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**Performance Measures and Resource Allocation:
The Behavioural Consequences of the
University Research Assessment Exercise in England.**

by

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**A thesis submitted in partial fulfilment of the requirement for the degree of
Doctor of Philosophy in Industrial and Business Studies**

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Glossary Of Terms And Abbreviations.

BMS	Business and Management
CATREG	Categorical Regression with Optimal Scaling
Dept.	Department
Eng.	Engineering
FTE	Full Time Equivalent
HEFCE	Higher Education Funding Council for England
HEI	Higher Education Institution
Institution type	Whether old or new university
NPM	New Public Management
New university	A university previously funded by the Polytechnics and Colleges Funding Council (an ex-polytechnic).
Old university	A university previously funded by the University Grants Committee
PCFC	Polytechnics and Colleges Funding Council
RAE	Research Assessment Exercise.
TQA	Teaching Quality Assessment
UoA	Unit of Assessment
UGC	University Grants Committee
Quite active	Used in the English sense of meaning moderate, rather than the American sense of meaning very.
VC	Vice Chancellor
Vote	Total amount of funds allocated to a discipline area.

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Declaration

This thesis is my own work and has not been submitted, in full or in part, for any other degree at another university.

A significant part of the thesis has been published or accepted for publication in academic journals. In addition to the papers published in academic journals, parts of this thesis have also been presented in academic conferences and seminars. These papers are listed below.

PUBLICATIONS FROM THESIS.

Published Journal Papers.

1. Talib, A (1999), "Simulations of the Submission Decision in the Research Assessment Exercise: The "Who" and "Where" Decision.", Education Economics, Vol. 7 (1) pp 39-51.
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5. “Performance Measurement for Non Profit Organisations: The case for using Data Envelopment Analysis in University Performance”, EIASM International Conference on Accounting, Auditing & Management in Public Sector Reforms, Zaragoza, Spain, September 7-10, 2000.
6. “Behavioural consequences of an outcome control imposed in a self-control environment: a study on the Research Assessment Exercise”, 12th Asian Pacific conference on International Accounting Issues, October 21-24, 2000, Beijing China.

Abstract

This dissertation analyses the research funding resource allocation mechanism (the Research Assessment Exercise) in England to assess its viability as a resource allocation tool and a performance control measure, to form a view on both the internal consistency of the exercise and to explore possible unintended consequences.

Case study interviews were carried out with university administrators to investigate the institutional impact. The academics' behaviour was researched by a questionnaire survey. A survey of journal editors was also carried out. Logistic regression was applied to the survey of academics to analyse the data.

The RAE has resulted in a "publication culture", where academics are concentrating on research that produces early publishable results and a tendency to publish as many papers, as possible, from the same research project.

The impact of the RAE on academics was not independent of their characteristics. The level of self-assessed research activity was a significant predictor variable. The 'middle-tier' academics were the most influenced by the RAE "four-paper" effect.

Overall, the RAE lacked coherence and consistency as a resource allocation methodology, and had unintended consequences as a performance measure.

CHAPTER ONE
INTRODUCTION

PERFORMANCE MEASURES AND RESOURCE ALLOCATION: THE BEHAVIOURAL CONSEQUENCES OF THE UNIVERSITY RESEARCH ASSESSMENT EXERCISE IN ENGLAND

CHAPTER ONE

1.1 INTRODUCTION

The purpose of this thesis is to analyse the research funding resource allocation mechanism (the Research Assessment Exercise) in England¹ for its efficacy as a resource allocation tool and a performance evaluation measure from the perspectives of the relevant stakeholders. The analysis relies on the underlying concepts and theories of resource allocation and performance evaluation from economics, accounting and management literature. This thesis examines the Research Assessment Exercise (RAE) for its internal consistency, and explores any incongruity and consequences that have arisen and could arise.

An important public policy issue is the funding and support of scholarship and scientific enquiry. Across nations, there is some diversity in the form in which this policy is implemented. A key issue is the extent to which research is supported through universities, as opposed to being supported through research institutions independent of universities. The support of research through

¹ Though all UK universities are subject to the Research Assessment Exercise, different funding quantum and funding implications would arise depending on which part of the UK a university is located in. There is a separate funding body for each of the four nations in the UK. This thesis examines the English RAE.

universities leads to further key questions, namely how much funding should be provided and, crucially, which mechanism should be used for allocating the funds, and what are the possible consequences (intended and unintended) of any implemented allocation mechanism.

Public funds for research in England are provided under the dual support system. The Higher Education Funding Council for England (HEFCE) contributes to the salaries of permanent academic staff, premises and central computing costs largely according to a set of formulae. The Research Councils provide for direct project costs and make a contribution to indirect costs largely in response to competition between research proposals. Research Council funding is tied to specific projects unlike the funds provided by HEFCE for research, which is distributed as a block grant and Universities are free to distribute internally as they see fit. The formula for the HEFCE “research grant” is a function of the quality of the research undertaken (as measured by the RAE) and the volume (largely the number of submitted research active staff) for each Unit of Assessment (UoA), i.e., subject area².

1.2 MOTIVATION FOR STUDY

Over the past two decades, there have been significant developments in the management of funds for higher education. Australia and South Africa, for example, have introduced methodologies for the allocation of resources that differ markedly from the RAE, while Hong Kong has a similar allocation device as the RAE.

² A detailed description of the funding process is in Chapter Four.

This is the ‘ripple’ effect of public policies. It is a widely held view by comparative policy analysts that policymakers draw considerable inspiration from the action of their counterparts in other jurisdictions (Bennett 1997). When policy decision-makers are confronted with the need to solve a problem, there is a tendency to search for ready-made solutions adopted in other jurisdictions (Rose 1993). The RAE is (potentially) a “ready-made” solution for resource allocation in the higher education sector of other jurisdictions. Indeed, in an interview with the author, the HEFCE confirmed that a number of countries have inquired about the workings of the RAE. This thesis could prove useful to policy makers in other jurisdictions considering adopting the RAE with view to improvement.

‘New Public Management’ emphasizes the importance of accountability and performance evaluation. Performance indicators have become fashionable in the public sector as, in theory, it provides the opportunity for government to retain firm control over departments by exercising a strategy of “hands-off” rather than “hands-on” control (Carter 1994). Universities can be regarded as public institutions because they serve the public through teaching, research and other services, and their management may be regarded as public administration because public revenues primarily fund them. As universities provide distinct and partially fee-based services, university practices should offer insight into the use of performance models associated with the new public management (Harris 1998). Thus, one motivation for this thesis is to explore the use of performance models and goal setting in universities as a means for gaining insight into the use

of similar performance approaches in the broader context of the new public management.

The use of the university setting is also to highlight the contingency theory aspect that the control designs will “fit” organisations but not others. The contingency factors influencing the “fit” will differ between the different public administration organisations, and care needs to be taken in imposing a standard new public management approach “across the board”. Early researchers using contingency theory have emphasized the need for research regarding the influence of contextual variables on the effective design of Management Accounting Systems (MAS) (e.g. Waterhouse and Tiessen, 1978). The adoption of contingency theory in management accounting is based on the belief that there is a need to identify situations where specific control designs would fit some organisational and environmental features better than others. Major contingency variables that have been studied for their effects on the “fit” between MAS design and managerial performance include perceived environmental uncertainty, task uncertainty, societal cultural values, technological complexity, organisational structure and organisational strategy (for example see Abernethy and Guthrie, 1994; Ouchi 1979, 1980; Mia and Chenhall, 1994; Chong, 1996; Kirsch, 1996; Otley, 1980). It is useful to investigate if the RAE is an appropriate management control tool for the university environment, and if personal characteristics of academics have any bearing on the behavioural consequences.

Furthermore, the RAE is a resource allocation mechanism with research performance measures as the basis for the allocations. The RAE can be viewed

as a management control tool, though it is more aptly described as an outcome control. According to the Kirsch model³, academics apply “self-control”. The RAE and academics provide an interesting subject area to investigate the behavioural implications of imposing an outcome control in an environment that is more suited to self-control.

Universities have a long tradition of academic freedom and autonomy. The RAE is a budget allocation compromise between autonomy and accountability. The contradiction in formula based allocation of funds in the higher education sector is, on the one hand, to achieve accountability for public funds (in that they are applied *efficiently* to achieve national policies and goals), but at the same time to maintain academic freedom and autonomy for universities to set their own priorities. Has the RAE been successful in steering universities towards achieving national goals?

After the McNay (1997) study on the impact of the 1992 RAE, the HEFCE expressed concerns about the cumulative effect of successive exercises (HEFCE M 6/97):

“it would be sensible, therefore, if the RAE is repeated, to continue monitoring effects and take steps to mitigate negative effects”
(HEFCE M 6/97, 1997: p. 23).

It is timely to undertake this thesis as institutions and academics are more familiar and have intimate experiences with the RAE for which the impacts and effects can now be measured, understood and critiqued.

³ See Chapter Two for details of the model.

1.3 RELEVANCE OF THESIS

As a budgeting tool, the RAE allocates resources on the basis of centrally assessed research performance. The research performance Units of Assessment (UoA) is measured by the quality of the research output of the staff in the unit. Therefore, the RAE is viewed by the academic staff as a performance measurement and management control device, although a partial one, because it takes into account only the research aspects of the job and not the teaching duties. For this reason, RAE is regarded as an output control apparatus. The RAE as a performance measure mechanism or a management control tool raises two issues. The first is traced to Goodhart's Law (Goodhart, 1975), which suggests that once a performance indicator is identified, those whose performance is being evaluated will seek to improve his⁴ position on just those indicator(s) that have been revealed, most often at the expense of the unmeasured activities. The second issue pertains to the control of professionals and how the RAE fits as an outcome control imposed on academics vis-à-vis the Ouchi and the Kirsch models of control.

There has been an increased interest in the widespread dissemination of outcome performance data to secure enhanced strategic control of public sector organisations. Much energy has been expended on the development of outcome-related performance measures in the public sector, although the behavioural impact of such measures has not been widely researched (Smith, 1993). Nevertheless, the literature is replete with studies of the impact of performance measures and of the potentially resultant dysfunctional behaviour in the private

⁴ For ease of expression, the male gender also refers to the other.

sector (e.g., Hartmann, 2000; Briers and Hirst, 1990; Merchant, 1998; Van der Stede, 2000; Otley, 1978; Laverty, 1996). This thesis examines if such behavioural distortion from performance measures is applicable to the higher education sectors.

Furthermore, the RAE is an incomplete budgeting tool. The budget allocation is determined by the research performance of the UoA, typically the departments within a university. The department's research performance is practically the aggregation of the research performance of the academic staff in that department. The budget is allocated to the university as a block grant. There is no requirement that the budget is internally distributed in accordance with the methodology in which it is earned. This is partially to preserve the university autonomy in setting its own priorities. This inconsistency between the earning of the resources and the internal distribution of the resources means it is not necessarily that the person or unit whose performance is measured is directly rewarded for it. The disparity between performance measures and direct rewards warrants a study of the behavioural implications of RAE.

Overall, the findings and discussion in this thesis could prove to be useful to policymakers in England and elsewhere, and to researchers on performance measures and management control, and formula based budget allocations.

1.4 ORGANISATION OF THE THESIS

This thesis examines the differential impacts and consequences the RAE has on the various stakeholders such as policymakers, tertiary education institutions,

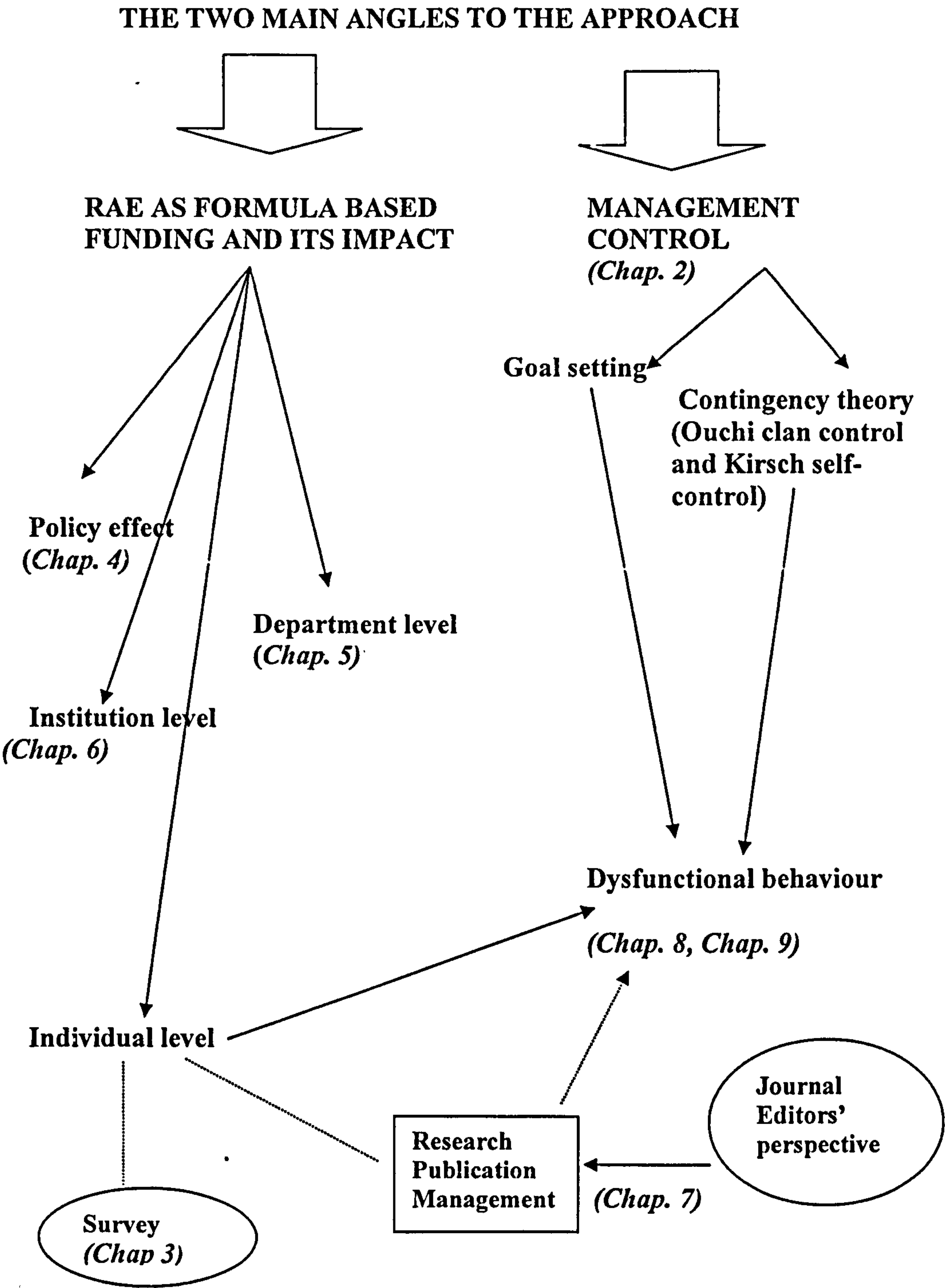
academics, and journal editors⁵. Apart from investigating the (general) impact and consequences of the RAE on the different stakeholders, we also adopt a management control perspective on the RAE. Hence, the thesis is based on two inter-locking foundations. The first is RAE and its impact. The other is viewing the RAE in light of management control and goal setting literature. The study approach adopted is summarised in Figure 1.1.

Chapter Two reviews the literature on motivation, goal setting and management control – particularly the Ouchi ‘clan control’ and Kirsch’s ‘self control’ models. They help to frame the reactions of tertiary institutions and academics to the RAE. The research design, survey methodology, research questions and hypotheses, and format for the empirical analysis are presented in Chapter Three.

In Chapter Four, the historical background of the RAE provides the setting for the thesis. The historical background is crucial in appreciating that the RAE was (partly) introduced as a result of funding constraints decided upon by the government. Chapter Four also discusses the national policies and goals expected of the RAE.

⁵ Other stakeholders not directly addressed in this thesis include research institutions, industry, students, particularly research students, and the general public.

FIGURE 1.1: THE STUDY’S APPROACH



Chapter Five analyses the submission of strategies available to the departments and develops a maximisation model. Some illustrative data are applied to a simulation to show the anomalies in the value per point and to highlight the “choice of panel” decision.

With findings from case studies, Chapter Six investigates the RAE consequences on institutional behaviour. The interview sample includes “old” and “new” universities to extract the different strategies that each group adopts and the associated behavioural changes due to the RAE.

Given that journal editors are in a unique position to assess the impact the RAE had on publications and its management, Chapter Seven reports and interprets the survey of journal editors for their views and reactions on (1) publication quantity and quality, (2) the management of publications by academics, (3) the refereeing process, and (4) proliferation of journals.

Chapter Eight and Chapter Nine report and analyse the findings of the survey of academics. As the RAE focuses on research activities and requires the measurement of a scholar’s research performance, it has induced behavioural changes including gaming and shunning of activities that have little or no bearing on the RAE rating. Chapter Eight also compares some of these findings to the McNay study (1997). In Chapter Nine, the survey responses are classified into distinct groups of subjects, based on personal characteristics of the respondents. The last chapter, Chapter Ten, summarises the key findings, draws some significant conclusions, and provides some suggestions for future research.

1.5 CONCLUSION

The management of research output is a significant consequence of the RAE. The most noticeable consequence is the rush to publish just prior to the RAE deadline, resulting in premature attempts at publishing. The RAE has shifted the research focus to research output publication. This has resulted in academics concentrating on research that produces early publishable results, and avoiding projects that will take a long time to complete. There also is a tendency to publish as many papers as possible from the same research project.

The impact of the RAE on academics was not independent of their characteristics. The thesis' result findings indicate that the younger academics were adopting more dysfunctional behaviours as a result of RAE. The level of self-assessed research activity was also a significant predictor variable. The average researcher was the most influenced by the RAE to practise gaming. Academics' age group, department RAE ratings and experience were also significant characteristics influencing gaming practices.

Overall, the RAE lacked coherence and consistency as a resource allocation methodology, and had unintended consequences as a performance measure. The results and findings are detailed in the body of the thesis and are discussed briefly in the final chapter.

List of Research Procedures Adopted:

The following are the procedures undertaken in this study, listed under the chapter number.

Chapter 2:

1. A review of the management control literature.
2. A review of the motivation theories with emphasis on goal setting theory.
3. A review of the RAE literature.

Chapter 3:

4. The survey design and methodology explained.
5. The econometric (logit regression) model explained.

Chapter 4:

6. RAE analysed from a policy perspective and formula based funding reviewed.
7. Outcome of RAE 1996 analysed for BMS UoA to investigate if policy objectives are reflected.
8. The “ceiling effect” analysed.

Chapter 5:

9. RAE submission strategies modelled into a maximisation formula.
10. Submission strategies analysed including the value per point effect.
11. Value of mentor researchers assessed.

Chapter 6:

12. Impact of RAE on institutions investigated by case study approach.
13. Interviews with university administrators conducted to investigate impact of RAE on strategies adopted by universities.

Chapter 7:

14. Perspective of journal editors investigated by a survey.
15. Survey results analysed.
16. Survey of editors compared with academics' survey, for collaborative evidence.

Chapter 8:

17. The academics survey descriptive results were presented and analysed.
18. Sample size was explained and comparing mean responses of late returns with the rest of returns tested non-response bias.
19. The independence and association of the response variables and the characteristic variables were tested.
20. The survey results were compared with the results of the McNay study.

Chapter 9:

21. We classified the respondents into groups based on the characteristics of the respondent and applied ANOVA to test if the response means of the groups were significantly different.
22. We then tested the extent of the impact of RAE on behaviour changes. Three levels of impact were defined based on significance of proportion of respondents agreeing to behaviour changes.

23. We developed a model for predicting behaviour response, with the individual characteristics as predictor variables. CATREG was applied and results presented.
24. The results of the association measures, ANOVA and CATREG were compared.
25. Responses were collapsed into dichotomous variables and logistic regression applied.
26. Factor analysis was applied to test validity of the measure constructs.
27. Reliability was tested by cronbach measure.
28. Logistic regression model was tested.

Chapter 10:

29. The study findings and conclusions are discussed in this chapter.

CHAPTER TWO
THE MANAGEMENT CONTROL PERSPECTIVE

CHAPTER TWO

THE MANAGEMENT CONTROL PERSPECTIVE

2.1 INTRODUCTION

This chapter draws on motivational, behavioural, management control, clan control, self control and goal-setting theories and research to frame the role and effects of the Research Assessment Exercise (RAE) and other consequences brought about by the exercise. This chapter highlights the motivational and behavioural effects the Research Assessment Exercise might induce on academics.

