between administrative cost and complexity

While it is intuitively plausible and, in SoftLaw's experience, generally accepted that
administrative costs will increase with complexity, the nature of the relationship is

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[13] See Australian Treasury, 1999

undocumented. It is only in recent times that scrutiny has been applied to accuracy in public administration and statistically valid error rates have been calculated (see Table 4).

There are three major theoretical relationships to note in regards to 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 of desired levels of accuracy by policy makers is rare. For a given level of accuracy, RBT is likely to reduce significantly the costs of increased factual complexity 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 per cent of claims are Y per cent over-paid in order to reduce claims processing costs Z per cent'. However, a similar decision cannot be made as readily by a government agency. This asymmetry has significantly contributed to the increase in administrative complexity. Staff at government agencies 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.[14]

Secondly, the time cost of public sector staff 'traditionally' administering a 'unit rule' rises very rapidly as logical complexity increases and capital costs grow rapidly as additional training, checking and verification are required. There are also likely to be more appeals against decisions and time devoted to review. By contrast, recurrent costs are much less sensitive to logical complexity when RBT is used. Increases in capital cost as a result of increasing logical complexity start from a higher level with RBT but progress at a much slower pace. For more detail see Appendix A.[15]

These relationships are set out diagrammatically in Figure 3.

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[14] 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 per cent 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.

[15] These assertions presume that RBT itself is an accurate representation of the law. Although the need for review of individual decisions is likely to be significantly reduced, there will continue to be a need for a review of the RBT.

Figure 3 The relationship between capital and recurrent costs and complexity for administration using 'traditional' and 'rulebase' technologies
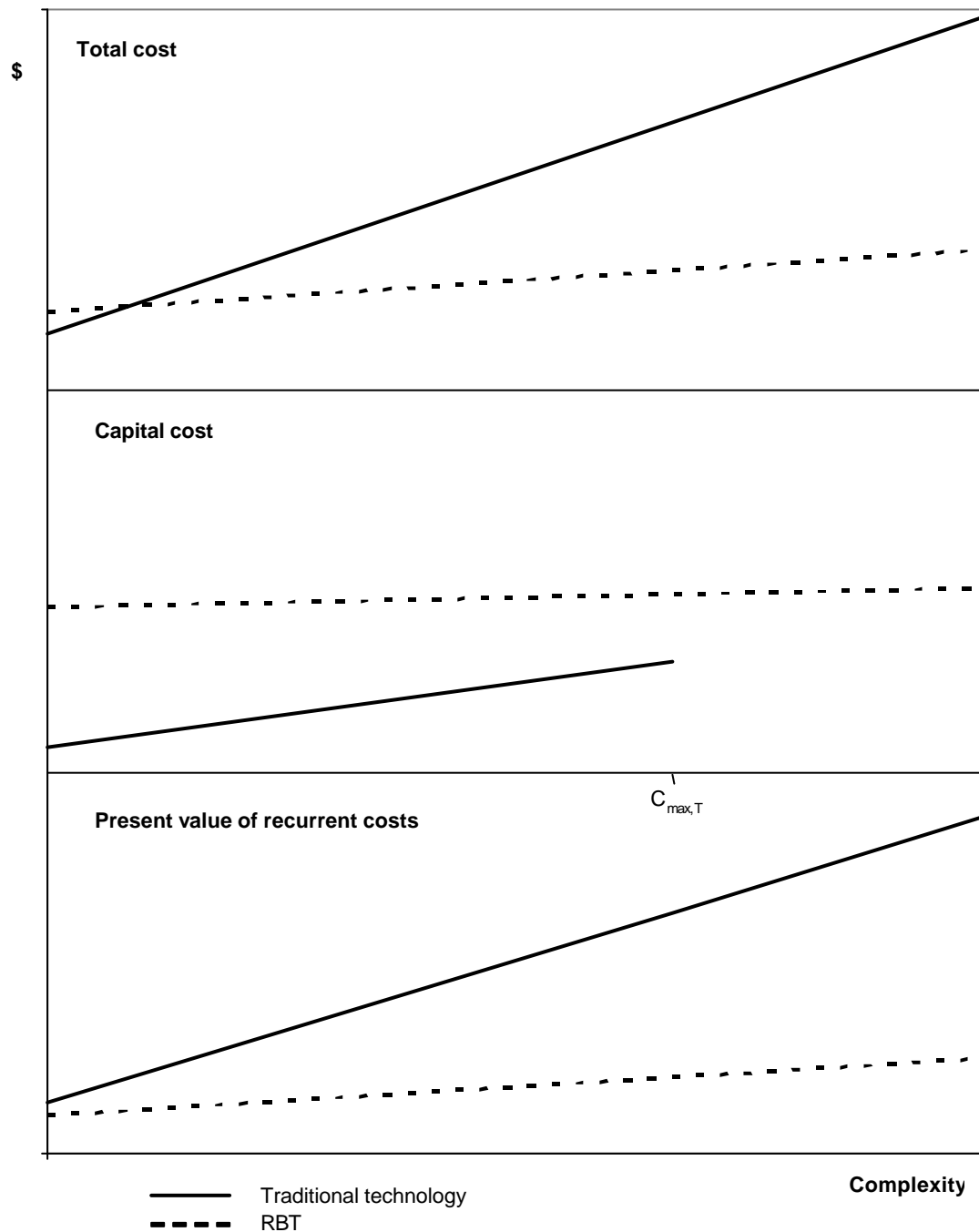
$c_{max, T}$ = ceiling level of complexity traditional technology can deal with and achieve required accuracy