2.2 CONTROL AND THE RESEARCH ASSESSMENT EXERCISE

Researchers and practitioners have long recognised the benefits and need for control mechanisms to help steer organisations in their goal seeking activities. Control Theory and Goal Congruence are attempts to explain how one person or group in an organisation can ensure that another person or group collaborate toward common organisational goals. Whereas management control is the process by which managers influence other organisational members to implement the company's strategies, control systems refer to measurement systems that influence behaviour of members whose activities are being measured. A perennial concern in the design of control systems has been if the induced behaviour is consistent with the company strategy. In this research, the interest is to analyse the behavioural consequences of control systems. This arises from the idea that in exercising control over a person or group, the

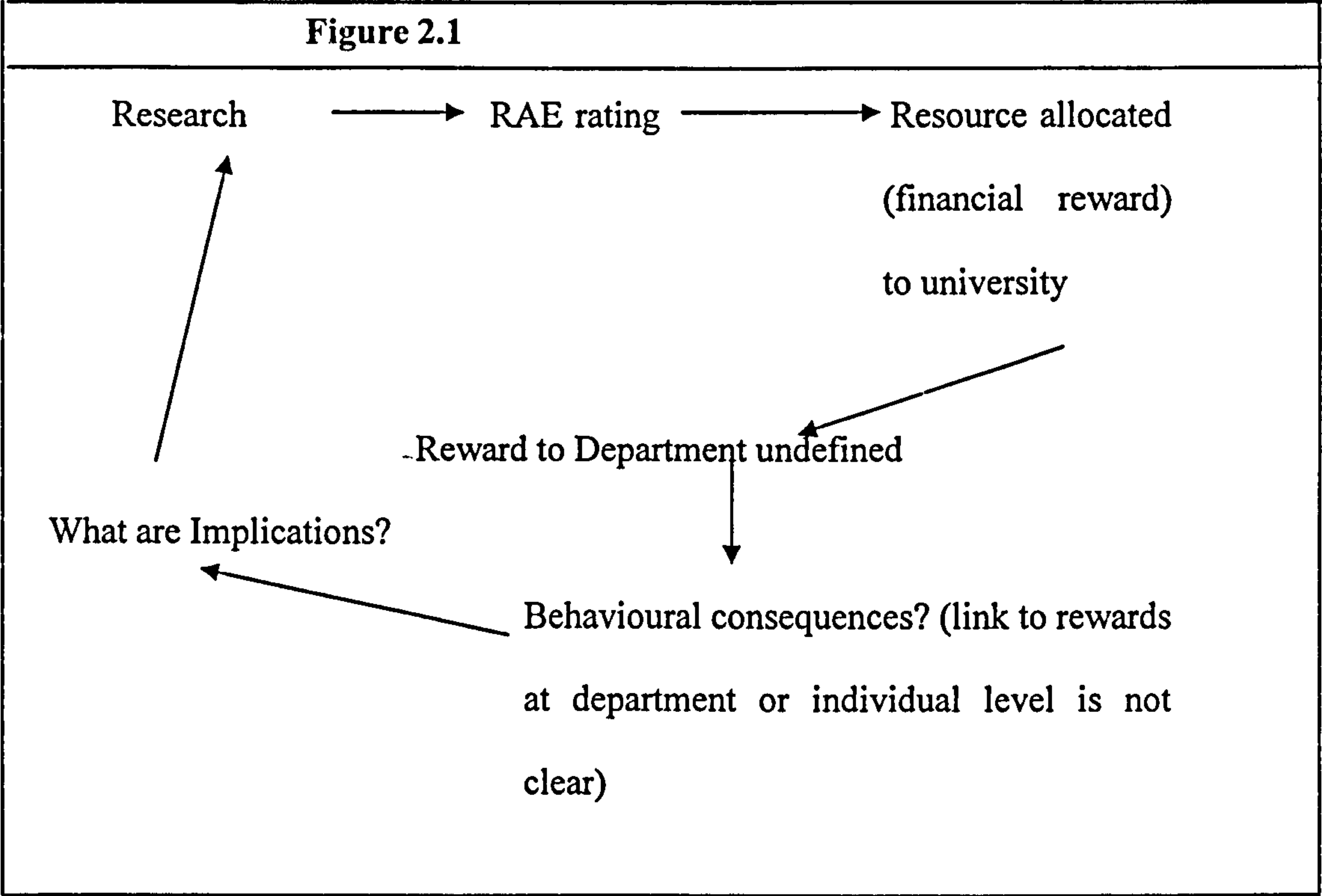
controller is taking some action in order to regulate or adjust the behaviour of the subjects (Kirsch, 1996).

Empirical research has shown that task characteristics and organisational environments influence the types of organisational controls. The modes of control have been identified as behavioural, outcome, clan and self. Kirsch (1996) has integrated the different theorisations to predict the circumstances under which each type of control would be chosen.

The control procedures and processes of complex organisational tasks are issues and problems in organisational theory that are not well understood (Flamholtz *et al*, 1985; Merchant, 1988; Snell, 1992). In the case of the management and organisation of research staff responsible for scientific and academic activities, these concerns are amplified as their endeavours result in outcomes that are non-routine, creative and often non-predictive. In this respect, the Research Assessment Exercise (RAE) represents a management control process installed by the funding council in order to *regulate or adjust the behaviour* of academics (*i.e.*, the controlled), thereby presenting an excellent case to demonstrate the difficulties and issues associated with structuring control mechanisms for complex tasks.

The RAE can be regarded as serving two purposes, *viz.*, as a management control tool for performance evaluation, and as a device for resource allocation where higher allocations are given to the universities with superior performances. In a sense the RAE can be viewed as merely a resource allocation defence

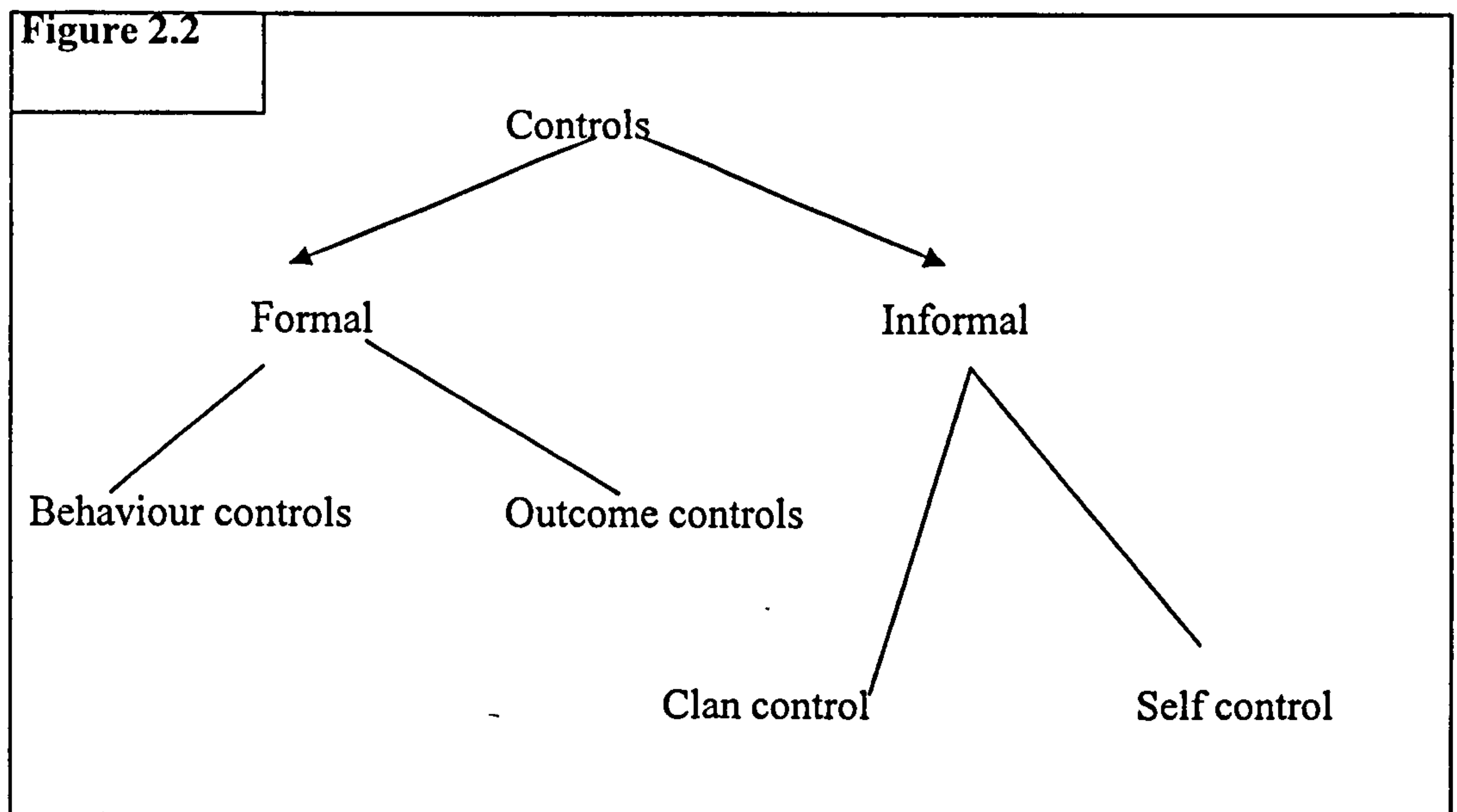
mechanism; which can allocate funding cuts “objectively” so as to neutralise contention (a surrogate for policy judgements). As the RAE seems to be an incomplete resource allocation mechanism, it provides the opportunity for an investigation. Figure 2.1 shows the research assessment and funding process for which this thesis investigates the behavioural consequences of the RAE and the implications for scholarly activities and output.



2.3 FORMAL AND INFORMAL CONTROLS

The two broad categories of control in the organisational literature are *formal* and *informal*. Among the widely researched types of formal controls are *behaviour-based* and *outcome-based* (see Thompson, 1967; Ouchi 1979). Formal controls tend to focus on performance evaluation strategies where behaviours or outcomes are measured, evaluated and rewarded (Eisenhardt 1985). In Ouchi’s

conceptualisation, the choice of a control strategy would depend on ‘knowledge of the transformation process’ and ‘the ability to measure outputs’. The Ouchi model is described in detail in the next section.



One type of informal control is to use *clans* to control behaviours of individuals by combining the effects of selection processes and social mechanisms (Ouchi, 1979). A clan is any group of individuals, such as a profession or a labour union, with common goals and who are dependent on one another. When knowledge of the transformation process is imperfect and outcomes are difficult to measure, then it is likely that clan control would be instituted (Ouchi, 1979). For instance, in the case of a research lab where it would be difficult to require the precise behaviours that, if followed, would lead to scientific breakthroughs, and where it would difficult to identify outcomes that provide meaningful or timely

measurements of the scientists' works, the alternative to organisational control is to institute clan control by the systematic selection of individuals with desired professional training, socialization of members to goals and values of the clan (*i.e.*, group or organization), and rewarding contributions in clan-approved rituals such as, in the case of the academic community, participation at conferences and publication of articles.

A second type of informal control is *self-control*. This concept is consistent with self-management wherein an individual sets his own goals, monitors his own work, and rewards or sanctions himself in a meaningful way (Manz *et al*, 1987; Erez and Kanfer, 1983). While the key to clan control is the selection and socialisation process, the impetus for appropriate behaviour for self-control is the individual's role objectives and standards (Jaworski, 1988). Such self-control are appropriate for tasks that demand a high amount of autonomy, creativity, or intellectual activities that would make it difficult for controllers to identify and enforce the desired behaviours (Greenberger and Strasser, 1986).

The characteristics of the four modes of control identified in the literature are summarised in Table 2.1.

TABLE 2.1: Characteristics of four modes of control.	
Behaviour:	Behaviours that transform inputs to outputs are known. Controller monitors and evaluates controllee's behaviours Explicit link exists between extrinsic rewards and following behaviours.
Outcome:	Desired task outcomes are known and measurable. Controller evaluates whether outcomes were met. Explicit link exists between extrinsic rewards and producing outcomes.
Clan:	Task-related behaviours and outcomes are not pre-specified. Goals are determined by clan and evolve during the task period. Clan identifies and reinforces acceptable behaviour. Rewards are based on acting in accordance with clan's values and attitudes. Shared experiences, values, and beliefs among the clan members. Members exhibit strong commitment to the clan.
Self:	Controllee sets own task goals and procedures. Controllee is intrinsically motivated. Controllee engages in self-monitoring and self-evaluation. Rewards are based partly on Controllee ability to self manage.

(Source: Kirsch (1996) p 4.)

2.4. OUCHI'S FRAMEWORK FOR ORGANISATIONAL CONTROL

A significant issue that has a direct impact on the management control environment is the task and/or process that the manager is expected to perform (Ouchi 1979). Thompson and Tuden (1959) produced a model for decision making based on "beliefs about outcomes" and "beliefs about objectives".

(Table 2.2)

<u>Table 2.2</u>		<i>Preferences about possible outcomes</i>	
		<i>Certain</i>	<i>uncertain</i>
<i>Beliefs about objectives</i>	<i>Certain</i>	decision by computation (1)	decision by compromise (2)
	<i>uncertain</i>	decision by judgement (3)	decision by inspiration (4)

From Thompson & Tuden’s concern with the interconnections among our beliefs about goals, process and the approach to decision making, Perrow (1970) turns the focus from the intersection of the elements of management to the task itself. Perrow argues that the organisation’s response to the planning and control process is related to (1) the extent to which the task is analysable and (2) the degree to which the activities in the process are homogenous among different performance of the task (which he calls exceptions). This is shown in Table 2.3.

Table 2.3

	Few exceptions	Many exceptions
High analysability	Routine (1)	Engineering (2)
Low analysability	Craft (3)	Non-routine (4)

Viewed together, Thompson & Tuden and Perrow suggest a relationship between task and control. Ouchi took these models further to develop his model concerned with control processes rather than decision process.

Ouchi (1979, 1980) classified modes of organisational control along two dimensions: (i) the extent of ambiguity in output measurement and (ii) the extent of knowledge of the transformation process. He invoked a transactions-cost perspective, according to which the attributes of different control modes with respect to the above two dimensions determine their relative efficiency. Efficiency is measured in terms of minimisation of transaction costs. In the transaction-costs approach, the organisation is treated as a network of exchanges, which should be regulated by control modes in the most economic manner. Different control modes have different characteristics, which are associated with costs arising from the structure of property rights in organisations. Equity, or reciprocity, in the terms of exchange between the parties involved is a fundamental notion. Transaction costs are intertwined with reciprocity. These costs arise when the goods or services to be exchanged do not lend themselves to easy and precise evaluation. To preserve equity in such cases, experts (third parties) tend to be called upon to value the goods or services subject to exchange. This leads to greater transaction costs. This is manifest in the RAE panels. This high transaction cost can be a deterrent for less developed nations to implement a similar research assessment exercise (Lim 1999).

Three fundamentally different mechanisms for control predominate in the organisation literature: markets, bureaucracies or hierarchies, and clans (Ouchi,

1979). The market mechanism handles control issues through its ability to measure and reward individual contributions. Bureaucracies rely on a combination of close evaluation and the socialised acceptance of common objectives. The clan mechanism operates through a socialisation process that effectively eliminates goal incongruence among individuals. These three approaches can be distinguished along two dimensions: underlying normative and informational requirements. Normative requirements refer to the basic social agreements shared by the exchange parties in order to minimise transaction costs. Table 2.4 summarises the normative and informational requirements necessary to operate each control mode.

TABLE 2.4: TYPE OF CONTROL

TYPE OF CONTROL	SOCIAL REQUIREMENT	INFORMATION REQUIREMENT
Market	Norm of Reciprocity	Prices
Bureaucracy	Norm of Reciprocity Legitimate Authority	Rules
Clan	Norm of Reciprocity Legitimate Authority Shared Values & Beliefs	Traditions

The social requirements refer to the set of agreements between people which form the basis for control. Reciprocity engenders equity and fairness in exchange, and if widely held would result in minimising transaction costs. A market control cannot exist without a norm of reciprocity, but it requires no social agreements beyond that. In an arms-length transaction, the reciprocity norm assures that if one party attempts to cheat the other, then the cheater, if discovered, would be punished not just by the victim and his partners, but also by

all members of the social system. Thus, the severity of the punishment would exceed the damage, effectively deterring future cheaters. If honesty cannot be taken for granted in market transactions, then to avoid being cheated, each party has to incur the high combined costs of surveillance, complete contracting and enforcement. These costs can amount to an extent that the market control mode fails. The RAE appears to be an attempt to create a “quasi market” for research activity and output, but trying to establish a market mechanism with “enforced” pricing by creating an artificial quasi market does not seem appropriate for academic research.

When markets fail or are not suitable, the bureaucratic or hierarchical form of control is often adopted. In addition to the reciprocity norm, this mechanism requires an agreement or understanding on the superior’s legitimate authority, ordinarily of the legal-rational structure. The employee relinquishes autonomy and freedom in some areas to his superiors thus permitting them to direct his work and monitor his performance. This is possible only if employees accept the legitimate right of their superiors to command, audit and monitor them.

The clan mode of control requires not only the norm of reciprocity and the concept of legitimate authority (mostly of the “traditional” rather than “legal/rational” form); but also social agreements on a broad range of values and beliefs. Although a clan does not have the semblance of the explicit price mechanism of the market or the explicit rules of the bureaucracy, this approach of control implies an intimate level understanding among members on what constitutes acceptable behaviour. It requires a high level of commitment on

every member to the socially prescribed behaviours, and can be an effective means of eliciting the appropriate behaviours. For professionals and academic researchers, the clan control can be a useful device. In fact, the internal staff development and training programs, and to a large extent university PhD programmes, achieve or introduce a relatively high degree of indoctrination to the organization and its culture.

The clan mode of control is similar to the tribal code of practice and the concept of *assabiyah* developed by the Arab scholar Ibn Khaldoun (AD 1332-1406). Derived from the Arabic root word *asab*, which means “to bind,” *assabiyah* refers to the force which binds humans in their group life. It instils a sense of solidarity among group members based on the fact that they share a common origin, culture, ethics and values. In the political context, *assabiyah* is similar to patriotism, and in the modern management context, it is represented by common sets of values and beliefs. In an analogous sense, organisations share values that are codified. These shared values can be implicit or explicit as in published codes of ethics for professional bodies. Just as with tribes or clans, any infringement of the codes of practice may be punished with the severe punishment being disowned by the tribe. Professional associations such as the Accountancy bodies have occasionally expelled errant members who commit acts deemed highly disreputable by their codes of behaviour and practice.

Following Ouchi (1979), the relationships among the three control modes (viz., markets, hierarchies, clans) are formed by the two dimensions – Knowledge of the Transformation Process, Ability to Measure Output – as shown in Table 2.5.

TABLE 2.5

		KNOWLEDGE OF THE TRANSFORMATION PROCESS	
		Perfect	Imperfect
ABILITY TO MEASURE OUTPUT	High	1. Behaviour or Output Measurement	2. Output Measurement
	Low	3. Behaviour Measurement	4. Ritual and Ceremony: Clan control

If the ability to measure output is high but knowledge of the transformation process is imperfect, output control mechanisms are most appropriate. Thus, markets are the more effective control mechanism as there is little need for writing detailed and costly contracts as with hierarchies. Furthermore, there is not much need for extensive internal monitoring and mediation by third parties.

If the ability to measure output is low but knowledge of the transformation process is perfect, the attention shifts from output measurement to behaviour measurement. When the ability to measure output is high and knowledge of the transformation process is perfect it would be possible to measure both behaviour and output. In this case, decision makers have the choice between behavioural or output controls. As markets and hierarchies can perform these functions, the choice would depend on the cost of each alternative.

If the ability to measure output is low and knowledge of the transformation process is imperfect, neither markets nor hierarchies would be tenable, thereby supporting the case for control through clans and corporate culture (Ouchi,

1979). In essence, clan control is possible when there is a high degree of discipline developed through the dedication of each individual to the interests of the group as a whole. The behaviour of clan members is regulated through mutual monitoring using symbols and norms not readily susceptible to precise translation into performance measures.

Under the circumstances where there is weak ability to measure output and an imperfect knowledge of the transformation process, the strategy is to carefully select candidates to ensure the employment of an able and committed set of people, followed by the use of rituals and ceremonies which serve to reward those who exhibit the underlying attitudes and values that further organisational success.

2.5 KIRSCH MODEL

Agency theory has contributed much to the development and understanding of corporate governance. In particular, agency theorists (e.g., Mitnick, 1982; Arrow, 1985) have developed reasoning for behaviour-oriented contracts as basis for rewarding employees (*i.e.*, agents) for their desirable outcome-oriented behaviours. This is because outcomes are a function of the agent's effort level and uncertainties in the task environment. Moreover, where Ouchi proposes that behaviour-based controls are suitable for cases where knowledge of the transformation process is perfect, agency theorists argue that behavioural contracts can be structured when knowledge is imperfect if principals or controllers invest in information systems in order to observe or monitor the actions of agents. In this sense, as suggested by agency theory, an organisation's

control mechanism is also dependent on “behaviour observability”.

It has been argued that *monitoring* is an information system that makes behaviour observable, while evaluations and rewards moderate the way in which actions are regulated (Eisenhardt, 1985). The process of obtaining information on a controlled behaviour is not the same as acting on that information in order to change the behaviour. Eisenhardt integrates Ouchi's theory of control with agency theory into one model that predicts the choice of control strategy. From Ouchi, she notes that “outcome measurability” and “knowledge of the transformation process” are predictors of control strategy, and from agency theory, she includes “behaviour observability” and “uncertainty” as predictors. This integrated model is empirically tested with retail sales compensation data, with “Knowledge of the transformation process” represented by “task programmability” defined as the degree to which appropriate behaviour can be specified in advance. The results suggest that when behaviours are measurable (observable), behaviour control is implemented, and when the cost of outcome measurement is low, or outcome uncertainty is low, outcome control is used.

Govindarajan and Fisher (1990) further refined Eisenhardt's and Ouchi's models. They modified Ouchi's model to include the behaviour observability construct from Agency theory, and they retained the notion of task programmability from Eisenhardt's work. Govindarajan and Fisher's model suggests that behaviour observability, outcome measurability, and task programmability are antecedents of types of control strategy. Kirsch (1996) further refined Govindarajan and Fisher's model by replacing “task programmability” with “controller's

knowledge of the transformation process” as an antecedent. Table 2.6 shows the Kirsch integrated model that suggests academics fit into Cell 8 and self-control is all that is required. But, it can be argued that academics fit between Cell 7 and Cell 8 since their behaviour may not be fully observed by the superiors while observation, rating and pressure by peers are common in academia.

TABLE 2.6: KIRSCH MODEL

		Controllers Knowledge o f Transformation process	
		High	Low
High Outcome Measurability	High behaviour observability	Cell 1 Behaviour	Cell 5 Outcome
	Low Behaviour observability	Cell 2 Outcome	Cell 6 Outcome
Low Outcome Measurability	High behaviour observability	Cell 3 Behaviour	Cell 7 Clan
	Low Behaviour observability	Cell 4 Self	Cell 8 Self

2.6 THE “PROFESSIONAL-BUREAUCRATIC” CONFLICT

2.6.1 Is the RAE an appropriate control?

The organisational structure has been the traditional form of control where the challenge has been in designing mechanisms and systems that permit a degree of rational and ordered behaviour among employees. A guiding paradigm is contingency theory. Ouchi adopts contingency theory when he draws the important distinction between behavioural controls and outcome controls.

Research on task uncertainty and professional culture as contingency variables has yielded the professional-bureaucratic conflict (“the clash of cultures”). In a study on management control over professionals in Public Accounting firms, it is observed that control, often residing in individual professionals as a consequence of long term socialisation and the imposition of formalised, structured techniques of control, may cause professional-bureaucratic conflicts that lead to dysfunctional behaviour (Dirsmith *et al*, 1997).

The management of professionals has always been a challenge. A study was undertaken in a large teaching hospital in Australia to examine the effects due to the implementation of formal administrative controls, encompassing both behavioural and output controls, on professionals (Abernethy and Stoelwinder, 1995). This attempt to understand the circumstances that would lead to adverse consequences finds conflicts between professional and bureaucratic norms and values are reduced when individuals with high professional orientation are averse to an environment of control where output controls dominate as it restricts them in their self regulatory activities (*ibid*, p. 13). In this regard, the RAE, if viewed as a form of output control, is incompatible for university academics since there is great tendency toward high professional orientation.

Based on Perrow’s model to explore the influence of task characteristics on the effectiveness of accounting, behaviour and personnel forms of control, research is conducted to examine the role of accounting and non-accounting controls in an R&D setting. It finds that non-accounting controls, particularly personnel controls, contribute to organisation effectiveness where task characteristics are

not well suited to accounting based controls (Abernethy and Brownell, 1997).

Birnberg et al (1983) discuss behaviour that can arise when a control system inappropriately assumes a Cell 1 (*per Ouchi cell classifications*) world. (*"..one of the methods by which managers will exploit the cell 1 world when it is inappropriate is through the accounting information system"* (Birnberg et al, 1983: p. 119). The RAE is a form of output control; which according to Ouchi is a control only appropriate for a Cell 3 (or Cell 1) world but not for a Cell 4 world. Birnberg et al categorised dysfunctional behaviours arising from "inappropriate" controls into six broad categories: 1) smoothing; 2) biasing; 3) focusing; 4) gaming; 5) filtering; and 6) illegal acts.

1. Smoothing

Some managers are able to affect the flow of data without altering the actual activities of the organisation. Such smoothing behaviour could result in sending a message in the present period, when in reality, the event does not occur until some future period. Conversely, the manager may delay the sending of a message to a future period even though the event has occurred in the current period. The common smoothing practice is that of shifting of a revenue or expense item from one period to another. The shifts may arise from the need to hold down costs or increase revenue to meet targets or budgets. Sometimes, the smoothing act serves to prevent reported performance from appearing to be too superior in one period in order to ease the future workload, resulting in budget slacks. Academics, too, can game or smooth their publication flows across RAE exercises.

Birnberg *et al* felt that the absence of observability of the process, lack of analysability and heterogeneity all limit the ability of the superior to detect smoothing behaviour. These are characteristics of academia.

2. Biasing

When a manager selects from a set of possible messages a signal that is likely to be accepted and is most favourable to him, biasing is said to occur. The permissibility of submitting a selected set of staff as research active for the RAE provides a venue for such dysfunctional behaviour (Talib and Steele, 2000).

3. Focusing

Focusing occurs when certain aspects of the information set are either enhanced or degraded. Focusing, smoothing and biasing are strategies intended by the sender to manipulate the recipient by affecting the set of data available to the recipient. The sender however has not altered his behaviour.

4. Gaming

When there are attempts to alter job-related behaviour, employees will act in ways to maximise the payoffs. In an ideal world, where the superior has set the rules properly and the right performance measure is used, the subordinate when

maximising his payoffs would also maximise the superior's payoffs. However the risk exists where the superior uses a surrogate measure of performance. The subordinate while attempting to maximise the surrogate measure may reject courses of action more (or also) desirable for the superior. More precisely, gaming of a performance measure is said to exist when the subordinate knowingly selects his activities so as to achieve a more favourable measure on the surrogate used by the superior for evaluation, at the expense of selecting an alternative course of action that would result in a more desirable level of performance, as far as the superior's true goal is concerned.

Birnberg *et al* were of the view that outside of Cell 1, it is not obvious how the superior can be sure of avoiding such behaviour. The subordinate will select his action with the aim of sending the superior the message the superior wants to receive and the message will be credible to the superior. This has been called the "moral-hazard" issue in agency literature. An example of this behaviour in academia could be in the form of concentration on research activities at the expense of teaching and other duties.

5. Filtering

Filtering and focusing are closely related. Filtering occurs where the more desirable elements of the data are communicated and the less desirable are not. Filtering strategies include over-collection, over-presentation and aggregation. Over-collection involves obtaining much more information than required. Over-presentation occurs when one inundates receivers with vast quantities of

information to confuse the recipient. Another strategy is to aggregate the information to a high level so that the critical aspects are lost. By doing this, the subordinate may effectively eliminate attention-directing information from the report.

6. Illegal acts

An illegal act is one that violates a private law such as organisational rules or a public law. Unethical acts in academia such as the violation of codes of ethics for publication can be considered illegal acts. An example of unethical practices under the auspices of the RAE would be submissions of the same paper to different journals.

2.6.2 How does RAE affect Research in Universities?

One of the basic tenets of professionalism is the notion that a professional is highly accountable to his peers (Carter, 1988: p. 216). Professionals have largely been averse to towards centralised authority. If a member perceives the superior as exercising centralised authority and the subordinate holds negative feelings towards centralised authority, then dysfunctional behaviour would arise from budgetary emphasis (Taylor, 1996).

An increasing trend in the public sector is the use of explicit performance indicators. Smith (1993) infers seven ways in which excessive use of “outcome-related performance indicators” (ORPI) in the public sector might influence

behaviour. These are:

1. Tunnel vision: Concentration on areas included in the ORPI to the exclusion of other important areas. (Functional fixation).
2. Suboptimisation: The pursuit by managers of their own objectives (Agency theory)
3. Myopia: Short-termism.
4. Convergence: An emphasis on not being exposed as an outlier on any ORPI, rather than a desire to be outstanding.
5. Ossification: A disinclination to experiment with new and innovative methods.
6. Gaming: Altering behaviour.
7. Misrepresentation: Including creative accounting and fraud.

Examples of behaviours resulting from tight controls and a budgetary emphasis include job-related tension, poor relations with superiors and peers, data manipulation (Hopwood, 1972), short-term view, seeking “safe” decisions, budget slack (Anthony & Govindarajan 1995), increased motivation (Merchant, 1981; Argyris, 1952; Hofstede, 1968). The behavioural outcomes have been

classified into two main groups: (a) Data manipulation - behaviour affecting the reported results without altering performance behaviour; and (b) Performance behaviour - altering job related acts. These effects can be mapped to the higher education sector as shown below in Table 2.7.

TABLE 2.7

BEHAVIOUR	MANIFESTED IN HIGHER EDUCATION BY
A. DATA MANIPULATION <ol style="list-style-type: none"> 1. Biasing 2. Focusing 3. Filtering 	“strategic submission” of research “research active” staff
B. PERFORMANCE ALTERING BEHAVIOUR <ol style="list-style-type: none"> 1. Smoothing 2. Functional Fixation (Tunnel vision) 3. Short-term view (Myopia) Avoiding risky investments Ossification / Convergence 4. Gaming 	smoothing research output concentrating on research output at the expense of other activities short-termism and avoiding “risky” research smoothing, research topic choice specialisation, hiring strategies

2.7 MOTIVATION THEORIES

2.7.1 Relation to Organisational Analysis

The concept of motivation is central to organisational theory. When an individual is motivated, he is driven to act or do something. An unmotivated person would be one who has no impetus or inspiration to perform. In motivation research, the pursuit is to understand the factors and forces that would energise the individual to satisfy a need, and concomitantly, to understand how

behaviour is energised, directed and sustained. For managers, the objective is to direct behaviour and channel the workforce's energy toward the organisational ends.

Understanding human behaviour is fundamental to understanding how organisations function, whether they are profit making enterprises or government agencies intended to serve the “public interest”. The usefulness of any model of human nature depends on its ability to explain a wide range of social phenomena; the test of such a model is the degree to which it is consistent with observed human behaviour. A basic human behaviour we all understand, for example, is that people are willing to make trade-offs among things that they want. Therefore models that specify individuals as never willing to substitute some amount of goods for another amount of goods are inconsistent with observed behaviour (Jensen and Meckling 2000 p4).

There are numerous theories that try to unravel the complexities of human behaviour and motivation. One of the earliest treatises on motivation is the *field theory* research by the psychologist Kurt Lewin. According to *field theory*, behaviour is a function of factors related to the person and the environment. While other research relies on different assumptions, they seem to isolate motivation as a unitary phenomenon as if motivation is a characteristic that can be measured along a continuum anchored with “little” and “great” at its ends. However, motivation is more complex than a unitary phenomenon. Individuals exhibit not only different levels but also different kinds of motivation (Ryan and

Deci, 2000: p. 54).

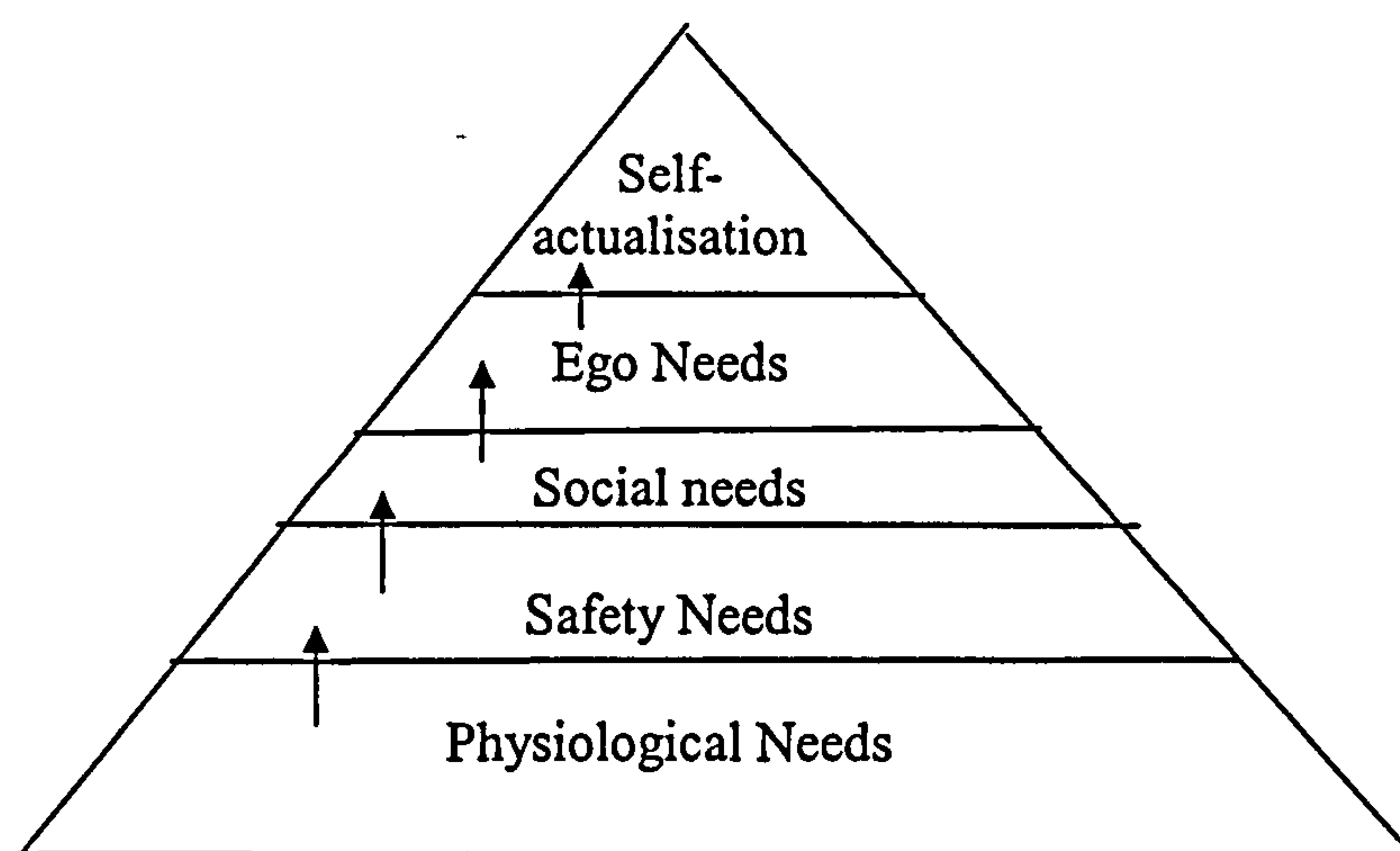
Motivation theories are demarcated by whether the orientation is content or process. Content theories attempt to identify different kinds of needs or motives that are capable of driving behaviours, rather than the processes in which behaviour is energised, directed, and sustained. Examples of such 'content theories' include Need-Hierarchy theory, Achievement Motivation theory, and Motivation-Hygiene theory. While content theories are criticised for the lack of guidance on the specific actions that may result in higher levels of motivation and productivity, process theories examine only the mechanics of motivation. Process theories, exemplified by Equity theory, Expectancy theory, and goal-setting theory, outline the dynamics that are important, the links that must be created and maintained, and the factors to be considered to achieve higher levels of motivation and productivity. Jensen and Meckling (2000) suggest the Resourceful, Evaluative, Maximising Model (REMM) as a behavioural model that addresses the failings of other behavioural models used in the social sciences.

2.7.2 Needs-Hierarchy Theory

The Needs-Hierarchy propounded by Maslow (1943, 1954) is one of the earliest and most widely referred-to theories in motivational research. According to the theory, there are different levels of needs that influence behaviour. These needs are generic and they include, in ascending order, physiological needs (*e.g.*, food and drinks), safety and security needs (*e.g.*, shelter and protection), social needs (*e.g.*, group membership and affiliation), ego needs (*e.g.*, personal prestige and

self-esteem), and self-actualisation (*i.e.*, fulfilling one's potential and aspirations). Figure 2.3 shows the '*hierarchy of prepotency*' in which the five levels of needs are arranged. Physiological needs are the most pre-potent and hence the most basic. In an ascending order, once a need level is satisfied it ceases to motivate. The individual then shifts his attention to the immediate higher level. As anticipated, by and large, the hierarchy of needs holds in most cases, but it does not necessarily apply to every individual, since some individuals may never aspire for higher needs when their lower needs are satisfied, and many never attain the self-actualisation phase.

Figure 2.3 *Maslow's Hierarchy of Needs*



In addition to these five needs, Maslow classifies three other needs that are seldom referenced. These include the desire to know and understand (cognitive needs) aesthetic needs (desire for beauty in one's surroundings), and need for growth and avoidance of deficiency and deprivation (*i.e.*, self-preservation and avoidance of pathological states). Much of the post-Maslow research focuses or extends the needs hierarchy formulation. For example, Alderfer (1972) re-

arranges the five basic needs into three categories: existence (physiological, material and safety needs), relatedness (interpersonal safety, esteem and love needs) and growth (self-confirmed esteem and self-actualisation needs).

Jensen and Meckling (2000) referred to Maslow's model as the psychological model of human behaviour, which they regarded as a step up the revolutionary ladder from the sociological model. In contrast to REMM, in Maslow's hierarchy of needs model the individual is unwilling to give up any food for any amount of safety until his or her food needs are satisfied. What Maslow and his followers have done is to confuse two entirely different issues: how an individual allocates resources among alternative goods at a given level of wealth, and how that allocation pattern varies as an individual's wealth rises.

Maslow himself, in the latter part of his famous article, qualifies his early statements that deny substitution. He argues that he did not mean that literally 100% of a person's food had to be satisfied in order for him or her to begin to satisfy the safety needs and so on. This qualification brings Maslow more towards the notion of substitution and the income elasticity of demand.

2.7.3 Achievement Motivation Theory

This theory proposed by McClelland (1961, 1962, 1975) identifies three major needs which impact upon motivation and behaviour: (a) achievement need (desire to accomplish some goal or task more effectively); (b) affiliation needs (desire to have close, amenable relations with others); and (c) power needs (desire to be influential and to have an impact on a group). For achievement

itself to be desired, work situations must have characteristics and features that are meaningful and possible for an individual to assume responsibility and to obtain credit, even if only intrinsic, for the performance. Moreover, achievement situations are those with realistic levels of difficulty, since easy tasks and too difficult tasks are not motivators.

McClelland's power motivation concept can be described in a hierarchy of four stages. First, power is derived through association with powerful people. Next, the source of personal power emanates from the self. The third stage is the exercise of power over people. The last stage is where the emphasis shifts from oneself to some common goal, and thus power derives from influencing people to attain such a goal. McClelland distinguishes between two forms of power - personalised and socialised. Personalised power relates to personal dominance and a will to win. Socialised power combines both motivation and inhibition where the main concern is with group goals and motivation.

Strong affiliation is held to induce negative consequences on managerial performance, since it could lead a manager to make exceptions for inefficient performance by subordinates. McClelland concludes that managers with high need for power and self-control, but low need for affiliation, are typically the more successful leaders.

This theory provides guidelines for explaining observed human behaviour. By identifying an individual's level of achievement motivation, the stage of power motivation, and the extent of affiliation motivation, the individual's behaviour

may be predicted and understood. In addition, according to Attribution Theory, an individual may attribute success and failure, in varying degrees, to his ability, his effort level, the task difficulty or luck (Weiner, 1972). Individuals with high need for achievement are likely to attribute their failure not to inability but to not trying hard enough, whereas those with low need for achievement will attribute failure to their inherent inability.

2.7.4 Motivation-Hygiene Theory

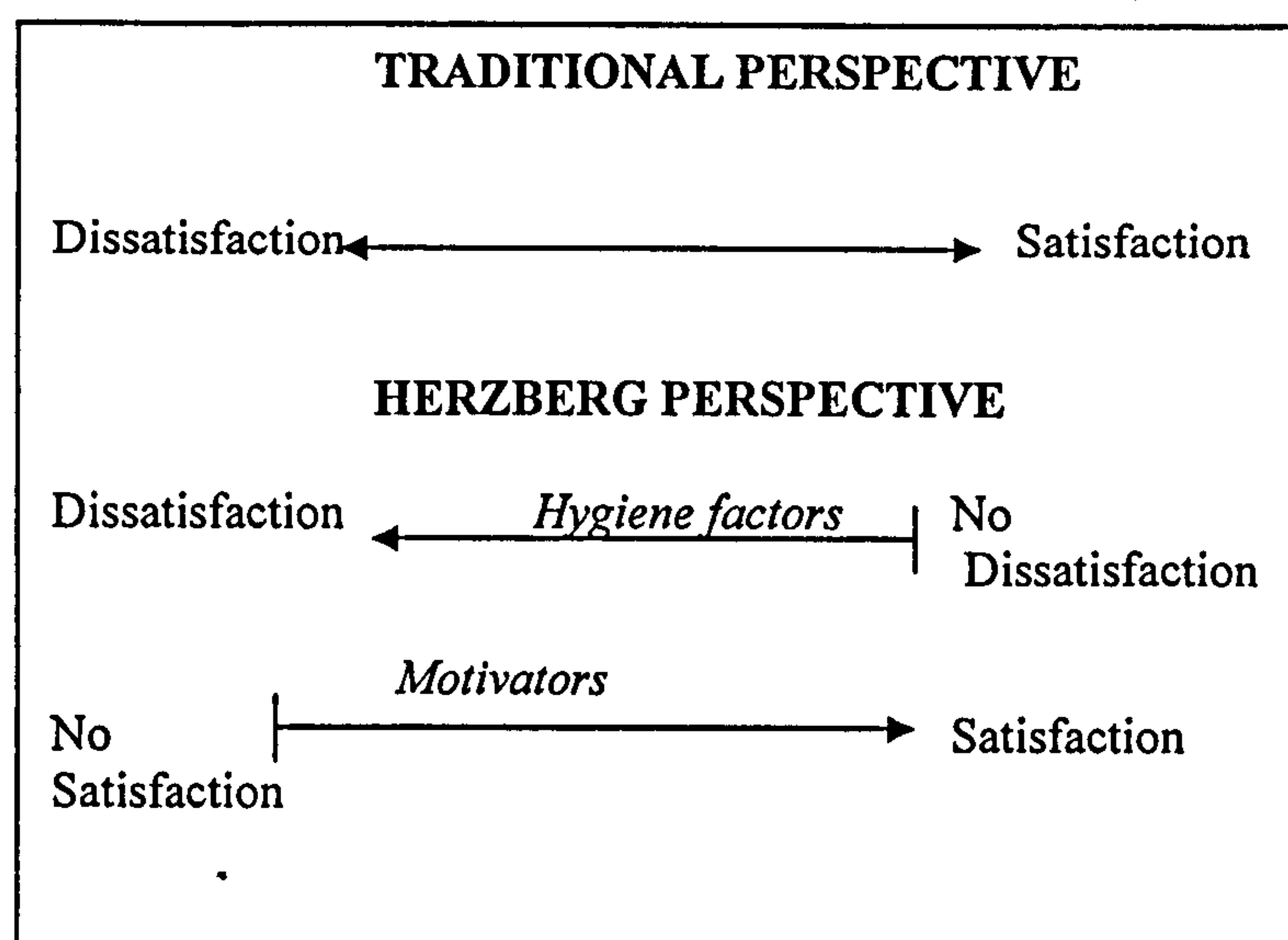
Developed by Herzberg (1966, 1976) to address how far job satisfaction affects motivation, the theory postulates that (1) factors causing positive job attitudes are different from factors causing negative attitudes; and (2) factors and personal effects associated with sequences of job events differ according to whether such events are long term or short term.

Herzberg identifies several factors (motivators) that are expected to lead to job satisfaction. These were achievement, recognition, challenging nature of the task, responsibility, and advancement (promotion). The provision of these factors are expected to lead to positive feelings and better performance. Job dissatisfaction, however, result from different (hygiene) factors which are categorised as company policies and practises, interpersonal relations, physical working conditions, job security, benefits and salary. As the theory lays, satisfaction and dissatisfaction are not opposite ends of the same continuum but are different phenomena. The presence of good job content factors (motivators) leads to satisfaction and the absence of good job context factors (hygiene factors) leads to dissatisfaction. Furthermore, although the absence of good hygiene

factors causes employees to be dissatisfied, their presence are not necessarily satisfying and does not motivate people to work hard. By contrast, when workplace motivators are lacking, employees will not be satisfied or motivated, but will also not be dissatisfied.

The major contribution of the Herzberg theory is the observation that improvements in hygiene factors may not necessarily enhance motivation. They are necessary but not sufficient for superior performance. The key to enhanced performance is to apply motivators such as those pertaining to job content. The traditional and Herzberg's approaches to satisfaction/dissatisfaction are depicted below in Figure 2.4.