Thirdly, these relationships, as depicted in Figure 3, assume that accuracy is specified, measured and constant. In fact, with traditional technology, the more likely outcome as complexity increases is that costs are maintained and accuracy suffers. Across time and country, comparisons of costs involved in administering specific areas of law have to be treated carefully because it is very hard to ascertain what is happening to levels of accuracy.

Empirical evidence of the extent of administrative cost

Because no metrics have been developed for assessing complexity, it is very difficult to find evidence which would allow the hypothesised relationships described above to be tested. There is a pressing need for the development of complexity metrics so that analyses, such as those described in Table 4, can be meaningfully compared. Complexity metrics would allow analysts to determine the extent of inaccuracy present and to compare it to an acceptable benchmark, given the level of complexity inherent in the rules being implemented. Such analysis would provide a meaningful foundation for assessing administrative performance and allow conclusions as to whether an agency is performing well or poorly given the complexity of the rules the political process has required it to administer.

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

A gauge of the sorts of complexity which have increased administrative costs most significantly might be obtainable from cross-country comparisons of administrative burdens and the nature of social security arrangements. Mitchell *et al.* (1994) provide average administrative cost estimates for ten OECD countries including estimates for the average administrative cost of public transfers as a percentage of total transfers for each country during the 1980s. The figures range from 1.9 per cent for Norway to 7 per cent for Switzerland, with the remaining countries in the range 2.4 per cent to 4.9 per cent. Administrative costs were greater in countries where social security systems demonstrated 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 a par with administrative costs for countries with a universal system thus implying that Australia is quite efficient.

The results suggest that an increase in complexity due to the introduction of income-testing does not significantly increase administrative expense, but an increase in complexity due to an earnings-related component does. In this case Australia has enjoyed the equity benefits of earnings-related complexity without incurring significantly higher administrative costs as a fraction of expenditure. 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 one per cent (old age) to 13.2 per cent (unemployment insurance). The latter is an area where establishing and monitoring eligibility is more complex.

<u>The pursuit of equity is likely to increase complexity and administrative costs</u>

The horizontal equity dimension of the relationship between complexity and administrative cost is well covered in the public administration literature. O'Faircheallaigh *et al.* (1999, pp. 221-223) discuss various Australian 'citizen-based accountability' developments since the Coombs Royal Commission 1976, such as Freedom of Information, the Administrative Appeals Tribunal and ombudsman's offices, and go on to assess the aggregate costs of various administrative review provisions in excess of $150 million 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.

The relationship between expenditure and complexity

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 microeconomics of monopoly pricing suggest that a monopolist who can price discriminate can increase revenue. Price discrimination involves setting prices for various quantities or to various people that do not vary with costs. The main barrier to price discrimination is the possibility of resale. In order to engage successfully in price discrimination, a monopolist has to be able to establish and maintain segmentation of the market in a cost-effective manner. It is important to note that perfect price discrimination is as efficient as perfect competition. Monopolists who set their charges in a fashion that better distinguishes capacity and willingness to pay amongst their potential customers not only improve profit but economic efficiency as well. In this case, equity might suffer if less well off customers have a high willingness to pay and consequently bear the higher prices.

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 but rather the legal and administrative problems that arise from discrimination and complexity. To illustrate, it is contrary to the Constitution of 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 licence fees, which include a tax element, vary geographically due to variations in the levels of congestion which, when combined with disparities in topography, result in varying levels of spectrum scarcity (Pender 1997, p. 34).

The quantum of revenue the Commonwealth can earn as 'landlord' of the spectrum depends on whether there are legal barriers to price discrimination. If there are not, it also depends on the extent to which the Commonwealth can discriminate amongst spectrum users according to their willingness to pay. The extent to which the Commonwealth can

effectively practise such discrimination in turn depends on the administrative costs of dealing with complex arrangements which satisfactorily differentiate amongst potential spectrum users. Electronic RBT has the potential to reduce the costs of this differentiation. Sets of rules can be constructed and cheaply applied to particular situations to implement effective differentiation. In this manner electronic RBT can reduce the life cycle administrative costs of complexity. As a consequence, when a body of law or accompanying regulation 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 have a capacity to contrive scarcity values socially and their capacity to extract revenue similarly depends on legal barriers to 'price' discrimination and administrative costs. For example, ASIC levies charges on the public for the use of its services and earns the Commonwealth revenue more than double the costs of its operation.[16] Although these exactions often have the character of a charge, for example the cost to lodge a prospectus, they are legally levied 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 a flat rate for the lodgement of a prospectus, ASIC could improve its revenue by charging rates differentiated according to criteria indicative of willingness to pay. Simple examples might be charges levied according to the proposed scale of distribution or the quantity of monies to be raised. On a more sinister note, ASIC could require applicants to apply an ASIC rulebase constructed from ASIC policy statements setting out ASIC interpretation of the law. Then it could charge applicants on the basis of levels of compliance indicated by this rulebase.

Example: Price discrimination

There are numerous examples of governments introducing more complex arrangements to increase revenue or decrease outlays (with less compromise to economic efficiency) in the tax and social security area. It is the most commonly targeted rationale 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 (Pender and Ross 1995). At the state level, in both Australia and the US, tax concessions may be granted in return for locating facilities in particular areas. In the current Australian immigration regulations, under some circumstances the capacity of an Australian citizen to sponsor a migrant is higher if they live in a regional area.[17] Presumably this reflects a view that migration imposes a lesser burden on the Commonwealth and on Australia if migrants settle in these areas.

To our knowledge, there have been to date no significant public sector implementations of RBT primarily intended to increase revenue or decrease expenditure by differentiating more stringently between citizens' circumstances. However, this has been a significant motivation for the implementation of RBT in commercial situations. For example, in

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[16] See ASIC Annual Report 2002/03 p 10.

[17] See Visa Sub Class 119 Regional Sponsored Migration Schemes *Migration Regulations 1994.*

marketing material for its Aion product, Platinum Technology (now owned by Computer Associates), describes the use of RBT in two commercial situations:[18] first, with respect to direct marketing portfolio management advice by Robeco Groep and secondly with respect to credit card delinquency call management by World Financial Network. In both these cases, rulebase technologies are intended to improve private revenue and/or reduce expenses by distinguishing between customers more efficiently. In the Robeco case, rulebase systems enabled the company to deal more economically than they were previously able to with clients who had less money to invest.

The relationship between goodwill and complexity

The 'goodwill' of the citizens with respect to a body of rules encompasses a commitment to comply firstly with the spirit and secondly with 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 wherein the citizen weighs up the risk of a failure to comply with the cost of the consequences such as fines. This view ignores the 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.[19] Wenzel (2001) sets out a list of references dealing with a related but 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' (Wenzel 2001, p. 4).

Consider a situation where 'goodwill' is a significant determinant of citizens' behaviour. Suppose it is desired to achieve either a given level of compliance with the rules or a given level of accuracy of determinations of how those rules apply in particular circumstances. It seems likely that the quantum of public administrative expense incurred in order to achieve desired levels of compliance or accuracy will fall as private goodwill improves.

There are two ways in which the goodwill of individual citizens will manifest itself. Firstly, with respect to instructions to their agents, for example tax agents, and their monitoring of their agents' determinations and filings and secondly, in the extent to which they are prepared to self-determine, carefully and honestly, the applicability of the rules to their own situations. 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.

Complexity makes it more difficult and costly for citizens to monitor their own agents or self-determine their liabilities. In turn, this makes it more difficult to acquire first-hand experience of, and confidence in, the fairness of the rules.[20] At high levels of complexity it becomes increasingly difficult for citizens to gain a sense of the fairness of the rules

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[18] Platinum Technology White Papers "How Insurance companies are automating core business policies" and "How banks are automating core business policies" 1998.

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

[20] Tyler (2001) discusses the importance of these experiences in nurturing 'law abidingness' in general.

from their own experiences and observations. Levels of complexity in some areas of law in Australia have reached an extent where it is not uncommon 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.[21] 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.

Example: The relationship between goodwill and complexity

The discussion above results in two propositions. Firstly, citizens' behaviour is influenced by their 'goodwill' towards a body of rules and improved goodwill will reduce public sector costs. 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 evaluates examples of these propositions in three contexts – tax, accounting standards and 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 2000 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 levels of commitment to comply. She notes that:

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

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

> [T]he roughly 2,300 pages of FASB standards almost doubled to about 4,000 by 2002 (Healy and Palepu 2003, p. 1).

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[21] Implicitly there is an assumption that the term p in equation (2) (see section 5.2 of Appendix A) 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", Furse 2002)

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

> [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, p. 7).

Ruhl and Salzman (2003) describe the results of a survey they conducted of 168 members of the environment section of the US Bar Association 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 regulatory legitimacy amongst the regulated and the decreasing capacity of the regulators to distinguish between deliberate and involuntary non-compliance.

2.3   Income tax

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

2.4   Conceptual issues associated with complexity in tax law

Five sorts of tax bases can be identified:

1. *Labour.* PAYG tax on wage income earned from time spent in the market economy is the most obvious example of this sort of tax.

2. *Private wealth.* The state maintains extensive registers (for example land titles, mining tenements, and companies) of private property rights to extract, dispose of and claim income from the ownership of capital goods. In addition to 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; and

- taxes on transactions. Stamp duty on motor vehicle transfers, land title conveyances, mortgages and share transfers fall in this category as do gift duties and FID.