FIGURE 2.4: TRADITIONAL AND HERZBERG PERSPECTIVES ON SATISFACTION AND DISSATISFACTION



2.7.5 Equity Theory.

An outgrowth of motivation-hygiene theory is that job dissatisfaction is frequently reported to be due to feelings of unfairness. Adams (1963) articulates

this observation in the context of social exchange relationships between individuals. In an exchange, an individual gives something (input) in return for something (output). If input is not recognised as relevant or not appropriately valued by the other party, then inequity may result. Perceived inequity breeds dissatisfaction, as manifested in the feelings of anger (unfavourable inequality) or guilt (favourable inequality).

As a result of inequity tension emerges as a motivating force that aims to reduce and remove the inequity. Methods of reducing inequity include altering or distorting inputs and outcomes, changing the reference source and, in extreme cases, job transfers, absenteeism or resignation.

The theory, however, has several limitations. For example, when multiple reference sources exist, it is not clear which source will be selected. It is not intuitive if an individual would compare his effort and rewards with a co-worker in the same department, across the entire organisation, or with his peers in other organisations. There is also not enough evidence to suggest which equity-attaining strategy will be selected or the sequence in which they will be pursued. Further, it has been criticised that empirical research on equity theory is static in the sense that it does not take into account the time dimension of inequity (Vecchio, 1982). Another weakness is that the theory does not factor in transaction costs of the equity-attaining strategies. Individuals experiencing inequity might find the costs of a strategy, such as resignation, too high. This is of critical relevance to academia across the world where a change of university usually means geographical relocation. The older individuals might find

themselves locked in since relocation costs are high to them and their families.

2.7.6 Expectancy Theory

As expected, an individual's behaviour is influenced by his subjective perceptions of the internal and external forces (Lewin, 1951). This is incorporated in expectancy theory that determines the forces that drive the individual towards a particular goal whereas others constrain his progress towards that goal. The theory essentially assume that an individual chooses his behaviour on basis of two variables. One is that the expectation that his behaviour will lead to a specific outcome, and the other is that the strength of the individual's performance or personal utility, for a given outcome, from his effort (the sum of the valences).

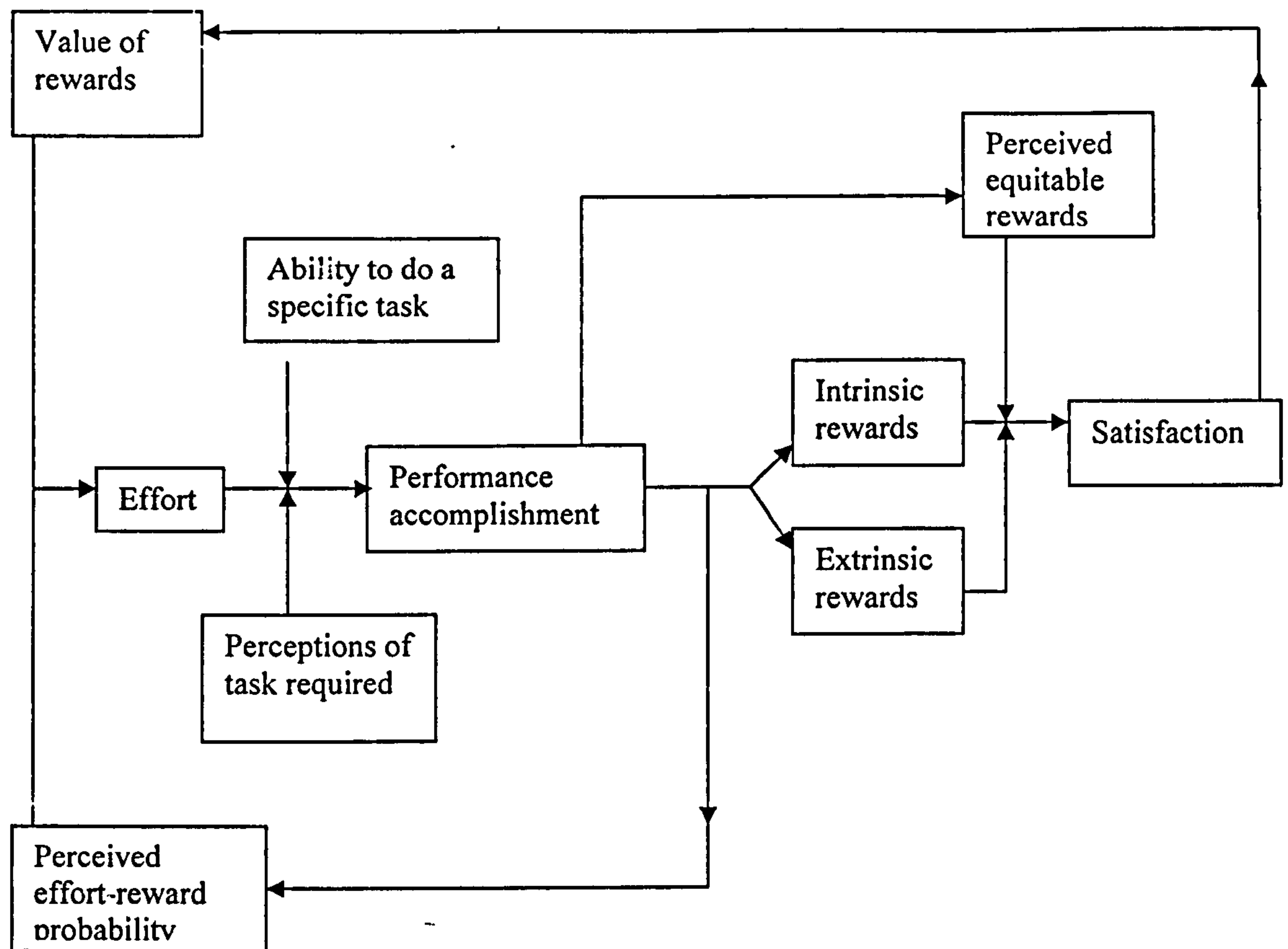
Vroom (1964) suggests that in preferring one outcome out of several alternatives, an individual would anticipate experiencing feelings of satisfaction (valence) that would arise if the preferred outcome occurs. These valences can be positive or negative. An individual will behave in such a manner that the outcomes with positive valences are maximised while those with negative valences are reduced. Integral in the theory is the role of expectancy or the probability that the choice of a particular alternative action will lead to a desired outcome. Together, expectancies and valences produce a force that motivates the individual towards a particular action. Galbraith and Cummings (1967) suggest that there are two types of valences: intrinsic and extrinsic. Intrinsic valences relate to goal-directed behaviour such as feelings of competence and it is motivational because it leads to satisfaction. Extrinsic valences are those associated with the

consequences of behaviour, such as reward that is contingent on work-goal accomplishment.

Porter and Lawler (1968) extend Vroom's concept of motivational force by incorporating a larger number of variables into the model and by introducing various feedback loops to present a more complete model of motivation. The model is summarised in Figure 2.5.

Actual performance in a job is determined principally by expended effort, but it is also influenced by an individual's ability to do the job and by his perceptions of the required tasks. Performance is seen as leading to intrinsic rewards (such as sense of accomplishment) and extrinsic rewards. These rewards lead to satisfaction. What the individual sees as a fair reward for effort will affect the satisfaction derived. Likewise, the actual value of rewards will be influenced by satisfaction. The model is more dynamic over time. The feedback loop operates in two ways. Firstly, to the extent that performance leads to reward, the perceived effort-reward probability is increased. Secondly, as satisfaction occurs after receiving a reward, it influences the future value of that reward. Effort is a function of the value of reward and the effort-reward probability.

Figure 2.5: Porter and Lawler model.



In management accounting research, Ronen and Livingston (1975) develop an expectancy theory model expressed as follows:

$$M = IV_b + P_1 \left(IV_a + \sum_{i=1}^n P_{2i} EV_i \right)$$

where;

M = motivation to work

IV_b = intrinsic valence associated with goal - directed behaviour

IV_a = intrinsic valence associated with successful performance of task.

EV_i = extrinsic valences associated with the i th extrinsic reward
contingent on work - goal accomplishment, $i = 1, 2, \dots, n$.

P_1 = the expectancy that goal - directed behaviour will accomplish the work - goal.

P_{2i} = the expectancy that work - goal accomplishment will lead to
the i th extrinsic reward.

In this model, motivation to work depends upon the individual's subjectively determined values of intrinsic and extrinsic valences and on relevant expectancies (probabilities). Specifically, these include: (i) expected intrinsic valence associated with goal directed behaviour, independent of actual achievement; and (ii) expected intrinsic and extrinsic valences associated with work-goal attainment.

But, the above model is restrictive as it implies that, associated with any work-goal, there is but one outcome perceived by the individual. In most cases, especially in academia, there are a number of plausible outcomes and the individual may seek any of them (Rockness, 1977). With each of these alternative outcomes there will be an associated level of effort to be exerted by the individual and associated intrinsic and extrinsic rewards. Allowing for these possibilities, Rockness (1977) extends the basic expectancy model into the following multiple-goal multiple-outcome expectancy model:

$$F_i = \sum_{j=1}^n IV_{effort_j} + P_1 \left(\sum_{k=1}^n IV_{outcome_k} + \sum_{i=1}^n P_{2i} EV_i \right)$$

where :

F_i = force toward a particular work outcome i .

IV_{effort_j} = the intrinsic rewards directly associated with effort to achieve a particular outcome.

$IV_{outcome_k}$ = the intrinsic rewards directly related to achieving a particular performance outcome.

EV_i = the extrinsic rewards which are dependant on a particular performance outcome.

P_2 = the expectancy that effort will lead to a particular performance outcome.

P_{2i} = the expectancy that achieving a particular performance outcome will lead to extrinsic rewards EV_i .

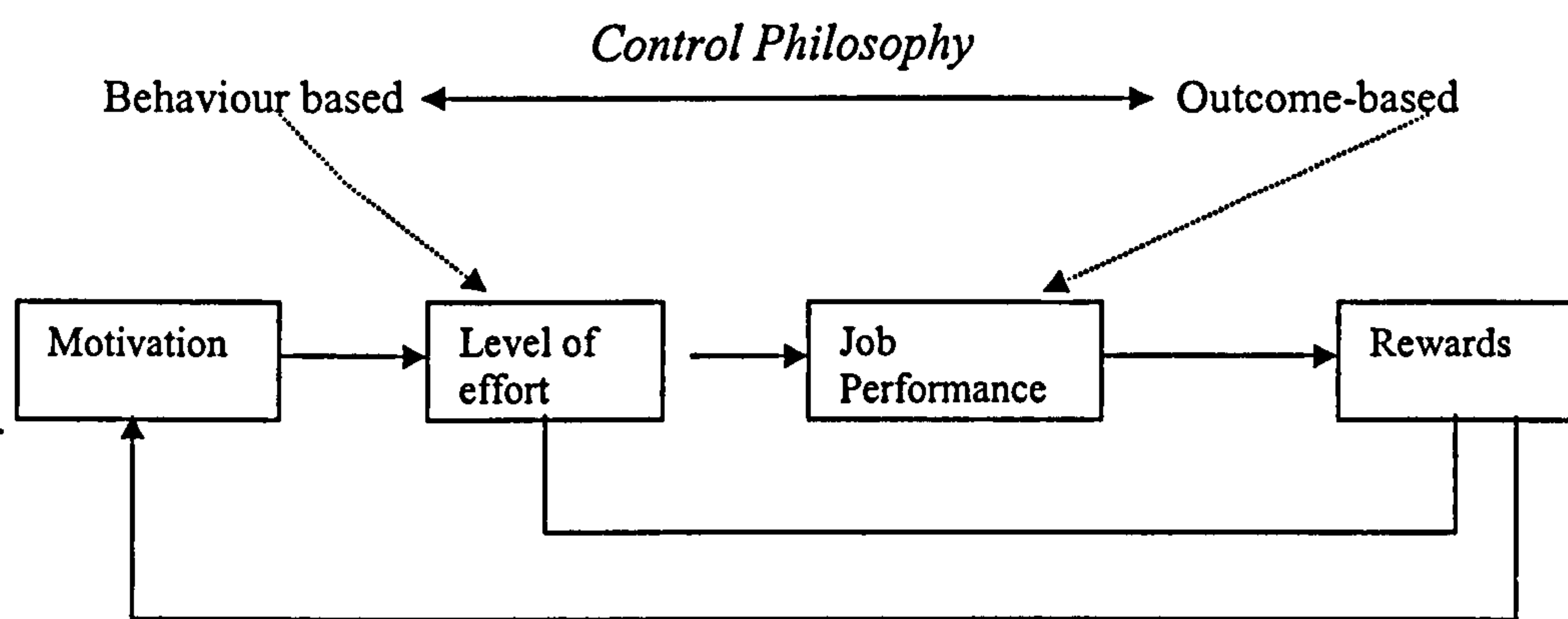
According to the revised Rockness model, increases in the expected rewards lead to greater force towards performance which in turn leads to higher levels of performance. Alternatively, the individual may perform at a specified level for which the force is strongest. The rewards recognise the cost of effort required to achieve the specific level of performance. Given the trade-off between expected rewards and the cost of effort, the individual is assumed to direct his maximum effort towards the performance level that would lead to the maximum net expected rewards. Thus, in a budgetary setting, with other variables remaining the same, higher performance can be attained by increasing rewards offered across the budget continuum. Moreover, the model offers an explanation for why an individual may be motivated to attain a given budget level but lacks motivation to achieve another budget level. For a given reward structure, increases in budget level may lead to increase in performance until the point is reached where the expected rewards do not justify the incremental effort. In essence, as the budget difficulty increases, the cost of the effort increases, the net expected rewards decreases, and satisfaction decreases.

2.7.7 Goal Setting Theory

Another approach to motivating staff is via goal-setting where the motivation is to achieve goals. It focuses on the external situation to guide performance and does not focus on the needs and beliefs of people. A common goal setting technique is the budget which serves to instil motivation, behaviour, and task performance. The motivational process, based on the expectancy theory, is usually represented by Figure 2.6 (Krafft, 1999). The motivational level influences the effort or behaviour, which leads to some level of achievement on

one or more dimensions of job performance (outcome). The performance is rewarded with one or more rewards (e.g., compensation, recognition). The rewards lead to increased motivation, which again influences behaviour, and so forth.

FIGURE 2.6: MOTIVATIONAL PROCESS CIRCLE



The effects may be negative or positive depending on the characteristics of budget goals, viz., specificity and difficulty of the goals. Specific budget goals are those expressed in quantitative terms such as “sell X units of Product Y”, whereas non-specific or general goals are qualitative expressions such as “sell as many units of Y as possible”. With this formulation, the RAE as a budget goal is intermediate between specificity and difficulty since the goals for an academic are specific in that he is given a target of up to four publications of a high quality within the RAE time period. The goal is non-specific because the quality is subjective. There is moreover task uncertainty in achieving the goals. The difficulty of the goal is represented by the level of performance needed to accomplish the objectives. Therefore, goal difficulty is contingent on the individual’s normal level of performance.

The relation between goal setting and performance is described in Figure 2.8 (Hirst 1987), showing the hypothesised sequence of activities that connect goal-related stimuli with task performance. Goal related stimuli are followed by a set of cognitive activities; interpretation of goals, search for valid plans or strategies and selection of valid strategies. Valid plans should include only relevant activities.

Figure 2.8 also depicts the moderating influence of task uncertainty. Goal setting has positive impacts on the direction, level and duration of effort. When goals are accepted, the attention is on *relevant* activities and effort will be directed to accomplish the goals. More difficult goals translate into a greater level of effort (Locke *et al*, 1981). If goals are difficult or appear unattainable, it could result in less effort being made to achieve the goal. Goals are also assumed to trigger the cognitive activity of developing effective strategies to attain the goal (*ibid*). However, a negative relation is likely to exist between task uncertainty and task knowledge (Hirst 1987; Hirst and Yetton; 1999) and the positive effects of goal setting are likely to be conditional on the completeness of task knowledge. If there is incomplete task knowledge, goal setting can have a negative effect on performance and even cause dysfunctional behaviour (Hirst, 1987). Otley (1978) argues that rigid budgetary controls do not lead to increased levels of budget-related tensions and finds mixed support for its associated dysfunctional behaviours, in contrast to Hopwood (1972).

Goal setting focuses attention on certain task activities and makes behaviour selective. Selective behaviour can be functional or dysfunctional. The focus on relevant activities to the exclusion of irrelevant and presumably non-productive

activities is functional. However, action plans could include dysfunctional plans such as gaming.

Dysfunctional selective behaviour also occurs where goal setting induces the exclusion or reduction of previously performed relevant activities. In the university environment, the relevant and important behaviours that could suffer are teaching, public service and voluntary academic work. A measurement system that is linked to performance would create pressures for increased activities in areas that are being measured at the expense of unmeasured or unmeasurable areas (Puxty *et al*, 1994). Thus, an unintended consequence of the RAE would be academics shunning voluntary activities and involvement with public policy issues.

Managers might protect themselves from missing budget targets by limiting their exposure to risky or long-term projects (Van der Stede, 2000: p. 610). In the same way, the goals set by the RAE for some staff might result in the avoidance of risky, speculative and exploratory projects, especially those that may require a long time to complete. This argument is consistent with Otley's (1978) finding that managers who are subject to rigid budgetary controls tend to devote a smaller proportion of their time to long-term planning.

A basic rule of goal setting is that "there is a linear relationship between perceived goal difficulty and performance" (Locke and Latham, 1990: p. 27). The more difficult the goal is perceived, the higher the performance improvement (Chow 1983; Hirst and Lowy, 1990). The closer one's current

performance is to the targets, the lesser the effect on the performance. Hirst (1987), however, argues that where task uncertainty is high, setting budget goals are less effective in promoting task performance than where task uncertainty is low.

The level of difficulty of a set goal is evaluated or determined by the person performing the tasks, and consequently different individuals would not improve their performance by the same amount under the goal setting approach. In reality, the relationship between (perceived) goal difficulty and level of increased difficulty is not linear. The more demanding the goal the greater the effort that is needed to achieve the goal. Conversely, simpler goals require considerably less effort. If the goal attainment is below the current performance, the effort could decrease. However, a high emphasis placed on meeting the budget can lead to budgets being more closely met (Otley, 1978).

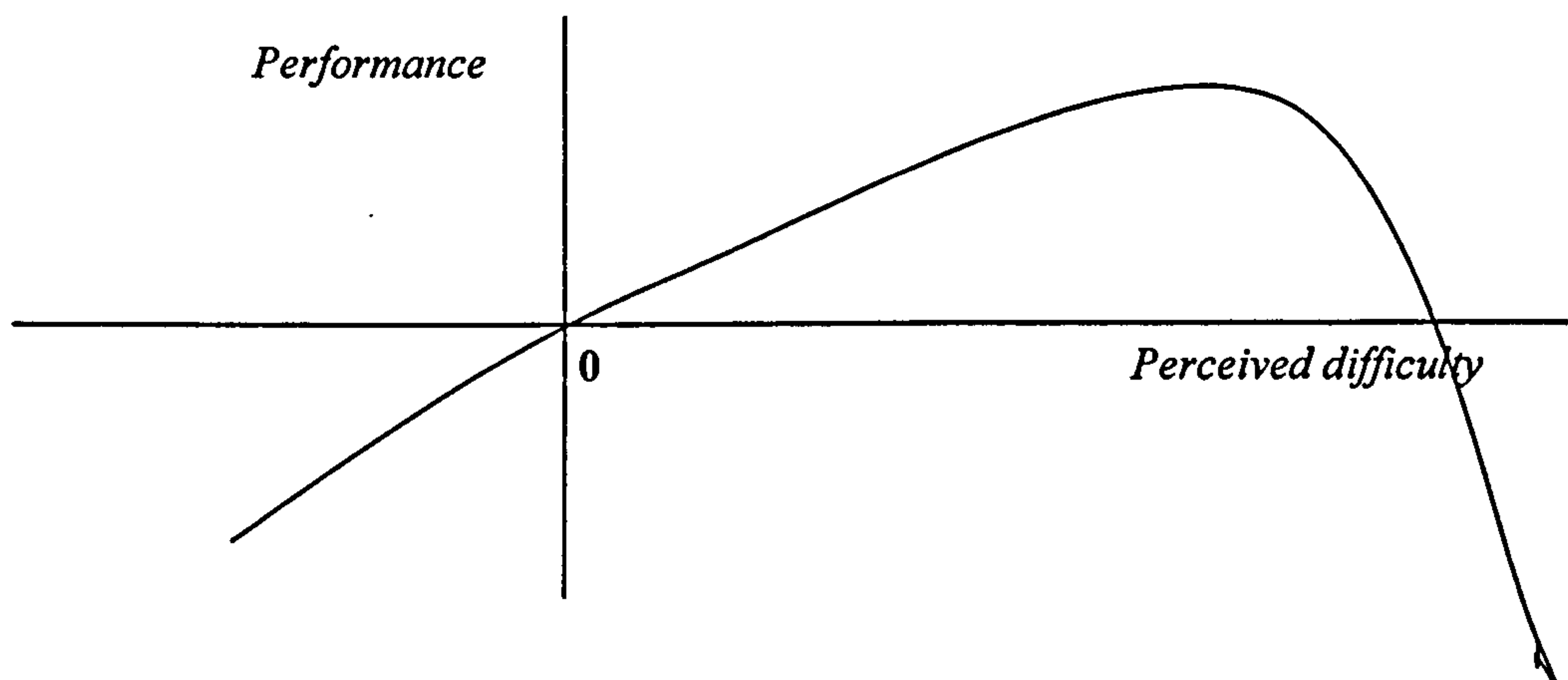
In the past, the research output and quality goal was as general as requiring academics to produce as many high quality papers as they could, but with the RAE the goal for each staff is to generate four papers of high quality. For the very active researchers, this could well be below their current performance with the possibility that it may reduce the normal effort. One, however, should not underestimate the importance of intrinsic motivation for academics. As articulated by Bailey (1994) on the issue of researcher commitment:

"Intrinsic motivation seems to be much less important than extrinsic drives..... over-regulation, the use of incentives, restrictions on the freedom of researchers to choose topics

and the use of tenure and promotional encouragement are less appropriate mechanisms to increase research productivity in a university than encouraging researcher's intrinsic interest in the process and outcomes of research".

At the other extreme, if the goal is unattainable, it could have de-motivating effects. The relationship between perceived goal difficulty and improved performance is depicted in Figure 2.7.