3. *Public Wealth.* Many social 'assets', for example the urban road network, are not parcelled up as are rights to private wealth. 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 and pollution.

4. *Consumption.* There are two sorts of consumption taxes, general (such as 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 production, 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 (Pender 1997, p. 45). 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 rate scales (schedules). Under a *global* regime all sources of income are added together and subject to the same rate scale (Pender 1997, p. 46). Until 1953 Australia had a schedular system whereby higher tax rates applied to dividend, interest and rent income (Pender 1997, p. 46).

In 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, although the base arrangements were broadly unchanged. In the early 1980s 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 and, as a result, the Labor government imposed a number of base broadening measures throughout the late 1980s.[22]

Current tax law reflects this history and is the result of many decades of the piecemeal accretion of provisions of law introduced to deal with particular concerns in vogue at the time. There has never been a policy commitment to any particular theoretical benchmark.

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[22] For discussion of these definitions and history, see Pender (1997).

That said, the benchmark which is most commonly used to judge tax arrangements in Australia is a 'comprehensive nominal income tax' (Pender 1997, p.46).

Recent history of tax legislation

The number of pages of income tax legislation has grown rapidly in recent years. In 1996 there were only 3500 pages (Inglis 2002); currently there are about 7000 (Banks, 2003b). In addition to the tax law, the ATO produces public and private tax rulings, about 3500 general public tax rulings in financial year 2000-01. One of the chief causes of this rapid increase was a tax simplification project which commenced in 1993. Intended to improve the expression rather than the substance of the law, the plan was to re-write the entire *ITAA 1936 Act* 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 and, as a result, parts of both the *ITAA 1997* and *1936* now apply.

Causes of complexity in tax law

The numerous explanations for the substantial increases in tax complexity fall into two basic groups, one arguing that it is intentional and the other that it is inadvertent. The second group focuses more on the institutional process which results in the content of new law.

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

1. 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 into their price structure, the Commonwealth can raise more revenue with the same rate structure by better differentiating between circumstances. As Yitzhaki (1979) demonstrates, theoretically based 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' (Yitzhaki 1979, p. 480). Rates are, however, highly visible whereas the costs of a more complex base are much more difficult to identify. Political preferences dictate a lower rate and a complex base structure.

2. 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.

3. 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 they otherwise would have been.

4. Increased complexity in tax law is a response to both increased complexity in the financial and economic environment and to tax avoidance.

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, ATO staff were required to understand the law and its workability. He argues that the move to self-assessment in the late 1980s broke this feedback mechanism and 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. Legal drafters and staff at the ATO and Treasury assume they have been given a very high-level political instruction to implement a Haig Simons comprehensive income tax (CIT) in black-letter law. The instructors either failed to understand the administrative complexity costs or were misled by the predictions of the instructed. The implementation of a CIT is conceptually complex and is likely to require more than 7000 pages of legislation. Simplification projects at a bureaucratic level fail because fundamental conceptual simplification is required, for example an instruction to tax wealth rather than income from capital from now on.

The third explanation attributes complexity to the self-interest of 'practitioners'. In the author's experience, this argument is common in the US where 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 per cent in real terms despite the introduction of tax preparation software (Keating 2003, p.3). Clearly H & R Block has a strong interest in maintaining 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, p. 30). The ATO cannot easily affect the rate structure but it can influence the legislative expression of the base. Suppose, as an alternative, the ATO's 'output' were to be re-cast as 'collect the revenue determined by the current tax law whatever revenue results'. In this event the ATO would not be under pressure to influence the definition of the tax base in order to provide particular levels of revenue; rather decisions about the rate and the base would be forced to a higher political level.

Sources of complexity in tax law

While it is easy to find practitioner material critical of the increase in complexity,[23] 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 such as new definitions which mesh poorly with existing ones.

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[23] For example, Wolfers (2002, p. 520) extrapolates recent growth in tax laws to forecast 158,600 pages by 2050.

Yitzhaki (1979) describes a general theoretical approach to choosing tax rates and bases for raising 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. As a solution to this problem in general, Yitzhaki sets out a three-step process as follows:

1. 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.

2. Rank the bases according to these functions.

3. Rank the bases according to functions describing administrative cost levels for each base for varying rates.

The solution which minimises social cost is that combination of rates and bases having the lowest total administrative cost 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.

Taxes on income from labour

The main source of complexity with regard to income from labour is work related expense deductions (WREs). Australia is unusual by OECD standards in allowing extensive WRE deductibility (Baldry 1998, p. 49). Baldry (1998, p. 59) estimates that the elimination of WRE deductibility would result in private sector administrative cost savings of about two per cent of revenue raised, a potential saving that has to be weighed against the efficiency and equity impact of abolishing WRE deductibility. The average tax benefit for those who claim WREs is in the order of one per cent of salary (Baldry 1998, p. 53). The average tax rate is about 25 per cent (Pender, 1997, p. 76) so the average tax benefit associated with WRE deductibility is about four 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 one per cent,[24] that is less than the estimate of private sector administrative costs. On the basis of these figures, the potential economic gain from eliminating WRE deductibility is net one per cent of revenue raised, comprising a two per cent positive administrative saving offset by the one per cent efficiency cost.