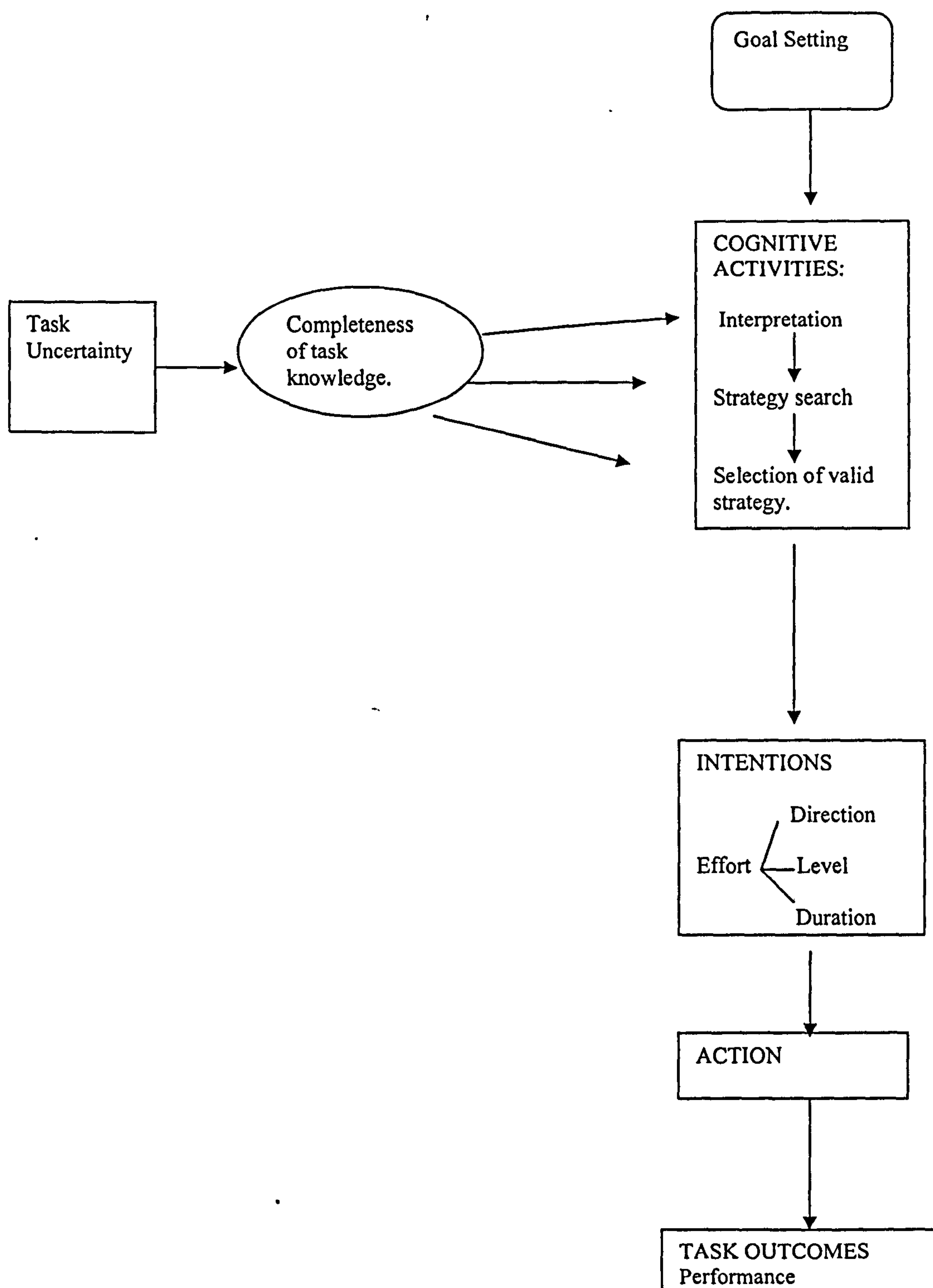
FIGURE 2.7: RELATION BETWEEN GOAL DIFFICULTY AND IMPROVED PERFORMANCE



An individual may increase his performance to match the difficulty of the goal, but if it is perceived as too difficult, the level of improved performance will drop. If the goal is perceived as unattainable, then the goal can have de-motivating effect and negative improved performance. In the case of the RAE, it would seem that the average researchers would exhibit the highest positive response. The effect could be negative on the non-active researchers, and could have a negative or marginal effect on the very active type.

The setting of goals promotes performance by increasing motivation as well as stimulating the search for and use of task strategies (Earley et al 1989, Locke & Latham 1990). In context of the RAE, task strategies can take the form of managing the output of the research and/or managing the choice of research topics.

Figure 2.8



(Source: Hirst, 1987: p. 778)

2.7.8 RESOURCEFUL, EVALUATIVE, MAXIMISING MODEL: REMM

One way of capturing the notion of resourcefulness is to think about the effects of newly imposed constraints on human behaviour. According to REMM, the response to new constraints is to begin searching for substitutes for what is now constrained. The search is not restricted to existing alternatives; REMMs will invent alternatives that did not previously exist.

REMM implies that there is no such thing as a need. The fallacy of the notion of needs follows from the proposition that the individual is always willing to substitute.

The foundation of the model is based on the following four postulates (Jensen & Meckling 2000 p 5).

Postulate 1: every individual care, he or she is an evaluator.

The individual cares about almost everything and is always willing to make trade-offs. Furthermore, valuation is relative in the sense that the value of a unit of any particular good decreases as the individual enjoys more of it relative to other goods. Individual preferences are transitive – that is if A is preferred to B, and B is preferred to C, then A is preferred to C.

Postulate 2: each individual's wants are unlimited.

Individuals prefer more “goods” to less. He or she always wants more of some things.

Postulate 3: each individual is a maximizer

Each individual acts so as to enjoy the highest level of value possible. The notion of an opportunity set provides the limit on the level of value attainable by any individual. The opportunity set is usually regarded as something that is given and external to the individual. Though economists tend to represent the opportunity set as a wealth or income constraint and a set of prices at which an individual can buy goods, the notion can be generalised to include the set of activities one can perform in a 24 hour day or in a lifetime.

Postulate 4: the individual is resourceful.

Individuals are creative. They are able to conceive of changes in their environment, foresee the consequences thereof and respond by creating new opportunities. Individuals engage in resourceful, creative activities that expand their opportunities in various ways.

In the *nature of man* M.Jensen and W H Meckling (2000) define REMM in large part by showing how it addresses the failings of the other behavioural models used in the social sciences.

The *Economic model* is a reductive version of REMM. The individual, under the economic model, is an evaluator and maximiser who has only one want: money income. The economic model reflects a short-run money maximiser who does not care for others. The economic model is, of course, not very reflective of human behaviour. From the *economic model*, REMM takes the assumption that people are resourceful, self-interested maximisers but rejects the notion that they are interested only in money income or wealth. In the sociological model individuals are viewed as the product of their cultural environment. Under this model humans are not evaluators; they are conventional and conformists, and their behaviour is determined by the taboos, customs and traditions of the society in which they were born and raised. In this model, individuals are also viewed as *social victims*. By contrast, REMM is an evaluator. The REMM model recognizes that customs do serve as important constraints on human behaviour, and people who violate them incur costs in many forms. But REMMs compare the consequences of alternate courses of action, including those that involve flouting social norms and consciously choose actions that will lead (in their view) to the preferred outcome. Social norms and culture are important determinants of action but not the sole force. There is a crucial distinction between the REMM model's recognition that cultural factors are reflected in human behaviour and the sociological model's assertion that cultural factors *determine* human behaviour. If behaviour is completely determined by acculturation as the sociological model suggests then choice, purpose and conscious adaptation are meaningless. Indeed if humans are endowed with little originality, have no ability to evaluate, and simply imitate what they see and do what they are told, it is not clear how *any* social change could take place. The

REMM model, in contrast, explains the evolution of customs and mores as the reflection in habits, unquestioned beliefs, and religion of behaviour patterns that reflect optimal responses to the costs and benefits of various actions. When the underlying costs and benefits of various actions change, individuals are faced with a conflict between new optimal forms of behaviour and culturally accepted but inefficient forms. In this situation there will be social conflict. And if the new behaviour patterns are indeed optimal, the population will gradually accommodate the new behaviour in the culture (Jensen and Meckling p11). Hence REMM does assume that society imposes costs on people for violating social norms, which in turn influences behaviour. REMM, however, also assumes that individuals will depart from such norms if the benefits are sufficiently great.

Under the *Political Model* the individual is a perfect agent seeking to maximise “the public good” rather than his or her own welfare. From the *political model* REMM takes the assumption that people have the capacity for altruism. They care about others and take their interests into account while maximising their own welfare. REMM, however, rejects the notion that people are *perfect agents*.

REMM regards individuals as resourceful, evaluative maximisers who respond creatively to the opportunities the environment presents to them, and work to loosen any constraints that prevent them from doing what they wish to do. The individual cares about not only money but almost everything for example respect, honour, power, love and the welfare of others. Under REMM, academics

will attempt to maximise their welfare by responding to the RAE in resourceful and creative ways.

2.8 PREVIOUS STUDIES ON THE RAE

There are survey studies on the impact of the RAE. For example, McNay (1997) examines the impact of the 1992 RAE on institutions and individuals. Although another survey of academics has been conducted, the analysis is not on characteristics of the academics or on research activity level. This thesis builds on the McNay study and uses a similar methodology involving case studies and surveys. The survey instrument employs the same scales from the McNay study so that a comparative analysis can be made. The contribution of this research is to develop the theoretical underpinnings and use of econometric methodologies that are not undertaken by the McNay study.

After surveying individuals in 14 geography departments, Jenkins concludes that the RAE has greater impacts than the Teaching Quality Assessments (TQA), and that the RAE has significant negative impacts on the organisation of teaching, the priority to teaching, and some impact on aspects of teaching quality (Jenkins, 1995a, 1995b).

Humphrey *et al* (1995) notes that *“Instead of talk of academic freedom of thought, an open exchange or sharing of ideas and the need to build a sound, scholarly basis for a university career, research selectivity is promoting the language of self-interest, marketing and entrepreneurship. There is talk of individuals not being encouraged to work with people outside of their own*

institutions, for fear that it will dilute subsequent research ratings". The authors also comment that academic staff could be discouraged from refereeing for journals, participating in seminars, or even seek to set up their own journals so as to provide an outlet for departmental publications. According to the McNay (1997) report, charities and professional associations are concerned that time pressures on academic staff as a result of the RAE initiative has made it difficult for them to obtain assistance from academics. Elton (2000) gives an overview of possible unintended consequences of the RAE.

Glass et al (1996) notes that the manner in which the RAE has been used to allocate funding has introduced scope for gaming. According to the HEFCE, the increased transparency in the 1996 RAE makes it more difficult to conduct assessment exercises without them becoming instruments of policy (HEFCE Report M6/97, May 1997: p. 7). Johnston (1994) illustrates the financial outcome of varying strategies with respect to the classification of staff as 'research active' by using tabulation. Different strategies by individual departments regarding classification would result in different levels of funding. The strategic trade off decision between quality and quantity of research active staff submission is also analysed by Talib and Steele (2000) and reduced to a maximisation formula.¹

Glass *et al* (1995) suggest that returns to scale are reducing for higher rated universities. The top rated departments are faced with a "ceiling effect"². Talib (2001) analyses the ceiling effect and how the changes in RAE 1996 and the

¹ See Chapter Five.

² See Chapter Four for analysis of the ceiling effect.

introduction of 5-star rating is an attempt to abate the effect.

There are also a number of institutional case studies reporting effects of the RAE (e.g., Green (1995) on University of Leicester; McVicar (1994) and Selway (1995) on the University of Portsmouth; and Schmidt *et al* (1994) on Manchester Metropolitan University). A detailed review of the literature on the institutional impact of the RAE is summarised in Chapter Six.

2.9 CONCLUDING REMARKS

The literature review undertaken in this chapter has assembled the theoretical basis for understanding the behavioural effects and implications for the Research Assessment Exercise (RAE). The theories and studies reviewed for this purpose include motivation, management control, clan control, and goal-setting. A brief overview of some previous studies and critiques of the RAE is also undertaken. It reveals that previous RAE studies do not differentiate the impacts for different classifications of academics, and also do not present behavioural implications of the RAE based on theoretical or empirical analysis. The thesis fills this crucial gap and lays out a future research agenda.

CHAPTER THREE

THE STUDY:

RESEARCH QUESTIONS AND METHODOLOGY

CHAPTER THREE

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RESEARCH QUESTIONS AND METHODOLOGY

3.1 INTRODUCTION

The methodologies for the surveys and the analyses are addressed in this chapter. Section 3.2 explains the design of the questionnaire for the academic, and Section 3.3 describes the research questions for this thesis. As respondents choose between “agree” and “disagree” to answer the survey questions, this chapter also explains the use of the logistic regression to model the dichotomous responses and the associated explanatory variables.

3.2 THE ACADEMIC SURVEY DESIGN

The study's objectives and overall approach were outlined in chapter one. This dissertation investigates the RAE from the perspective of the relevant stakeholders; namely policy makers, universities, academics and journal editors. To investigate the consequences and impact of the RAE on academics behaviour, a survey research instrument was used¹. A postal questionnaire was mailed in 1998 to a random sample of 1000 academics² in various disciplines across the English universities. A covering letter accompanied the survey as well as a note clarifying some questions/terms. A reply paid envelope was provided for replies. The covering letter, the questionnaire and the accompanying note are attached in Appendix 3-A of this chapter.

¹ The survey questionnaire was modelled on the survey instrument used by McNay (1997).

² The sample size is explained in chapter Eight.

The McNay (1997) questionnaire was modified to gather data to use for calibrating the econometric model developed for this thesis. As the McNay study uses the survey methodology to investigate the impact of the RAE on the behaviour of academic staff, basing our model on the 1997 study allows for a comparative analysis to be made³. McNay's 6-point Likert scale, anchored at its ends with "1" for "strongly agree" and "6" for "strongly disagree" is reused in the thesis' survey to facilitate such a comparison.

The questionnaire is designed to investigate these two main propositions:

PROPOSITION 1: That the RAE influences behaviour.

PROPOSITION 2: That the RAE increases staff mobility.

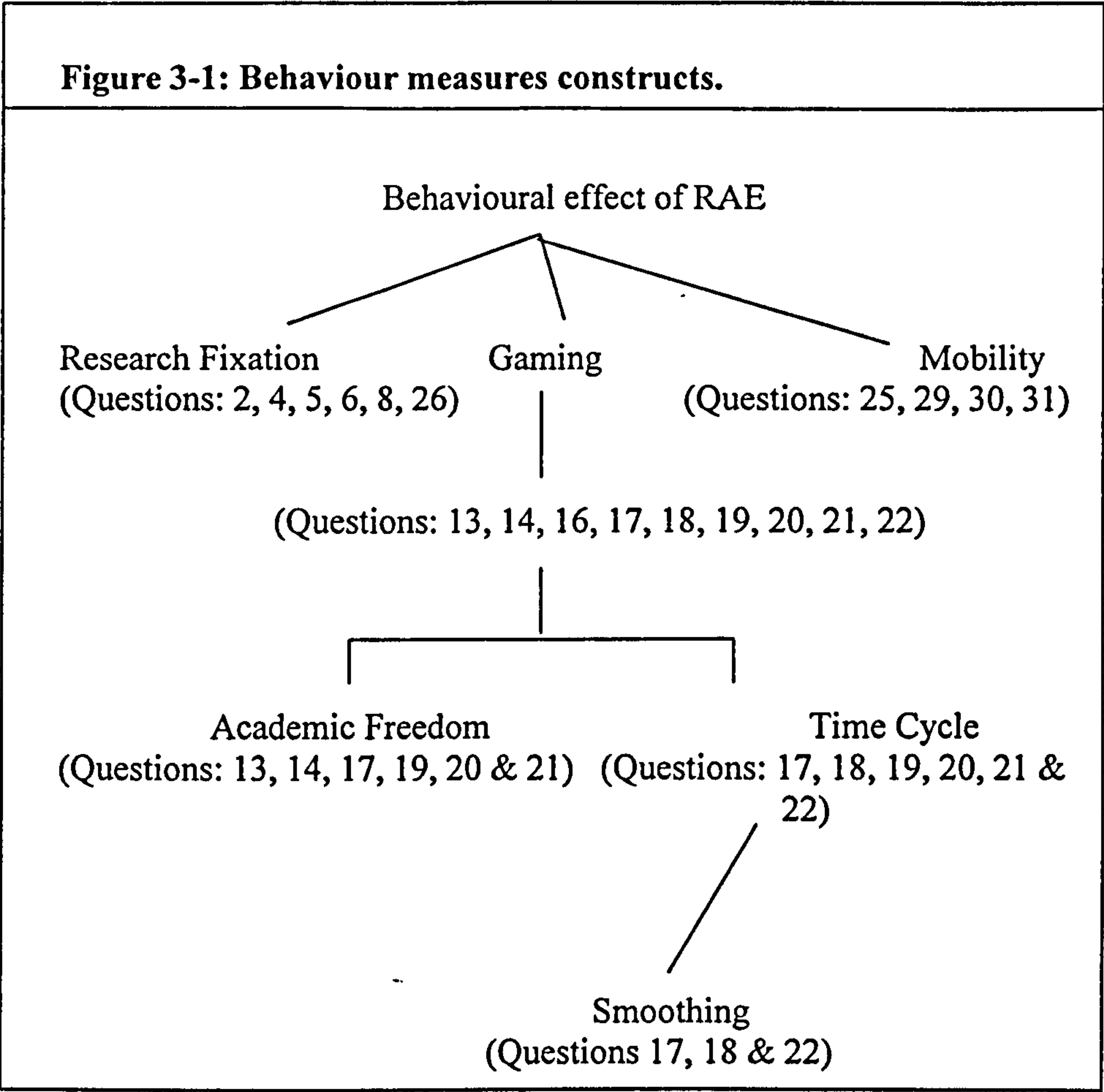
There are two categories of behavioural effects: (1) *Research Fixation*; and (2) *Gaming*. The *gaming* construct itself is comprised of a range of behaviour effects. One aspect of *gaming* is the reduction of inter-disciplinary research (Q16 in the Questionnaire) because academics might be inclined to de-emphasise inter-disciplinary research as the RAE panels are discipline specific. A study⁴ undertaken for the funding councils regarding the effects of the RAE on interdisciplinary research reports that 14% of researchers and 17% of the 1996 RAE panel members concur that the RAE strongly inhibits interdisciplinary research.

³ The comparison is in Chapter Eight.

⁴ "Interdisciplinary Research and the Research Assessment Exercise", April 1999, HEFC RAE 1/99.

The *gaming* construct is further decomposed into three other separate measures. The first is behaviour resulting from the *time-cycle effect*. This is then split into *choice of topic* and *smoothing research output*. The ability of the RAE to influence one's choice of research topics is considered an encroachment of *academic freedom*. For this purpose, the questionnaire statements dealing with the choice of research topics and premature publications are the measures for such an encroachment. In the same manner, the questions for *smoothing* – Q17, Q18, and Q22 – are combined to generate the smoothing construct.

Thus, there are a total of six measures: *mobility*, *research fixation*, *gaming*, *smoothing*, *academic freedom* and *time-cycle effect*. These measures are discussed in detail in Chapter Eight. The diagram in Figure 3-1 shows the linkages between the constructs and the survey questions. In addition to the questions in Figure 3-1, the survey has 13 additional behavioural questions to obtain perceptions rather than to record behavioural changes. The control questions – Q1 and Q3 – requested respondents to discriminate between extra time spent on research and teaching, and the extra time spent as a result of the RAE. The other questions sought views on the RAE that would be compared to the findings in the McNay study. An additional two questions enquire about the increase in the number of research students.



The above constructs and opinions are needed to examine the extent to which the RAE has resulted in some behavioural changes and patterns among the academics. These can be captured in conceptual models as follows:

$$\text{Behaviour} = f(\text{motivation, behavioural fixation})$$

and

$$\text{Motivation} = f(\text{RA, PE, JS, Age})$$

$$\text{Behavioural fixation} = f(\text{socialisation, age})$$

Therefore,

$$\text{Behaviour} = f(\text{RA, JS, Age, Socialisation, PE})$$

where:

1. RA = level of research activity (Q 45)

The goal setting literature suggests that the behavioural consequences of goal setting in a task complex environment are dependent on the subject's self assessed performance level.

2. JS = job security

Two proxy measures are considered as measures for job security (however research activity level is also pertinent):

- a) is position permanent (Q42)
- b) years in post (Q 35)

However, from the case studies of universities and interviews with senior academics and administrators, the above two proxies are not suitable proxies for job security. This is because universities are increasingly hiring contract staff, and in many instances, encouraging tenured staff to take up early retirement. These personnel policies are greatly influenced by the RAE (see Chapter Six). Hence, based on initial preliminary findings, we feel that research activity (Q45) is a better proxy for job security. Thus, Q42 and Q35 are dropped from the analysis.

3. Age = older staff are less likely to alter behaviour (Q44)

As older individuals are more risk-averse in endeavours that are probabilistic (Enomoto, 1999), they have less motivation to modify their behaviour. They would have developed behaviour fixation over the years. As they are also nearing retirement, they have less likely to change their ways. Furthermore, new behavioural strategies have different and usually higher transaction costs for older individuals⁵. Younger and newer staff have lower behaviour transaction costs, but may be full of enthusiasm and tend to be reluctant to adopt “dysfunctional” strategies.

4. Socialisation = indoctrination

Those who are “socialised” (i.e. have strong clan orientation) would generally resist changing their behaviour. This is represented by qualification (Q43), years of experience (Q34), and position (Q41).

An individual’s level of professionalism can be measured by his length of academic training (PhD) and socialisation process (experience) (Hage and Aiken, 1967).

5. PE = perceived emphasis on research

The emphasis placed on research in the academic’s external environment will influence his motivation and behaviour. If an academic’s work environment places a high level of emphasis on research, then the academic could associate

⁵ See Chapter Two.

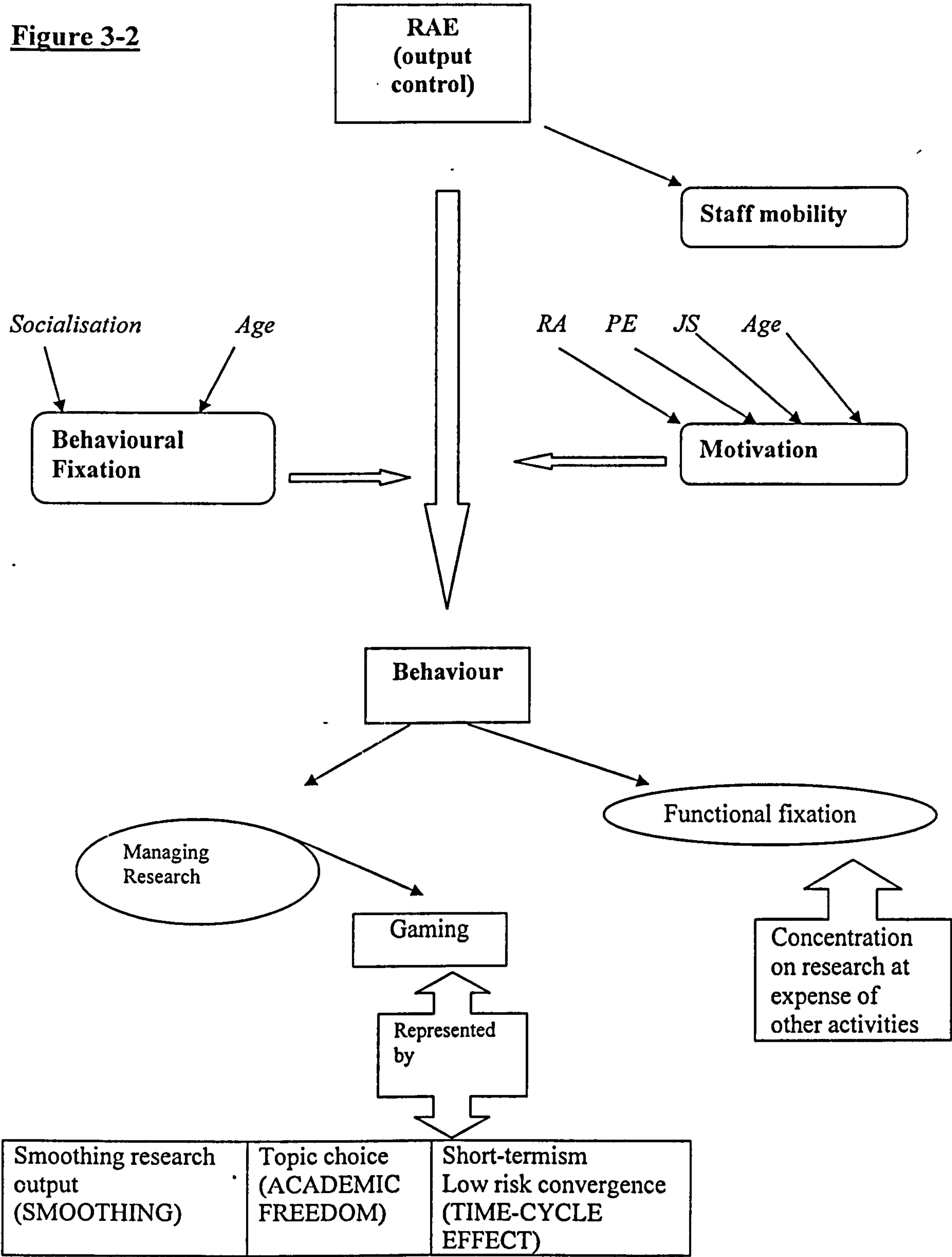
future rewards (extrinsic valances) with research performance. This, in accordance with the expectancy theory, will motivate him. Furthermore, under the equity theory of motivation, if the environment the academic works in emphasizes research and his peers are performing well in research, then the poor-performing academic might feel a sense of inequity. This feeling of inequity might motivate the academic to balance the inequity by adopting strategies to enhance his research output. These strategies could be functional, such as higher research productivity, or they could be dysfunctional, such as gaming activities and/or a concentration on research at the expense of other activities that are integral to academia.

The following proxies measure the perceived emphasis on research:

- a) Department status within University (department ranking compared to the University's average ranking) (Q38)
- b) Institution type (Q40)
- c) Department's RAE rating (Q37)

For ease of comprehension, Figure 3-2 shows the flow of the above arguments.

Figure 3-2



3.3 THE RESEARCH QUESTIONS AND ISSUES INVESTIGATED

The questions and issues for this study are classified under four major headings, and briefly explained in this section.

3.3.1 THE MAJOR QUESTIONS OR PROPOSITIONS

3.3.1.1 POLICY LEVEL IMPACT

The intended and unintended consequences of the RAE are important to policy decision-makers. The success of any public policy tool lies in its effectiveness in achieving the objectives and desired outcome. The RAE was introduced partly because of the research funding constraints that were imposed in the 1980s. It is likely that the main policy objective of introducing the RAE is to impose budget cuts with minimal political costs⁶. An explicit objective of the RAE is to reward excellent research, wherever it is found. The HEFCE categorically denies that the policy is to create centres of excellence⁷. However, the establishment of centres of excellence may have been a subsequent objective (Talib, 2001). This is elaborated in Chapter Four and leads to the first research question.

RESEARCH QUESTION 1: Does the RAE outcome reflect policy objectives?

Methodology:

An analytical review of the RAE mechanism and the RAE 1996 outcome for the Business and Management Studies (BMS) UoA is carried out in Chapter Four.

⁶ See Chapter Four for a discussion on this point.

⁷ An earlier version of Talib (2001) has been reviewed by the HEFCE and those comments are made by the reviewer.

3.3.1.2 ACCOUNTABILITY AND VISIBILITY VIS-À-VIS AUTONOMY (The Institutional Effect)

Funding from the RAE is allocated to universities on a block basis and there is no explicit requirement for the universities to distribute the funds in accordance with the formulae used by the awarding body. This partially helps to preserve the university's autonomy. In order for the RAE to strengthen the *centres of excellence*, the funds need to be distributed in accordance with the formulae. Otherwise the link between a department's research performance and its funding is broken.

RESEARCH QUESTION 2: What is the RAE's impact on the Institutions' behaviour and strategies?

Methodology:

Case studies.

3.3.1.3 THE LABOUR MARKET EFFECT

The research rating is based on the output of research staff in post at a particular date, irrespective of his location or when the research is produced and published. In some sense, universities are being rewarded for their *efficiency* in recruiting star or prolific researchers. This could lead to a "transfer market" for active researchers. It is also anticipated that universities, to attract and/or retain staff, will use reward incentives.

RESEARCH QUESTION 3: What are the RAE effects on the labour market?

Methodology:

The institutions' recruitment strategies will be investigated by case studies. The

survey of academics is used to analyse if academics believe that there are indeed pay premiums for *star* researchers.

3.3.1.4 HOW DOES THE RAE AFFECT THE MANAGEMENT OF RESEARCH?

As discussed in the literature review in Chapter Two, dysfunctional behaviours may arise if outcome controls are imposed on academics who would be more suited to clan or self-control, and the potential behavioural effects from goal setting. Control effects could be measured by examining an academic's allocation of time to different activities or by the strategies that are applied (Krafft, 1999).

RESEARCH QUESTION 4: What are the behavioural consequences as a result of the RAE?

Methodology:

The methodology adopted is a triangular approach of questionnaire, interviews and collaborative anecdotal evidence. Abernethy & Stoelwinder (1995) adopted the questionnaire methodology. A combination of interviews and questionnaires was adopted by Abernethy & Brownell (1997) and McNay (1997). In this study, in an attempt to limit the limitations of the survey methodology if adopted singularly, case study interviews and a survey of journal editors were also undertaken to support the results of the survey of academics.

3.3.2 FURTHER CONSEQUENTIAL QUESTIONS AND ISSUES

The four major research questions in Section 3.3.1 lead to a number of further issues for investigation. Most of the questions investigated are reproduced and

discussed in the “relevant”⁸ chapters, and hence are not explained in detail here. For ease of reference, the questions are reproduced in Appendix 3-B with cross-referencing to the locations in the thesis in which they are detailed.

3.3.2.1 POLICY LEVEL IMPACT

As pointed out in Chapter One, several stakeholders are relevant with respect to the functioning of the RAE. Among these, policymakers have a critical role. Chapter Four discusses whether the RAE outcomes reflect the objectives of these decision makers. The analysis discusses the *ceiling effect* and whether the introduction of the 5* rating abates this effect.

3.3.2.2 INSTITUTIONAL EFFECT

It is proposed that the RAE impacts institutional behaviour and strategies, not least of which are the submission strategies. The institutional impact of the RAE is probed with case studies of universities that are described in Chapter Six.

The impact and consequences of the RAE on institutions might differ between a university's departments and the university as a whole. Three areas of consequential impact are proposed. These are the RAE submission strategies, the allocation of RAE funding, and the hiring strategies. The objectives under each of these areas are further broken down into short-term objectives and long-term objectives that might also differ between the departments and the university. Table 3.1 displays these objectives.

⁸ For example, the questions relating to the institutional effect are discussed in Chapter Six that deals with the impact of the RAE on institutional behaviour.

Table 3.1: Short-term and long-term objectives.

	Department objectives	University objectives
1. <u>Submission strategy.</u> a) Short-term b) Long-term	<div>}</div> Reputation and staff morale.	Funding level Reputation
2. <u>Allocation of RAE funding</u> a) Short-term b) Long-term	Not applicable (distribution decision taken at university level)	To maximise benefits. (marginal implications) Equitable distribution and enhancement of reputation, in particular strategic areas.
3. <u>Hiring strategies.</u> a) Short-term b) Long-term	To fulfil teaching duties Teaching duties and research output, to enhance department reputation.	Teaching needs and inclusion in RAE submissions. Teaching duties and research performance to enhance university reputation.

The RAE submission strategies favoured by departments may not necessarily be the same ones favoured by the university. The departments have two potentially conflicting objectives. The first is to achieve a high rating to enhance the department’s reputation. The logical outcome would be to trade-off the quantity of submissions for quality. Moreover, the other objective is staff morale. To achieve this objective, departments would prefer to submit all or most of their staff as research active. The achieved rating, on the other hand, also influences

morale. The compromise objective would seem to be achieving a high rating with as high a submission as possible.

The university's objective for the RAE submission differs between the short-term and the long-term. In the short-term view, they would like to garner as much funding as possible. The maximisation of funding is the core of the model developed in Chapter Five. In a sense, the formulation does not take into account either the long-term objectives for the university or the department's objectives. The case studies in Chapter Six investigate if institutions attempt to maximise research funding by "strategic submissions".

Furthermore, the multidisciplinary nature of many departments creates a need for another strategic level of analysis for the submissions of the RAEs. This is the *where* decision, referring to which UoA to submit under (Talib, 1999). This is discussed in detail in Chapter Five. There is also the perception that higher grades are accorded to research that the RAE panel members are more familiar with (Martin and Skea, 1992). This "choice of panel" decision is investigated by interviews with university administrators.

A university's long-term objective must be to enhance its reputation, by achieving high ratings across all departments. The quest to achieve this objective raises certain questions with their attendant consequences. What does a university do with a department that is achieving an RAE rating that is below the university average? Does it cross subsidise the department to improve its ratings? Does it go out and hire researchers with a track record to boost the

department's image? Or does it close down the department? These are questions addressed in Chapter Six.

Universities receive the RAE research funding as block grants and have the liberty to allocate the funds as they wish. One dilemma they face is whether to reciprocate the departments that earn the funds in the first place, or to support the weaker departments. If the objective is to maximise the benefits of the funds in the short term, they may support the weaker departments because of the better marginal benefits as a consequence of the operation of the law of diminishing returns. As Mace (1993: p.19) comments, universities seem:

“...to see the law of diminishing returns applying if resources are allocated to already highly rated cost centres”.

As the RAE research funding is “earned” by departments or UoA's, universities may start to devolve their budgets, something that they may be encouraged to do by the RAE. The long-term objective of allocating the RAE funding could be to achieve equitable distributions and to avoid sentiments of inequity and resultant de-motivational effects⁹. Another long-term objective would be to maintain and enhance the reputation of the university, especially their areas of strength or niches. This could be the strategy for the “new” universities, as they would have difficulty competing with the established universities. Thus, the case studies of the universities attempt to reveal if the RAE leads to “niche” concentration by institutions.

⁹ See Equity Theory in Chapter Two.

The “new” universities have traditionally been teaching institutions. Research was not of paramount significance during their former polytechnic status. The RAE has essentially brought these ex-polytechnics into direct competition for the limited funds with the more established “old” universities. The research performance of these former polytechnics has to match that of the “old” universities to secure funding. This new challenge for the ex-polytechnics might require strategies that are different from the ones adopted by the “old” universities. Thus, this thesis investigates whether the ex-polytechnics as a consequence of the RAE differ from the ones adopted by the “old” universities.

The RAE formula includes the number of research students in the volume measure. Furthermore, research students increase the research culture in institutions. This leads us to investigate if research student numbers have expanded as a result of the RAE.

3.3.2.3 LABOUR MARKET EFFECT

The RAE has fostered many changes in the management of human resources (Talib and Steele, 2000: p. 80). Institutions are focusing on whom they should recruit for research, and how they should reward and retain existing staff. The McNay (1997) survey of academics showed that 12% of the recent appointees (or those who are less than one year in post) acknowledge the RAE as the dominant factor in their employment, while 30% deem it a significant factor.

The RAE assesses institutions on the basis of the performance of the staff in post on the census date. It is thus crucial who is in post on that date. This accelerated

a frenzy in the transfer market during the run-up to the 1996 RAE¹⁰. Hence, this leads to the proposition that the RAE influences staff mobility.

The immediate and significant objective of hiring staff is no doubt to fulfil teaching requirements. The long-term objective has always included research output as well (see Table 3.1). The RAE has introduced an additional dimension to the short-term hiring objective, that of whom to include in the submission. As apparent from Table 3.1, the objective is to hire excellent teachers who are also excellent researchers. The problem is that there are only a few who are good in both aspects, and that it is no trivial task to recruit them. In the world of the RAE, it is not clear-cut who a university would choose: an excellent teacher or an excellent researcher. Would the RAE result in categorising academics as researchers and teachers? Would the excellent teachers who under-perform in research be hired as teaching-only staff with no research output expectation in exchange for a higher teaching load, to relieve researchers from teaching? The various strategies that universities adopt are discussed in Chapter Six.

Talib and Steele (2000) highlighted the value of the mentor “star” researchers. That coupled with the “snapshot” approach of the RAE, could lead to institutions hiring “star” researchers with a proven track record who can double as mentors. While this “head-hunting” effort could be complimented with premiums being offered to candidates, at the other extreme, unproductive (research) staff could be persuaded to retire early or be given higher teaching and administrative loads.

¹⁰ The *Economist* (August 24th, 1996) raises the issue of the transfer market for academics that is analogous to the football market.

The hiring strategies adopted by institutions are investigated by the case studies. Apart from the hiring strategies actually adopted, we wanted to investigate the belief among academics on staff mobility. This belief was investigated by the survey of academics and furthermore, we tested if this belief among academics is dependent on the academics' characteristics.

3.3.2.4 ACADEMICS' BEHAVIOURAL EFFECT

The survey questionnaire, similar to McNay (1997), is used to collect data on the changes to behaviour due to the 1996 RAE. Besides comparing the findings with the McNay study that was based on the 1992 RAE, the objective is to extract the changes that have occurred during the interim.

Based on the contingency theory and work-related subject's characteristics as a contingent factor, the effect of the RAE on a subject's behaviour is hypothesised to depend on the subject's characteristic. From this proposition, we developed secondary propositions and raised further questions to investigate. We first tested for independence between the response variable and the characteristic variable. The statistics used to test the null hypothesis of independence and the results are described in Chapter Eight.

The mean responses of the groups, segmented by characteristics, are found to be statistically different though the analysis of variance method (ANOVA)¹¹ in Chapter Nine.

¹¹ The results of the ANOVA and Kruskal-Wallis tests were found not to be significantly different. Hence, we felt it was appropriate to use ANOVA.

The behavioural impact of the RAE on academics also suggests a number of other questions such as:

- Is the impact of the RAE on academics in the ex-UFC sector different from the impact on academics in the ex-PCFC sector?
- Do the more experienced academics exhibit less behavioural changes attributable to the RAE?

Academics in the departments that are rated lower than the average departmental rating for the university experience peer pressure to increase their RAE ratings. This pressure also applies to departments having low ratings. This pressure could result in dysfunctional behaviour and raises the following questions:

- Do academics in the departments that are rated lower than the average departmental rating for the university have higher research fixation and practise more gaming?
- Do academics in the lower rated departments practise more gaming?
- Do academics in the higher rated departments have higher research fixation?

Chapter Two has already explained that age and qualifications are significant contributing factors to motivation. Thus, we investigated if older academics are more resilient to changes and whether those with PhD qualifications practise less gaming.

Brinn *et al* (1998) argue that senior and non-senior staff would in general tend to have different responses to research and publication and to the RAE in particular. Junior staff may be anxious to build and develop their publication records in

order to develop their research competencies to enhance their career prospects. As the senior staff would not be subject to the same concerns (*ibid*: p. 315), they are not likely to practise gaming in publication management.

The RAE sets a goal of four published outputs per RAE cycle. Goals can promote performance by increasing the motivation and also stimulate the search for strategies to attain the goals (Locke *et al*, 1981; Earley *et al*, 1989; Locke and Latham, 1990). In the context of the RAE, task strategies can take the form of managing the output of the research and/or managing the choice of research topics. This leads to the investigation if the behavioural consequences of the RAE on an individual's research and publications management are dependent on the expected level of research performance. The RAE essentially defines research as published work, thereby intensifying an academic's focus on publications. The goal for academics is published research not research *per se*. Thus, the strategies to enhance the published output are scrutinized by the survey of academics. As shown in Figures 3.1 and 3.2, these publication strategies are a part of the *gaming* construct. Additional input is sought from the survey of journal editors in Chapter Seven. This survey of journal editors studies the following propositions:

- Academics in their attempt to increase publications have placed emphasis on quantity rather than quality.
- Academics will increase collaboration with colleagues to increase publication output.
- The RAE deadlines and requirement of four publications will result in a rush of submissions just prior to the RAE deadlines.

- Academics will attempt to extract as many papers as possible from the same research project.
- Academics will be reluctant to devote time for refereeing papers for journals.
- The RAE has resulted in a proliferation of journals.
- The emergence and proliferation of “in-house” journals is attributed mainly to the RAE.
- The RAE has potential unintended consequences on publishing ethics.

We have listed in this section the questions addressed and tested in this thesis, grouped under the four headings. They are expanded in more detail in the relevant chapters , for a better appreciation.

3.4 ECONOMETRIC METHODOLOGY

This section explains the use of the logistic regression model for dichotomous variables as the primary tool for analysing the academic survey data. The discussion commences with the linear probability model and leads to the logistic regression model.

Respondents to the survey questionnaire are requested to indicate their levels of agreement or disagreement on a scale of 1 through 6, where 1, 2 and 3 are for agreement, and 4, 5 and 6 for disagreement. The responses can be, more generally, collapsed into two groups: (1) agrees, or (2) disagree. Since they provide qualitative responses, the logistic regression model is used to model the formulation of their choices.

3.4.1 DICHOTOMOUS VARIABLE MODELS

The logistic regression model is considered appropriate because the dependent variable is dichotomous and $E(Y_i | X_i)$, the conditional expectation of Y given X is the conditional probability that the event will occur given X . The event is the agreement that certain behaviours exist. The academics respond to the survey by agreeing or disagreeing to the survey statements. The model then estimates the probability that an academic with a given set of attributes will make a certain choice.

The simplest procedure to estimate the regression model where the dependent variable is dichotomous is the usual least squares method. This is the *linear probability model* (LPM), described in Section 3.4.2. An alternative method takes the position that there is an underlying or latent variable y^* which is not observable (Maddalla, 1992). What can be observed is $y = 1$ if $y^* > 0$, and $y = 0$, otherwise. This is the central idea behind the *Logit* and *Probit* models.

3.4.2 THE LINEAR PROBABILITY MODEL (LPM)

In *linear probability models (LPM)*, the equation expresses the dichotomous dependent variable Y as a linear function of the explanatory variable(s) X as follows:

$$Y_i = \beta_1 + \beta_2 X_i + \mu_i$$

The conditional expectation of Y given X : $E(Y_i|X_i)$, can be interpreted as the *conditional probability* that the event will occur given X . The μ_i are the disturbances.

Assuming $E(\mu_i) = 0$, to obtain unbiased estimators, we get

$$E(Y_i|X_i) = \beta_1 + \beta_2 X_i$$

Now letting P_i = probability that $Y_i = 1$ (*i.e.*, the event occurs) and $1 - P_i$ = probability that $Y_i = 0$ (*i.e.*, the event does not occur), the variable Y_i has the following distribution:

<u>Y_i</u>	<u>Probability</u>
0	$1 - P_i$
1	P_i
Total	<u>1</u>

Therefore $E(Y_i|X_i) = 0(1 - P_i) + 1(P_i)$

And $E(Y_i|X_i) = \beta_1 + \beta_2 X_i = P_i$

The probability (P_i) must lie between 0 and 1.

3.4.3 THE PROBLEMS WITH LPM

The fundamental problem with the LPM is that it is not a logically attractive model because it assumes that $P_i = E(Y = 1|X)$ increases linearly with X , that is, the marginal or incremental effect of X remains constant throughout. This linear

relation does not represent the relationship of the variables in the dataset. Thus, among other reasons discussed below, the LPM is not pursued.

3.4.3.1 NON-NORMALITY OF THE DISTURBANCE μ_i

The ordinary least squares (OLS) method of estimation assumes that the disturbances (μ_i) are normally distributed. However, for LPM the μ_i only takes two values and has a binomial distribution.

$$\mu_i = Y_i - \beta_1 - \beta_2 X_i$$

$$\text{and when } Y_i = 1 \quad \mu_i = 1 - \beta_1 - \beta_2 X_i$$

$$\text{and when } Y_i = 0 \quad \mu_i = -\beta_1 - \beta_2 X_i$$

The non-adherence to the normality assumption may not be critical as the OLS point estimators remain unbiased (Gujarati, 1995: p. 543). Furthermore, according to the central limit theorem, as the sample size increases, the OLS estimators tend to be normally distributed generally (Malinvaud, 1966: pp. 195-197)¹². If the regressors are deemed stochastic and are jointly normally distributed, the F test can still be used even though the disturbances are non-normal. Therefore, in large samples the statistical inference of the LPM will follow the usual OLS procedure under the normality assumption.