There are also potential equity issues from abolishing WRE deductibility. As the use of WRE deductibility significantly increases with income, vertical equity would be improved by abolishing WRE deductibility.[25] 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 such as WREs 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, p.7).

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[24] Twenty five per cent burden times four per cent extra revenue = one per cent efficiency cost.

[25] The highest claimants of WRE deductions (20 per cent of average salary) are covered by the occupational code 'legislators and government appointed officials including judges' (Baldry 1998, p. 52).

Taxes on income from wealth

Yitzhaki's (1979) method can also be applied to income from wealth. Table 5 below sets out an indicative ranking of efficiency and administrative costs applying to the main potential tax bases in Australia aside from consumption. The figures in the table are rankings on a scale of one to ten of the administrative and efficiency costs of tax bases as a fraction of revenue and show ordinal ranking because cardinal figures are very difficult to obtain. For example, the table shows the administrative burden of labour income tax is low and similar to the low efficiency burden of property taxes.

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

Notes:

1. For example, tax on urban congestion, greenhouse gas emissions.

2. Ranges given for potential variation in rate, e.g. efficiency burden five for lower rates increasing to ten 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 and social 'decisions' which are the main sources of conceptual design complexity in the Australian income tax area. They are:

1. We choose not to tax activities which cause social and environmental damage where such taxes would result in an efficiency gain, for example 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.[26]

2. 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 cost (Pender 1999, p. 4) than taxes on business capital because property is immobile.[27]

3. Having ruled out a significant tax burden on property and the production of social 'bads', we constrain the tax rate on labour and business capital to be equal if

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[26] Taxes on petrol are not currently set at levels which account for social and environmental externalities in Australian cities (Pender 1999, p. 4).

[27] The level of 'recurrent taxes on immovable property' as a fraction of GDP is low in Australia by anglophone standards although not by overall OECD standards (OECD 2001, p. 27).

possible. That is, we have a global income tax system. There has been very little discussion in Australia on the merits of the alternative, a schedular system with lower rates on mobile business capital.[28] Because business capital is mobile and fungible, the efficiency and administrative burdens 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 that 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 details 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 were to be taxed at lower rates, there would be efficiency and administrative cost benefits.

Table 6 ITAA 97 – Numbers of parts (in Chapters 2 and 3) and pages

	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 and benefits – interaction	2-15	120

Other sources of conceptual complexity

In the case of deductibility of WREs, 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 a more careful definition of the base. In fact, as discussed above, it appears that 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 in two ways. 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.

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[28] 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 regards to tax on interest income and capital gains. The Ralph review, despite the explicit inclusion in its terms of reference of lighter taxes on capital gains, 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 (Head and Krever 1997, p. 8). A way of mitigating this efficiency cost is to allow trade in tax losses. However, rather than promoting tax-loss trade there are numerous provisions quarantining tax loss (CCH 2003, p. 51) which 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.

Likewise, special industry concessions fall into this category. For example, although expenditure on planting trees is, in general, capital and non-deductible, there is a special four-year write-off for grapevines (CCH 2003, p. 1007), a concession which gives rise to several costs. To the extent the concession is not simply capitalized into the value of land well-suited for grapevines, the tendency is for too many grapevines to be planted thus incurring an efficiency cost. In addition, rules have to be written setting out which expenditure will qualify and which won't and these rules have to be complied with thus incurring a complexity cost. Failure to abolish these sorts of complexity is a governance failure, a failure to administer the tax system in the interests of all Australians. However, 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 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 that other parts of the tax system do not discourage innovation, allowing tax-loss trading for example. 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'. Due simply to 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 reveal that it results from design decisions to eschew simpler tax bases in favour of those which are more complicated, an observation that weakens the 'politically inadvertent/institutional design flaw' argument. It may be that institutional processes compound the problem, but process alone cannot explain the high-level design complexity identified.

Among the 'politically intentional' arguments, the fourth, the 'gaming' argument, is the weakest. It is 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 on these bases. Similarly, the consideration of public and private administrative costs likely to result from tax changes has not been sufficiently adequate to sustain an argument that a

deliberate cost-shifting exercise has taken place on a large scale. In conclusion, it is most likely that the first two politically intentional arguments are the main causes of complexity. That is:

1. complexity is a politically attractive way of raising a given level of revenue at a higher social cost than is necessary; and

2. the pursuit of equity has been interpreted in a procedural rather an effective burden sense.

2.5   Conclusion

This section can be summarised in three propositions.

1. In public administration there appear to be very strong forces which ratchet up complexity without regard for the consequences.