3.4.3.2 HETEROSCEDASTIC VARIANCES OF THE DISTURBANCES

The variance of μ_i is heteroscedastic because it depends on the conditional expectation of Y_i , which, of-course, depends on the value taken by X . Thus, ultimately the variance of μ_i depends on X and is thus not homoscedastic. In the

presence of heteroscedasticity, the OLS estimators, although unbiased, are not efficient; that is, they do not have minimum variance. This problem, however, is not insurmountable (Gujarati, 1995: Chapter 11 provides methods to deal with the heteroscedasticity).

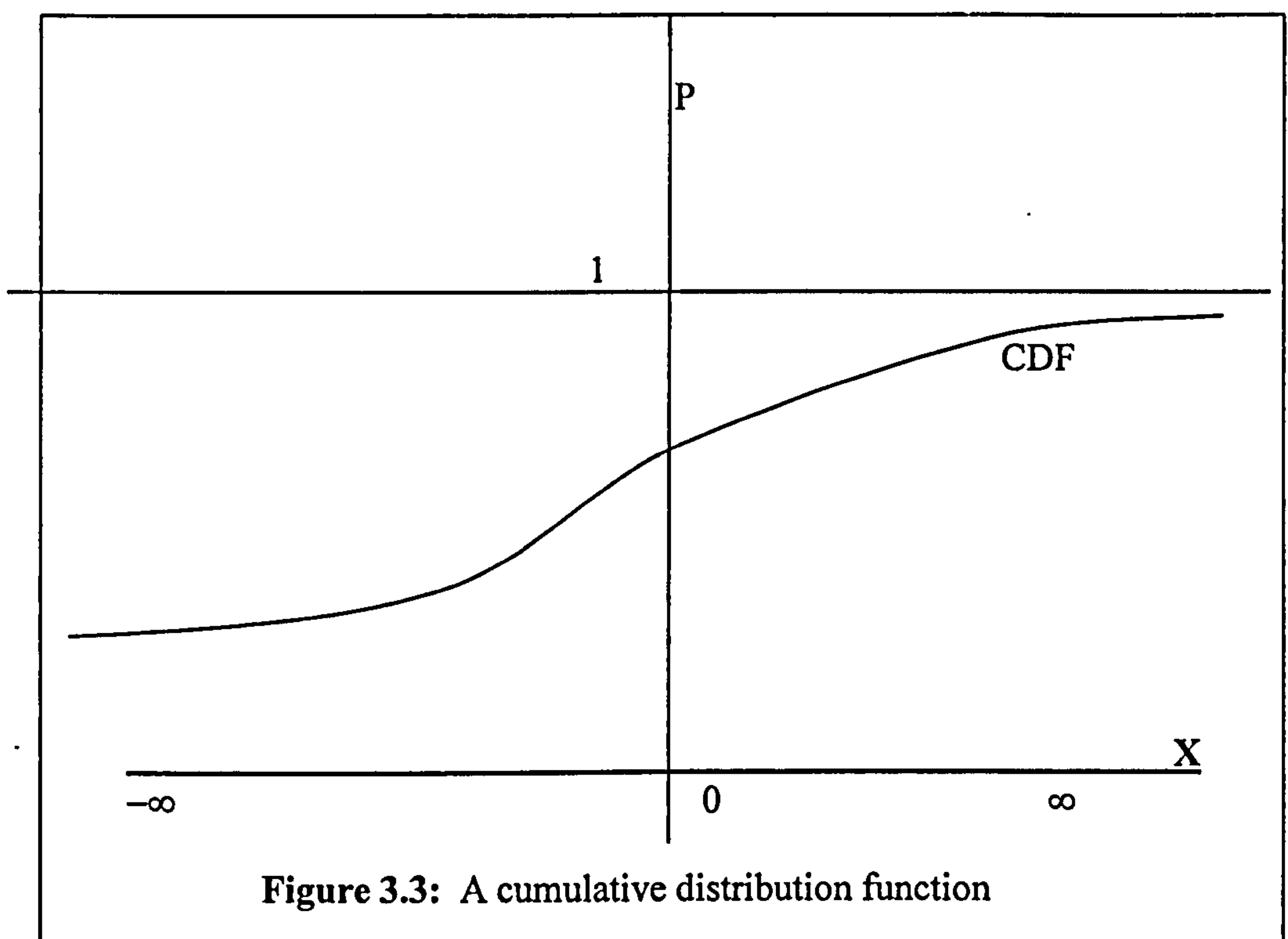
3.4.3.3 NONFULFILLMENT OF $E(Y_i | X_i)$ LIES BETWEEN 0 AND 1

There is no assurance that the estimator of $E(Y_i | X_i)$ will necessarily lie between 0 and 1, and this is a significant problem with the OLS estimation of LPM. The logit and probit models guarantee that the estimated probabilities will indeed lie between the logical limits 0 and 1.

3.4.4 REQUIRED FEATURES IN PROBABILITY MODEL

It is essential to develop a probability model that has these two features: (a) as X_i increases, $P_i = E(Y = 1|X)$ increases but never steps outside the 0-1 interval, and (b) the relationship between P_i and X_i is non-linear, that is “one which approaches zero at slower and slower rates as X_i gets small and approaches 1 at slower and slower rates as X_i gets very large”. The model should have a cumulative distribution function (CDF) as shown in Figure 3.3 (Gujarati, 1995; Maddala, 1992).

¹² If P_i takes particular values in relation to the sample size.



The CDFs used to represent the 0-1 response include (1) the logistic distribution-giving rise to the logit models, and (2) the normal distribution giving rise to the probit model.

The probit model assumes that the errors μ_i in the regression model follow a normal distribution while the logit assumes a logistic distribution. Since the cumulative normal and the logistic distributions are very close to each other except at the tail end, we are not likely to produce different results with the probit or the logit methods (Maddala, 1992: p. 328). However, the estimates of the parameters β_i from the two methods are not directly comparable. The logit estimates need to be multiplied by 0.625 to be comparable to the estimates obtained from the probit model (Amemiya, 1981).

Therefore, for dichotomous dependent variables, the two models are essentially the same (Altman *et al*, 1981) and the choice between them is one of convenience (Gujarati, 1985). For this reason, and because the logistic regression is used for this study, the probit model is not described here. The next section explains the logistic regression model.

3.4.5 THE LOGISTIC REGRESSION

For this model, the first step is to define P_i , the probability that the i th respondent chooses the first option or answer, as given in equation (3-1) below:

$$P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-(B_1 + B_2 X_i)}} \quad [3.1]$$

Equation [3.1] is the logistic distribution function and can be written as

$$P_i = \frac{1}{1 + e^{-Z_i}} \quad [3.2]$$

If P_i is the probability of a YES (agree) response, then $(1-P_i)$, the probability of a NO (non-agreement) response is:

$$1-P_i = \frac{1}{1 + e^{Z_i}} \quad [3.3]$$

where $Z_i = \beta_1 + \beta' X_i$

$e = 2.71828$

and $\beta' X_i$ is a vector of variables; where $Z_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_n X_{ni}$ and where the subscript i refers to the i th respondent. The X s represent the characteristics of the individual, which determine P_i .

As Z approaches $+\infty$, e^{-Z_i} tends to zero, as Z approaches $-\infty$, e^{-Z_i} increases indefinitely. Therefore P_i ranges between 0 and 1 and is nonlinearly related to Z_i (i.e. X_i), thus satisfying the two requirements mentioned earlier. P_i is non-linear not only in X but also in the β 's as can be seen from the logit model.

This function is monotonic, with $P(x) \downarrow 0$ or $P(x) \uparrow 1$ as $(x) \uparrow \infty$ depending on whether $\beta < 0$, or $\beta > 0$. It takes the value $P(x) = 1/2$ at $x = -\alpha/\beta$, and the curve has a steeper rate of increase around that value as β increases. When $\beta > 0$, this curve is the distribution function of the logistic random variable having mean $-\alpha/\beta$ and standard deviation $[P/(3\beta)]^{1/2}$.

Therefore, from equation 3-2 and 3-3 we can write:

$$P_i / (1-P_i) = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad [\text{Equation 3.4}]$$

Now $P_i / 1-P_i$ is simply the *odds ratio* in favour of agreement; the ratio of the probability of “agree” to the probability of “not agree”. Thus if $P_i = 0.8$, it means that odds are 4 to 1 in favour of agreement.

If we take the natural log of [Equation 3.1] we obtain L , the log of the odds ratio.

$$L_i = \ln(P_i / 1 - P_i) = Z_i = \beta_1 + \beta_2 X_i$$

L is called the **logit** and is not only linear in X but also linear in the parameters.

It is this linearity in the parameters that is crucial.

The logistic regression, therefore, transforms a dependent variable having inherent non-linear relationships with a set of independent variables into a dependent variable having a linear relationship with a set of independent variables. Logit models estimate the linear determinants of the logged odds or logits rather than the non-linear determinants of probabilities. Therefore, in linearising the non-linear relationship, logit models shift the interpretation of coefficients from changes in probabilities to the less intuitive changes in logged odds. The loss of interpretability however is balanced by the gain in parsimony; the linear relationship with the logged odds can be summarised with a single coefficient, but the non-linear relationship with the probabilities cannot be so simply summarised.

Logit models also have the following features:

1. Although L is linear in X , the probabilities themselves are not. This property is in contrast with LPM model where the probabilities increase linearly with X .
2. As P goes from 0 to 1, the logit L goes from $-\infty$ to $+\infty$. That is although the probabilities (of necessity) lie between 0 and 1, the logits are not so bounded.
3. The interpretation of the logit model is as follows: β_2 , the slope, measures the change in L for a unit change in X . This tells how the log-odds in favour of agreeing, change as the dependent variable (X) changes by a unit. The intercept β_1 , is the value of the log-odds in favour of agreeing if the independent variables are zero.

4. Whereas the LPM assumes that P is linearly related to X , the logit model assumes that the log of odds ratio is linearly related to X .

3.5 THE LOGISTIC REGRESSION MODEL

This section describes the application of the logistic regression model we applied to the dataset from the survey of academics. The empirical results from the model are developed in Chapter Nine. We first delineate the variables in the model and that is followed by a discussion of the model.

The responses of the survey are grouped into “agree” and “non-agree”. Hence, our response (dependent) variable was dichotomous. The dependent variable is the dummy variable = 1 if behaviour exists (agreement) and 0 if there is no agreement that behaviour exists (as result of the RAE). The model estimates the probability that an academic is adopting (or has increased) a specific behaviour.

The explanatory (predictor) variables in the model are:

Discipline: A set of dummy variables for discipline:

1 Science	1 if respondent in a Science related discipline, and 0 otherwise
2 Physics	1 if respondent in Physics UoA, and 0 otherwise
3 Engn	1 if respondent in Engineering, and 0 otherwise
4 BMS	1 if respondent in Business & Management UoA, and 0 otherwise
5 Liberal	1 if respondent in a Liberal Arts, and 0 otherwise

6 EDUC	1 if respondent in Education, and 0 otherwise
7 BUZ	1 if respondent in a Business related discipline, and 0 otherwise

Reference Category: Others disciplines

The respondents are grouped into seven classifications based on discipline and into an eighth classification for other disciplines (the control reference category). Academics from different UoAs but cognate disciplines are allocated to the same classification. The disciplines grouped under each classification with the frequencies in each group are shown in the Appendix of Chapter Nine.

Experience (EXP): A set of dummy variables for level of years of experience:

- 1. < 10 years experience
- 2. 10 –15 years experience
- 3. 15 –20 years experience

Reference category: over 20 years experience.

Department Rating (DR)

A set of dummy variables for department rating:

- 1 Department rated 5*
- 2 Department rated 5
- 3 Department rated 4
- 4 Department rated 3a.
- 5 Department rated 3b

Reference category: non-funded rating (1 and 2).

Average	This measures if the department rating is below or above
Rating (AVR)	average compared to the other departments in the university.
	This measure is a proxy for level of research emphasis and level of peer pressure.
	1 Higher than university average
	2 Lower than university average
	Reference category: department rating is about average of university.
Inst. Type	Dummy variable for Institution type:
	1 = ex- UFC 0 = ex-PCFC
PhD	Dummy variable for PhD:
	1 = no PhD 0 = PhD
Post	A set of dummy variables for academic post:
	1 Professor.
	2 Reader.
	3 Principal lecturer.
	4 Senior lecturer.
	Reference category: lecturer

Age group	A set of dummy variables for age group:
1	Below 40 years old.
2	Age between 40 and 50.
	Reference category: over 50 years old

Research Activity (RESACT)

A set of dummy variables for self assessed level of research activity:

1. Moderate activity
2. Quite active
3. Very Active

Reference category: inactive.

The model reference category is: An academic in “other” discipline, with over 20 years academic experience, in a department rated 1 or 2 in an ex PCFC institution where the average rating for the departments is 1 or 2, has a PhD, is over 50 years old and is still a lecturer who is inactive in research.

The resultant model is:

$$P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-Z_i}}$$

where:

P_i is the probability of agreement to a behaviour (i.e. the conditional probability)

And

$$Z_i = \beta_1 + \beta_2(\text{Discp}) + \beta_3(\text{EXP}) + \beta_4(\text{Dept Rating}) + \beta_5(\text{AVR}) + \beta_6(\text{INST}) + \beta_7(\text{PhD}) + \beta_8(\text{POST}) + \beta_9(\text{AGE}) + \beta_{10}(\text{RESACT})$$

A number of the variables are represented by a set of dummy variables. Therefore, those variables are decomposed into a number of dummy variables. Each dummy variable has its own coefficient; resulting in a total of 29 coefficients, including the constant, for the model. The coefficients and the resultant models are provided in Chapter Nine.

Age and academic experience are treated as categorical, instead of continuous, data. This treatment of age and academic experience as continuous variables has the implicit assumption that both variables have linear relationships with the probability. Older academics also have less motivation to alter their behaviour as they would have developed behaviour fixation over the years. The young new academics are more enthusiastic and may be reluctant to adopt “dysfunctional” strategies. Non-senior staff may be concerned to build and develop their publication record in order to demonstrate a research reputation, so as to enhance their promotion prospects. As a consequence one might expect non-senior staff to be particularly concerned with strategies, which might damage their reputation (Brinn et al 1998 p 315). We therefore expected that academics in the middle range of age and experience to have the highest behavioural impact from the RAE.

Furthermore, the data collected for these variables are not of a strictly “continuous” nature; respondents are asked to indicate which age group and experience group they belong to. Nevertheless, if the relationship were linear, it

would be identifiable from the results even when the variable is treated as categorical. Therefore, the categorical classification with a set of dummy variables would be more informative for the identification if the probability is higher for any particular group.

3.5.1 INTERPRETATION OF THE MODEL

There are three possibilities for interpreting the results of the logistic model. First, the slope (coefficient) can be used to indicate the expected change in the logit for a unit change in X. The difficulty with this is that it has little intuitive meaning. Second, the coefficient can be transformed to indicate the change in the odds (rather than the log odds) for a unit change in X. Third, the effects can be described in terms of probabilities.

The logistic regression coefficient shows the change in the predicted logged odds of experiencing an event or having a characteristic, such as agreement in this case, for a one-unit change in the independent variables. It has exactly the same interpretation as the coefficients in classical regression except that the units of the dependent variable represent the logged odds. For dummy explanatory variables, a change in one unit implicitly compares the indicator group to the reference group. These coefficients, however, reveal little about the relationship and do little to explain the substantive results (Pampel, 2000).

The effects of the independent variables on the logged odds are linear and additive - each X has the same effect on the logged odds regardless of its level or the level of other X variables – but the units of the dependent variable, logged odds, have little intuitive meaning. The effects of the independent variables on

the probabilities has intuitive meaning, but are non-linear, and non additive - each X variable has a different effect on the probability depending on its level and the level of the other independent variables. Despite the interpretable units, the effects on probabilities cannot be summarised in the form of a single coefficient. For this reason, a table of probabilities for various combinations of levels of the independent variables is produced. A more meaningful interpretation comes from the odds ratio. The coefficients (β) are transformed so that the independent variables affect the odds rather than the logged odds of the dependent variable. The interpretation of the effects of the independent variables on the odds offers a compromise between logged odds (β) and probabilities. The odds have more intuitive appeal than the logged odds (β), and can express effects in a single coefficient. The effects on odds are multiplicative rather than additive, but still have a straightforward interpretation.

3.6 CLOSING REMARKS

The research design adopted for this dissertation was briefly described in Chapter One. This was amplified on this chapter. The research questions and propositions investigated in the thesis were detailed in section 3.3. For ease of reference, we listed the investigated questions and propositions in Appendix 3-B cross-referenced to the location in the thesis where they are discussed in more detail.

The (academics) survey design was explained and rationalised in section 3.2. The econometric methodology and procedures adopted for analysing the data from the survey of academics was explained in the chapter. We explained in

section 3.4, the logistic regression methodology and proceeded to explain, in section 3.5, the model we applied to our data set.

The remaining chapters have been structured, to a large extent, to be independent self-explanatory chapters. The linkages between the various chapters of this thesis have been detailed in Chapter One and this chapter.

Appendix 3-A
The Questionnaire

Dear Colleague,

I am undertaking a research project on the impact, and the 'perceptions' of academics of the impact, of the Research Assessment Exercise (RAE).

I am seeking your help in this research project and would be extremely grateful if you could spare the time to complete the questionnaire and then return it in the reply paid envelope provided

The questionnaire does not request the identity of respondents. All information provided in the returned questionnaire will be treated as confidential and will only be used in aggregate form in combination with all other responses.

I do hope that you will be able to participate in the survey and would be grateful if you could complete and return the questionnaire as soon as possible. If you have any queries please do not hesitate to call me at (01926) 313021 or at (0467) 621644 or email me at: ameentalib@msn.com

I thank you for your assistance.

Yours sincerely,

Ameen Talib

RESEARCH ASSESSMENT EXERCISE QUESTIONNAIRE.

ALL RESPONSES WILL BE TREATED AS CONFIDENTIAL. THE SUCCESS OF THIS STUDY IS DEPENDANT ON YOUR RESPONSE; I EXPRESS MY GRATITUDE FOR THE TIME SPENT.

Please answer questions 1 to 32 on basis of how strongly you agree or disagree with the statements describing your individual behaviour/belief. The answers are on a scale of 1 to 6. Boxes 1 to 3 are for agreeing and boxes 4-6 for disagreeing. Please tick box [1] if you very strongly agree, box [2] if you strongly agree, box [3] if you agree but less strongly and box [6] if you very strongly disagree. The scale is in order of strength of agreement; where box [1] represents the strongest agreement and box [6] represents the strongest disagreement.

1. I now spend more time on research than 6 years ago.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

2. I now spend more time on research than 6 years ago as a result of the RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

3. I now spend less time in teaching preparation than 6 years ago.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

4. I now spend less time in teaching preparation than 6 years ago as a result of the RAE pressure on research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

5. I now give less time than 6 years ago to 'voluntary' academic activities- e.g. referring for journals.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

6. I now give less time to activities given no or low recognition by RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

7. The RAE has had a positive effect on my research output.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

8. Because of RAE, I now spend less time in voluntary academic work.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

9. I am feeling more pressure to publish due to the RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

10. I now (try to) collaborate more with researchers overseas to demonstrate international excellence.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

11. I now collaborate less (in research) with academics from other English universities.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

12. I now collaborate more (in research) with colleagues in my department.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

13. Perceived research preferences of RAE panels have affected my choice of research topic.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

14. The balance of my research has moved away from the 'applied' end of the spectrum towards more basic, 'pure' research .

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

15. In my view, RAE has a negative effect on inter-disciplinary research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

16. I now do less inter-disciplinary research than 6 years ago.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

17. Because of the RAE time-scales I have published some outputs at an earlier stage than I would prefer.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

18. Because of the RAE time-scales I have deferred the publications of some research output.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

19. My research topics or projects are influenced by the RAE time-scale.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

20. Because of the RAE time-scales I have avoided some research topics or projects because they would have taken a long time to complete.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

21. Because of the RAE time-scales I have avoided some research projects because they were speculative in nature (more risky in relation to security of output).

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

22. I now manage my research publications by '*smoothing*' it over the RAE time cycle (i.e. in trying to ensure sufficient publications for the RAE I publish early if I do not have enough publications and/or I defer publication if I have published sufficiently so as to ensure enough publications in the next round of RAE)

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

23. The RAE has increased my stress level.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

24. The RAE has improved the quality of research conducted in Universities.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

25. I believe RAE increases staff mobility between institutions.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

26. I now spend less time on consultancy work (including 'external' lecturing) to concentrate on research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

27. My department have expanded research student numbers beyond the capacity to supervise as well as we wish.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

28. I believe that the expansion in research student numbers is due to the RAE funding formula.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

29. University appointments are now driven by the RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

30. Universities are now paying a 'premium' to attract 'star' researchers.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

31. Academic researchers pay has increased due to the recognition earned from the RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

32.(a) The RAE four year time cycle is not appropriate for my subject area research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

(b) What, in your view, will be an appropriate RAE time cycle for your subject area?