2. Levels of inaccuracy and indeterminacy in public administration are far higher than most commentators care to admit. Statistically valid external assessments of levels of accuracy are a relatively novel feature of public administration. However, over the past five to ten years, audit offices have focused on this aspect of administration and found error levels higher than would likely be acceptable (and in many cases legal) in private administration.

3. Much academic and bureaucratic discussion of public policy design and effectiveness is marred by a failure to incorporate considerations of the relationships between conventional policy criteria, for example efficiency and equity, 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 any consideration given to the issues of accuracy, complexity and citizen goodwill.

These could be used by audit officers and in regulatory impact statements and, as knowledge of their use grew, in service delivery contracts with public agencies or private agencies contracting to undertake publicly financed functions. A novel approach might be to put an aggregate page limit on all Commonwealth law, regulation and delegation and only permit new law if old law is simplified or repealed. As demonstrated in the tax area, the problem with this sort of administrative approach is that complexity and simplicity need to be considered at the design level.

Two categories of action flow from this discussion:

*   Measures to halt or roll-back complexity might be taken. The first step would be to establish complexity and accuracy benchmarks; and

- Measures to reduce the inaccuracyand indeterminacy cost of complexity. Legislative rulebase technology offers this opportunity and the next section describes the benefits it can bring.

3. Electronic rulebase technology

3.1 Introduction

This section draws on the discussion above to evaluate the impact of electronic RBT on complexity in public policy. It describes RBT and then goes on to assess the impact of its introduction against each of the four public policy criteria – social, economic, financial and legal – set out in Section 1. The discussion is phrased as if polar extremes are under consideration, a traditional 'manual' assessment of the application of circumstances to a particular situation as opposed to the integration of RBT into all phases of the policy design cycle.

It is important to note that 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 the electronic lodgement of factual data. The direction of many of the arguments will be the same if a marginal change is under consideration although the amount of benefit, particularly in regards to administrative cost, is far greater where adoption of the electronic technology is complete. In 'green technology' literature this situation is often known as 'factor-4' or 'factor-10' (Von Weizsacker *et al.* 1997). 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.

3.2 Rulebase technology

Within government, RBT can be used to model rules where the authority does not derive from legislation, for example the wording of regulations and internal operating procedures. The technology can also be used outside government. The 'shell' of an RBT application is a 'business rule engine'. Worldwide there are about a dozen software vendors who supply business rule engine software. In the late 1980s and early 1990s, problems emerged in this industry as a result of a number of unsatisfactory experiences with applications which failed to live up to their promises. In the last few years, however, activity in the industry has grown rapidly and concerns have dissipated. In Australia, the application of RBT is growing and is currently in use at 13 Commonwealth and state agencies (ARC 2003).

LRT tools are a sub-set of a broader market in rulebase technologies. A legislative rulebase is a declarative body of rules, reflecting the precise terms of a body of legislation, and able to be driven by an external, computer-based engine. This engine investigates and applies the rules, whether from a database or through an interview with a user. It repeatedly makes judgements as to which provisions of the legislation do or do not apply from the data collected, finally reaching a conclusion as to the overall satisfaction or non-satisfaction of a goal and 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, p. 4).[29]

Like decision-support systems and management information systems, RBT is just another information technology tool, but it is a tool with implications for public policy goals that 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. An example of the application of LRT to human resource management procedures in a large organisation is described in Box 1.

Box 1 Applying legislative rulebase technology to human resources management

The NSW public sector has approximately 170 agencies which account for about an eighth of total employment in the State. In 1997, the NSW Government became concerned about the efficiency of the operation of the corporate services areas of these agencies.

A substantial proportion of staff time in these areas was devoted to advice about public sector employment conditions. The Government commissioned the development of 'HR Expert', a legislative rulebase technology (LRT) application based on the *New South Wales Public Sector Employment and Management Act 2002* (Brown and Coombs 2003; NSW Premier's Department 2004). HR Expert's objective is to improve the quality, consistency and timelines of human resource advice.

HR Expert deals with conditions of employment, such as maternity leave, study time, extended leave and voluntary redundancy. It is intended for use by employees, their managers and human resource staff. It takes a user through a set of interactive inquiries, providing advice specific to the user's circumstances based on reasoning constructed from the rulebase. Users are granted quick access to accurate information about their conditions and entitlements without needing to understand the rules or make any interpretations.

In the public sector, where employment conditions are specified in legislation, there is little room for discretion in determining a staff member's entitlements. In the event discretion is required, the typical approach in an LRT application is to alert the user to precedents, policy guides, appeal tribunal decisions and so on.

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

3.3   Economic efficiency and rulebase technology

In SoftLaw's experience, economic efficiency has not, to date, provided a strong motivation for the introduction of RBT. 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 RBT is the opportunity for a reduction in uncertainty if both groups can use the same technology. Alternatively, private sector implementation may reduce costs of appeal and dispute.

3.4   Administrative costs and rulebase technology

The determinants of administrative cost burden are described algebraically in Appendix A where the impact on private and public sector administrative costs of changes in decision making technology is discussed. The Appendix describes the extent of the social benefits potentially arising as a result of a move away from more traditional technologies to electronic RBT. That benefit is greater where:

- the reduced recurrent costs associated with rulebase technologies will continue well into the future;

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

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

- the costs of inaccuracy are high;

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

- relevant private sector time costs are less than public employee wages and the introduction of RBT 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 levels of logical or factual complexity in the rule set are high;

- the degree of integration of RBT into all stages of the policy cycle is highest; and

- the extent to which public and private sector procedures are re-designed to best incorporate RBT is large.

The organisational 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 and current costs of error rectification will generally be ignored. Such a failure will result in a lower than optimal adoption of LRT.

The possibility of a four-fold 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 comprise 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. Generally, these 'calculators' will have been very carefully verified. There can be multiple versions of the text, and this can present problems. There are certainly multiple intellectual models among the agency staff using 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 that 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, the possibility exists for many agency processes to be substantially improved. Staff share a consistent point of reference which is currently lacking and an accessible model that they can each rely on and contribute to. In addition, the electronic model is capable of all sorts of functions that the current media are unable provide. The creation of such a model, a legislative rulebase, enables an agency to integrate these functions in a way that has previously been unimaginable. The potential scale of improvement 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.

3.5 Benefits of rulebase technology

Despite its broad adoption in Australia in recent years (ARC, 2003), there is little publicly available material concerning the investment return on LRT projects. Information will often only become publicly available through an ANAO report. Understandably, agencies are reluctant to measure or publicise levels of inaccuracy. Pender and Johnson (1996) assessed the benefits of the introduction of RBT at DVA based on figures extracted from the auditor-general's report (ANAO 1996a). They concluded:

> 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 (Pender and Johnson 1996).

In many circumstances the choice of technology will not influence public sector revenue or expenditure aside from administrative costs. However if RBT 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.

3.6 Rulebase technology and equity and social justice

Rawlsian justice

As discussed in Rawls (1971, pp. 206-213) and re-iterated in Section 1.5 above, the rule of law is a vital part of a just society. RBT reduces the cost of a significant extension of the rule of law. For example, in the absence of the use of RBT in social security administration, persons both successfully and unsuccessfully seeking a benefit typically cannot be referred to the legal reasoning supporting the decision taken. Often these decisions are taken by individuals referring to manuals and using 'business rules' with tenuous links to the precise terms of the law. By contrast, if RBT is used with an accurate rulebase, a legal argument verifying every decision taken can readily be produced. No decision is reached without such an argument having been constructed at least electronically. It will make little difference to the majority of applicants which technology is chosen. However, in the Rawlsian justice thought experiment, the position of the worst off has to be considered. Those people will suffer serious adverse consequences when incorrect decisions are taken by administrative staff using systems which poorly reflect the terms of the law.

In situations where the cost to the individual of inaccurate determination is severe or punitive, the Rawlsian justice arguments for the introduction of RBT 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; and

- inaccuracy stems either from logical complexity, a circumstance which RBT can substantially ameliorate, or it stems from those kinds of factual complexity which RBT can also ameliorate.

The situations in which RBT will reduce the consequences of inaccuracy where factual complexity is concerned include those where:

- public sector staff involved in traditional determination practise illegal, statistical discrimination based, for example, on race or gender;

- the sheer breadth of factual issues strains the capacity of staff given the time provided. This is a significant issue. When making an assessment of Centrelink's administration of age pension payments, the ANAO observed that 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); and

- 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 RBT will be of little benefit in dealing with factual complexity. They include situations where:

- factual circumstances are difficult to verify and have a straightforward influence on obligations and entitlements; and

- 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. Alternatively, it can unwittingly improve equity, for example low-income social security beneficiaries may receive payments they are not entitled to because administrative staff members have misunderstood the requirements of the law. They can, of course, also miss out on entitlements. RBT could be used to deal with vertical issues at potentially finer levels of 'granularity' than traditional approaches. To date this 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 have been a significant motive for the introduction of LRT. More significant than specific inequities will be the frequent adverse impact on administrative costs stemming from a loss of goodwill. There is insufficient experience with LRT applications to assess their impact on goodwill. Although it reduces the cost of complexity, LRT may serve to increase its visibility and so increase resentment at the complexity of the underlying rules.

3.7 Conclusion

RBT is a relatively new IT technology which has the capacity to reduce significantly the public sector administrative costs of dealing with legislative complexity, given a requirement to achieve a certain level of accuracy. RBT and business rule engines (BREs) are being introduced in the private sector with the analogous motivations of reducing costs or improving accuracy. Although the potential reductions in public sector administrative costs should be sufficient motivation for the introduction of RBT, it also

has the capacity to further the achievement of other public sector objectives, for example Rawlsian justice and equity, particularly horizontal equity objectives. Despite its potential to achieve cheaper and finer targeting of expenditure beneficiaries or revenue payers, this objective has not, to date, been a significant factor when considering RBT. Neither have the potential economic efficiency benefits arising from increased certainty in the application of law to individual situations but both may become more important factors in the future.

4. 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' (Manning 1997). Manning saw hyperlexis as an American disease. Since that article the pace of gazettal of law appears to have increased in Australia and Manning's observation of the problems caused by hyperlexis have become relevant here. Much criticism of complex voluminous law has ensued, but little has been proposed in the way of concrete solutions. Academic consideration of this issue has been fairly minimal and largely limited to tax considerations. 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 increased attention being focused on the issue of complexity. First, 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 alarming. If these audits continue, it will be possible to conduct analyses of the causal links between complexity in the rules being administered and the observed levels of accuracy. The second development has been the emergence of a class of IT product, LRT, which can automate the process of determining the applicability of a set of rules to a given set of circumstances.

These developments are the motivation for this paper. Section 1 described the four fundamental criteria used to assess public policy – the impact on economic efficiency, public and private administrative costs, net government expenditure and the pursuit of equity and social justice. It discussed the absence of metrics for measuring the extent of policy complexity and the impact of complexity on three intermediate criteria – citizen goodwill, accuracy and compliance with administrative law values.

Section 2 described recent trends in legislative complexity and summarised the growing number of reports which explore the accuracy of administrative procedures. It examined a voluminous body of literature dealing with the trade-offs facing a policy maker attempting to reduce government expenditure, minimise the impact of policy on economic efficiency and achieve social justice and equity aims. By contrast, there is a marked absence of literature describing the impact of increased complexity on administrative costs and, through its adverse impact on citizen goodwill, compliance with administrative law values and accuracy, the other three fundamental criteria. The second part of Section 2 dealt with such interrelationships.

Section 3 explored, as an example, complexity in income tax. The last section discussed the tool LRT which has the capacity to reduce significantly the cost of complexity and alter materially the terms of the trade-offs between the four ultimate policy objectives and criteria.

Over the next two decades it is likely that the developments discussed in the paper 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. It is also likely that a re-think of policy design will happen in many areas for two reasons. First, the developments will result in a focus of attention on the costs of complexity which go beyond administrative costs, for example the 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, complexity will increase. Alternatively it may crystallise the true cost burden of adequately dealing with complexity and so become a force for decreased complexity.

Australia, like all developed countries, relies on the administration of tax, social security and other laws to achieve a wide range of social, economic and environmental objectives. Complexity has become a significant source of interference with the delivery of these objectives and thus it now poses an important policy problem. There are two basic approaches policy makers can take to dealing with this issue. They can stop making laws more complex, although, in order to achieve that end, it is likely that better methods of signalling the costs of complexity need to be developed. The alternative approach is technological. RBT can significantly reduce the administrative costs of achieving required levels of accuracy for a given level of complexity. It can also mitigate the adverse impact of complexity on the achievement of other policy objectives.

Appendix A Determinants of the administrative cost burden

This appendix describes algebraically the administrative cost burden of a particular set of rules. The 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 rule base, for example the number of rules and their logical complexity. In order to describe these factors more appropriately, 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 determine, in a costless and perfect manner, 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; and

- multiple, apparently equally valid, applications resulting in indeterminacy.

The appendix is split into two sections: the first deals with the characteristics of the rule base, the second with the determinants of administrative cost.

A1   Characteristics of the rule base

The algebra below models a rule base as a network.

Let:

N = number of rules in rule base

$j < N$ = number 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 the 'omniscient justice machine'

m = number of arguments in V

v = average number of rules in the arguments in the set V

$v = ?\ _i^m\ _{=1}\ d(a_i)$ where a is an argument in V, $d(a_i)$ is number 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)
$$+ \quad - \quad + \quad +$$

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 = Cl = 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 number of links as a fraction of the maximum feasible then Cl = av Cl_r over all rules (see Watts and 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 merely connected.

OS = measure of extent to which rule base is overstrung, i.e. linked by more than the natural number necessary to join all rules in a network. Thus

OS = h/ln(n-j)

where h = actual number of links and ln(n-j) is the number necessary to ensure a random graph is connected.

A2   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.

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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), per cent

T = degree of implementation of rulebased technology (per cent), at the one extreme T = 0 (traditional) at the other T = 100 per cent (complete electronic rulebase implementation)

d = discount rate, per cent per annum.

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) [g2p not yet defined] are considerably higher with traditional rather than RBT. RBT assists citizens and public sector staff to deal with logical and factual complexity. On the other hand, capital costs K for a given level of accuracy are typically higher with RBT. 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 e.g. 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.

$$r = S \sum_{?=1}^{m} p(a_?)d(a_?) \tag{3}$$

Where:

$p(a_?) = $ probability of use of valid argument $a_?$

[d (ai) not defined]

For given A and T, p and g vary with rule base complexity (RBC), i.e. logical complexity (LC) and factual complexity (FC).

$$RBC = RBC\ (\ LC,\ FC\ ) \tag{4}$$

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 to technology, training, logical and factual complexity and so on.

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