2 years ☐ 4 yrs ☐ 6 yrs ☐ 8 yrs ☐ Other (specify) ☐

Personal Details:

33. What is your Primary department? (i.e. what unit of assessment, per HEFCE classification, would you fall under?).

34. How many years have you been in academia?

5 years ☐ 5-10 years ☐ 10-15 years ☐ 15-20 ☐ over 20 years ☐

35. How long have you been in current post?

2 years ☐ 2-5 years ☐ 5-10 years ☐ over 10 years ☐

36. Were you included in the submission as research active staff?

Definite Yes ☐ Probably Yes ☐ Probably No ☐

Definite No ☐ Not sure ☐

37. What was your department's rating in RAE 1996?

5* ☐ 5 ☐ 4 ☐ 3a ☐ 3b ☐ 2 ☐ 1 ☐

38. Was your department research rating higher or lower than the average rating for your institution?

Higher ☐ Lower ☐ About average ☐ Not sure ☐

39. What proportion of staff were submitted by your department (subject area) in the RAE 1996?

A (95-100%) ☐ B (80-94%) ☐ C (60-79%) ☐

D (40-59%) ☐ E (20-39%) ☐ F (less than 20%) ☐

Not sure ☐

40. Is your institution ex-UGC ('old') or ex- PCFC ('new')?

Old ☐ New ☐

41. Post Held.

Professor ☐ Reader ☐ Principal Lecturer ☐ Senior Lecturer ☐

Lecturer ☐ Other (please specify)

42. Are you in a 'permanent' position?

Yes ☐ No ☐

43. Please *tick* the box against the qualification/degree you have.(*tick as many boxes as relevant*).

PhD ☐ MSc./MBA ☐ Professional Qualification ☐ BSc/BA ☐

44. What is your age group.

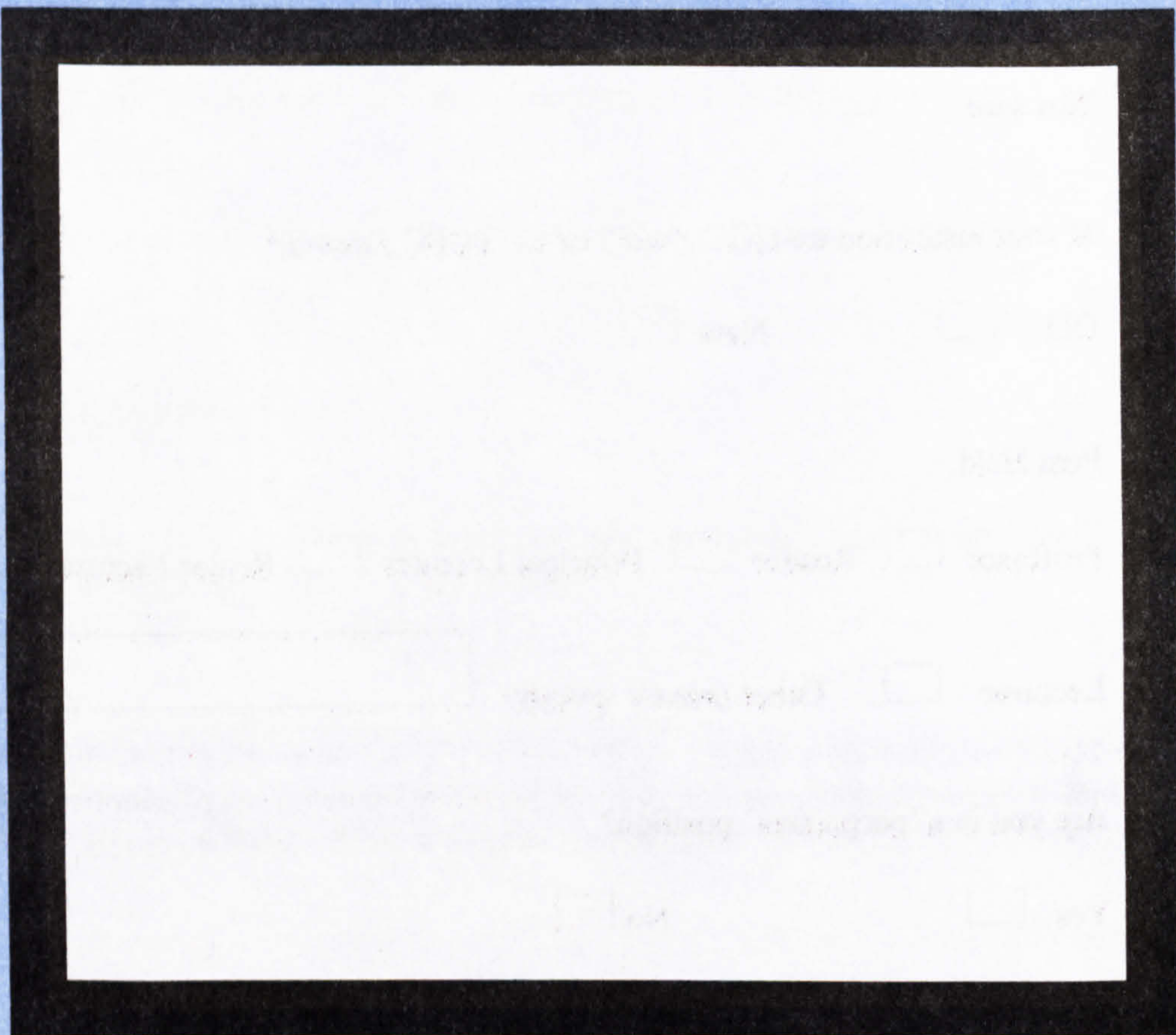
under 30 years ☐ 30-39 ☐ 40-49 ☐ over 50 years ☐

45. How would you rank yourself as a researcher?

Not at all active ☐ Quite inactive ☐ Moderately active ☐

Quite active ☐ Very active ☐

If you have any comments that you would like to make regarding any of the items on this questionnaire and/or the Research Assessment Exercise, please write them in the space below or attach a separate sheet.



THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY.

When complete, please return the questionnaire in the reply paid envelope provided to:

Ameen Talib
Warwick Business School
University of Warwick
Coventry
CV4 7AL

All comments will be treated as anonymous. All information provided in this questionnaire will be treated as confidential and will only be used in aggregate form in combination with all other responses.

THE RESEARCH QUESTION

RESEARCH ASSESSMENT EXERCISE QUESTIONNAIRE EXPLANATORY NOTES:

1. 'Voluntary academic work' (Q5 & 8) refers to unpaid work undertaken by academics on voluntary basis. An example is refereeing papers for journals.
2. Question (6) refers to activities such as teaching and refereeing; which are not directly rewarded under the RAE mechanism.
3. Question (11): English universities should read British universities.
4. The term 'Department' in the questionnaire also refers to 'division', 'subject area' or 'unit of assessment' as appropriate.
5. 'Current post' in question (35) refers to the number of years in the same post (i.e. lecturer, senior lecturer etc.) . This should be the total number of years in the same current post at present and previous institutions.
6. Question (36) refers to the 1996 RAE submission. The answer is expected to be a definite yes or a definite no. However if you are not informed about your inclusion in the submission you have a choice of three responses. A 'Probably Yes' indicates your belief that you should have been included based on your research output and the department rating.
7. Question (39) refers to the proportion of full-time equivalent (FTE) staff submitted for assessment as described in the published ratings

THE RESEARCH QUESTION.

The table below lists all the questions and propositions investigated in this study, referenced to the location where they are discussed.

	QUESTION / PROPOSITION	METHODOLOGY	REF.	
	RAE outcome reflects policy objectives. RAE leads to concentration of research funding. A “ceiling-effect” exists.	Logical analysis. } Analysis of BMS UoA outcome of 1996 RAE.	} Chap. 4	
	RAE allows scope for strategic submission. RAE increases the value of ‘star’ researchers, particularly the ‘mentor’ type.	} Mathematical Analysis.	Chap. 5	
	RAE influences institutional behaviour and strategies Universities preserve their autonomy in the internal resource allocation over accountability and visibility and Cross-subsidy between departments exist. RAE encourages devolved budgeting. RAE leads to ‘niche’ concentration by institutions. New universities strategies differ from the old universities Research student numbers are expanded as result of RAE. Institutions attempt to maximise research funding by ‘strategic submissions’.	 } Case study of Universities. Case study and survey } Case study	Chap.6 Chap 6 and chap 8 Chap 6	

	QUESTION /PROPOSITION	METHODOLOGY	REF	
	<p>Institutions do consider the RAE panel unit of assessment to submit staff under, to maximise funding outcome.</p> <p>RAE influences staff mobility</p> <p>RAE influences hiring strategy; ‘star’ researchers are headhunted and inactive encouraged to taking early retirement.</p> <p>Academics believe RAE influenced mobility and pay.</p> <p>The belief in mobility effect is dependent on academics’ characteristics.</p> <p>The RAE effect is developing over time.</p>	<p>} Case study</p> <p>Survey of academics.</p> <p>Logit model.</p> <p>Comparing means of survey with the McNay study.</p>	<p>Chap 6</p> <p>} Chap 8 9</p> <p>Chap 8 (8-5)</p>	
	<p>RAE influences academics’ behaviour</p> <p>The behavioural effect of the RAE is dependent on academics’ characteristics.</p> <p>The academics characteristics are independent of the response.</p> <p>The response means are different for groups based on characteristics.</p>	<p>Z score tested if proportion agreeing to behaviour change exceeds a level.</p> <p>Measures of association, CATREG and logistic regression</p> <p>Tests of independence</p> <p>ANOVA</p>	<p>Chap 9 (9-3)</p> <p>Chap 8 and 9</p> <p>Chap 8</p> <p>Chap 9</p>	

	QUESTION / PROPOSITION	METHODOLOGY	REF	
	Impact of RAE is dependent on: Institution type Experience Department rating Age Qualification Post Research Activity level	CATREG And Logistic regression (and measures of association)	Chap 9 Chap 8	
	RAE influences research publication management Trivial quantity exists Academics will increase collaboration with colleagues to increase publication output. The RAE deadlines and 'requirement' of four publications will result in a rush of submissions just prior to the RAE deadline. Academics will attempt to 'milk-out' as many papers as possible from same research project. Academics will be reluctant to devote time for referring papers for journals. The RAE resulted in a proliferation of journals. Emergence/ proliferation of 'in-house' journals is attributed mainly to the RAE. RAE has potential unintended consequence on publishing ethics.	Survey of academics And Survey of journal editors Survey of Journal Editors	Chap 8, and 9 Chap 7 Chap 7	
		Analytical review	Chap 7	

CHAPTER FOUR

FORMULA BASED ALLOCATION OF PUBLIC FUNDS

AND THE RAE

CHAPTER FOUR

FORMULA BASED ALLOCATION OF PUBLIC FUNDS AND THE RAE¹

4.1 INTRODUCTION

This chapter offers insights on the impact the Research Assessment Exercise (RAE) has on behaviours and strategies of academics in universities from a policy perspective. It discusses if outcomes of the RAE reflect policy objectives.

The chapter begins with a brief description of the formula funding in the context of the RAE. The rationale for adopting formula funding is stated in Section 4.3. A brief historical background of the RAE is outlined in Section 4.4 for a better appreciation of the developments of the research selectivity exercise. The RAE 1996 and Quality-Related Research funding is detailed in Section 4.5. A discussion of the RAE vis-à-vis formula funding is in Section 4.6. The Business and Management Unit of Assessment is used to illustrate the *ceiling effect* in Section 4.7.

4.2 INTRODUCTION TO FORMULA FUNDING MODELS

Formula funding models in the public sector are traditionally regarded as

¹ This chapter has been published as A. Talib "Formula Based Allocation of Public Funds: The case of Higher Education Research Funding" PUBLIC MONEY & MANAGEMENT Vol.21 (1), January-March 2001, pp 57-64.

instruments of empowerment rather than of control (Heald and Geughan, 1994). However, the contemporary purpose of formula funding differs from its traditional application since the current emphasis seems to be on cost reductions (*ibid*, p. 267). The emphasis is also on refining central control by simulated markets as a means of disciplining public service providers. This thesis examines in detail this control aspect of formula funding, in particular, the RAE. The key topics are the behavioral consequences of institutions and academics arising from adoption of the RAE and the associated funding distribution model. A basic appreciation of formula funding models and some of the issues involved (particularly those specific to the RAE) is essential for understanding the behavioral consequences of institutions.

The allocation of public funds by a formula funding model can be defined as a mechanism for the transfer of resources from the government to recipient bodies via an explicit distribution methodology. The amount of resources to be transferred is contingent upon certain measured characteristic(s) of the recipient. The formula funding mechanism in Higher Education depends on relativity. The “resource-earning” power of a particular characteristic such as the quality of research depends not just upon the absolute value for a particular recipient but also upon the values of that characteristic for all recipients. As the distribution formula is explicit, formula funding models are transparent up to the level of the formula, where the transparency takes the form of adherence to a set of rules. Complete transparency is achieved if both the formula weights and institutional characteristics are in the public domain. The formula funding for higher education is a clean slate, whereby present resources are functionally

independent of past resources, though there may be correlations between the present and past levels if the relevant characteristics are stable.

Formula funding models can serve policy objectives with a hands-off approach in that they are used to achieve wide-ranging objectives while preserving the recipients' autonomy to make decisions within a broad framework. In order to avoid transfers becoming a complex web of specific grants, formula funding models can incorporate a veil of ignorance that permits the recipient to spend the resources on a pattern different from the one on which they are earned (Heald and Geaughan, 1994). However, formula-funding models can have as much or as little prescription, regulation and control as one wants. The extent to which the formula is used to prescribe certain outcomes is contingent upon the regulatory framework that surrounds it.

The Research Selectivity Exercise, through the mechanism of the RAE, in England is one such model. The broad public policy objectives are to reward excellence in research. A consequent objective would seem to concentrate resources in excellent research departments to create "Centres of Excellence". However, there is no requirement that the funds earned by one unit of assessment (UoA) need to be distributed to that unit. The funds are distributed to the institutions as a block grant and each institution has the freedom to distribute it to the various departments as they desire. Under specific instructions from the government and having received the commissioned Coopers and Lybrand (1993) report on Research Accountability, funding councils, however, have begun to inquire whether research money is being spent on research broadly in accordance

with the cost centre pattern on which it was earned.

From the university perspective, however, a policy of allocating the RAE research funding to reflect the manner in which it was earned might not be optimal. The marginal utility of the allocated fund is higher if it is allocated to lower rated departments. The actual allocations of funds by universities could reflect their strategic goals that take precedence over individual departments. But, economics would suggest the allocation of funds based on the utility maximisation of resources. Therefore, universities should allocate the extra unit of resource to the department that yields the highest payoffs. If V is the aggregate welfare (payoff) and R_i is the resource allocation for a department i , then the optimum allocation strategy would be when $\partial V/\partial R_i$ is maximised. This would mean additional funds would be allocated to 5-star departments only if the volume measure could be increased. The funding council's student quotas, however, also drive the volume measure. One method for expanding the volume measure is to increase the number of research students and research assistants. An additional ten research assistants or six research students are equivalent to an additional full-time equivalent staff in the RAE submissions. The allocation methods used by universities are examined in Chapter Six.

The achievement of the policy objective of concentrating resources in excellent departments to create centres of excellence is, therefore, contingent on the behaviour of the recipient of the fund. For the institutions' behaviour to reflect the objectives of the formula funding model, the resources earned by a unit of assessment (UoA) need to be allocated to that UoA to allow for the concentration

of resources in centres of excellence. The RAE is a budget allocation compromise between autonomy and public accountability. The veil of ignorance in the RAE is designed to protect the University's autonomy. This autonomy, though significant for academic freedom, can lead to behaviour that contradicts policy objectives. An example of such behaviour is the cross-subsidy between departments.

The variables to be used in any allocation formula will no doubt influence the strategies and behaviours adopted by the recipient bodies. This chapter addresses the use of the formula funding as a policy tool by analysing the impact of the RAE with the Business and Management Studies (BMS) as the UoA in order to shed light on whether the outcomes are consistent with the policy objectives.

4.3 RATIONALE FOR THE ADOPTION OF FORMULA FUNDING MODELS

Formula funding models can have multiple objectives (Heald and Geaughan, 1994). First, formula funding models provide objectivity, or perceived objectivity, in the distribution of funds. This assists in the acceptance of the distribution by the respective recipients. These models divert arguments into the basis of distribution, away from an exclusive focus on the outcome of the distribution. They allow particular outcomes to be defended on the grounds that the rules and procedures are fair. The distribution can therefore be defended both within the policy community and with the public and media on the basis of fair procedures using objective indicators. Although the process workload may be substantial, it is more manageable than bilateral bargaining. In addition, the funding bodies can avoid becoming bogged down by specific cases.

Secondly, the adoption of formula funding models detaches the distribution decisions from the aggregate decisions, enabling the decisions to be taken on different timetables. It is also important that ministers and public officers who make decisions at the aggregate level are able to distance themselves from the responsibility for the impact of the aggregate constrained distributions. Formula funding models reduce the political costs of budget cuts. The responsibility for the distribution impacts, even if it arises from budget cuts, can be shifted to the funding body instead of the politician making the budget cut decision.

Thirdly, formula funding can abolish history and cancel accumulated entitlements. This gives the fund provider the flexibility to reduce and to reassign the allocations. In contrast, recipients may have ongoing commitments that they cannot breach. The universities are a classic example in which this dilemma arises. The contractual obligations with their employees, especially tenured staff, constrain their flexibility. As a result, some universities offer part-time and short-term contracts. Universities are also constrained by obligation to students to continue providing the courses and the academic staff for them. Bankruptcy, as a tactical means of disowning contracts, is not an option available for universities.

Fourthly, formula funding models constitute a mechanism whereby a distinction can be made between purchaser and provider. The funding body has the alternative of directly funding providers or of funding purchasers who contract with providers.

4.4 HISTORICAL BACKGROUND

During the 1980s, the University Grant Committee (UGC) and Polytechnics Colleges Funding Council (PCFC) allocated government funds to universities and polytechnics in the U.K., respectively. Since 1992, this binary divide has been abolished when the Higher Education Funding Councils (HEFC) was created for the four nations – England, Scotland, Wales and Northern Ireland². The former polytechnics in England, previously funded by the PCFC, attained university status and receive funds from the Higher Education Funding Council for England (HEFCE), and are eligible for research money. Although the decision to abolish the binary divide was independent of the selectivity exercise, it nevertheless had a significant impact on the RAE, as will be discussed later. The decision to abolish the binary divide was because the government wanted to increase the level of university education in the U.K. and because the U.K. polytechnics were perceived as equivalent to foreign universities. The then Vice-Chancellor of Warwick University, Sir Brian Folett, also expressed this view in interviews held with him over a two-day period. This chapter, in particular this section, has benefited from the discussions held with Sir Brian.

The initial impetus for the UGC's involvement in the RAE derived, not from a concern for research improvement but, from the public funding cuts applied to Higher Education during the early 1980s (see Jones 1986; Jones, 1994; Sizer, 1989). The budget cuts made it clear that it would be difficult to sustain research at the same level in all departments and in all universities. The 1980s also experienced the rise in the notion of accountability in the public service.

² Namely, HEFCE, Scottish Higher Education Funding Council, Higher Education Council for Wales, and Department of Education Northern Ireland, respectively.

Members of parliament questioned the value of research money allocated to universities. Therefore, some thought went into an assessment of research to demonstrate the output from the research money³. It was also thought desirable to separate research and teaching for funding purposes, to achieve more accountability for research funding⁴.

The 1981 cuts in university funding were a watershed for both the universities and for the structuring of relationships between government and the higher education sector. On various estimates, these cuts amounted to a loss of resources of between 11% and 15% in the periods of 1979-80 and 1983-84 (Heald and Geaughan, 1994: p. 271). Caught between the conflicting pressures of 'equal misery' or 'selectivity', the UGC opted for the latter. Key decision-makers in the university sector perceived the needs of the university system at the lower level of funding to be the achievement of certain procedural goals (notably, to make the grant allocation publicly defensible) and of certain substantive goals (notably, to protect excellence on research from the effects of this sharp reduction). Once the budget cuts were acknowledged as irreversible, there was no disagreement between the UGC and the government. There was congruency between the government's limited objective of public expenditure constraint and the desire of academic policy-makers to protect excellence. Just as the 1981 cuts demonstrated that the government regarded itself as entitled to suddenly and unilaterally withdraw resources, so there was a willingness to allow universities make their own adjustments within the constraints of the reduced funding so their autonomy is preserved.

³ Comment made by Sir Brian.

⁴ *Ibid.*

As the UGC administered the funds for both teaching and research, and given the fall in the real value of total annual funds, it was publicly stated that the selective funding of research was a viable method for protecting quality of both teaching and research. Selective funding was also a political means of objectively defending the cuts given the need to avoid the thinned spreading of resources. The UGC carried out its first research assessment in 1986, where it required universities to complete a four-part questionnaire covering various aspects of their research income and expenditure, research planning, priorities and output. Based on the responses, four rating scales were used: excellent, above average, average and below average. The UGC was reported as saying that the research rating was based on published research work and the amount of outside funding received. Apart from these general criteria, however, the UGC did not specify how the ratings were arrived at (Humphrey et al, 1996: p. 144).

In 1989, the UGC conducted its second assessment that incorporated several changes in response to criticisms made on the first exercise. The second exercise requested far more information concerning research activities than the 1986 exercise. It focused explicitly on UoA rather than university-wide data. Some of the information sought included details of up to two publications per staff, data on research students, external research income, and research planning and priorities. Table 4.1 shows the 5-point rating scale for the assessment.

TABLE 4.1: RATING SCALES FOR ASSESSMENT

RATING	DEFINITION
5	international excellence in many areas, national excellence in all areas
4	national excellence with some evidence of international excellence
3	national excellence in majority of areas or limited international excellence
2	national excellence in up to half of areas
1	little or no national excellence

Following the 1989 exercise, greater importance was placed on research ratings as a basis for allocating research funds. The funding body created a new formula in which the total block recurrent grant is determined through allocations across the three categories: teaching (T), research (R) and, special factor (S). The allocation of funds for research is made up of money for direct research (DR), contract research (CR), staff research (SR), and judgmental research (JR). The money a university received through DR and CR is related directly to non-funding body sources. The SR figure is dependent on the total number of U.K. weighted students while JR is influenced by the product of weighted student numbers and research rating of the UoA. Therefore, while research ratings are an explicit revenue determinant, the use of student multipliers means that universities can, in theory compensate for any reduction in research income due to poor ratings by merely expanding the student population.

After the 1989 exercise, the binary divide was abolished and the former polytechnics became universities. As a result, the following assessment exercise was brought forward to 1992. Differing significantly from previous exercises,

the 1992 exercise was the first one under the HEFCE and heralded the start of the current system. It was a snapshot approach since it was based on staff in post at the time of the exercise, and institutions are permitted to submit only research active staff.

The 1992 exercise also introduced several changes to the funding formula. The number of research active staff was now used as a volume multiplier. Units with ratings of “1” were not funded. The rating score was converted to a weighting score of “rating less one”. If a university were to include more staff in its submission, it would be gambling as it could reduce its rating score. Submissions are becoming a strategic trade off between quality and quantity. These changes have resulted in gaming behaviour and strategic submissions. These are described and analysed in Chapter Five (also see Talib and Steele, 2000).

The 1996 assessment exercise is similar to the one conducted in 1992 except for minor modifications and the change in the funding formulae. The 1996 exercise is described in the next section.

4.5 THE QUALITY-RELATED RESEARCH FUNDING⁵

Each year the Higher Education Funding Council for England (HEFCE) advises the Secretary of State for Education and Employment on the funding needs of higher education. The final total funding for higher education is decided by the government and approved by the Parliament.

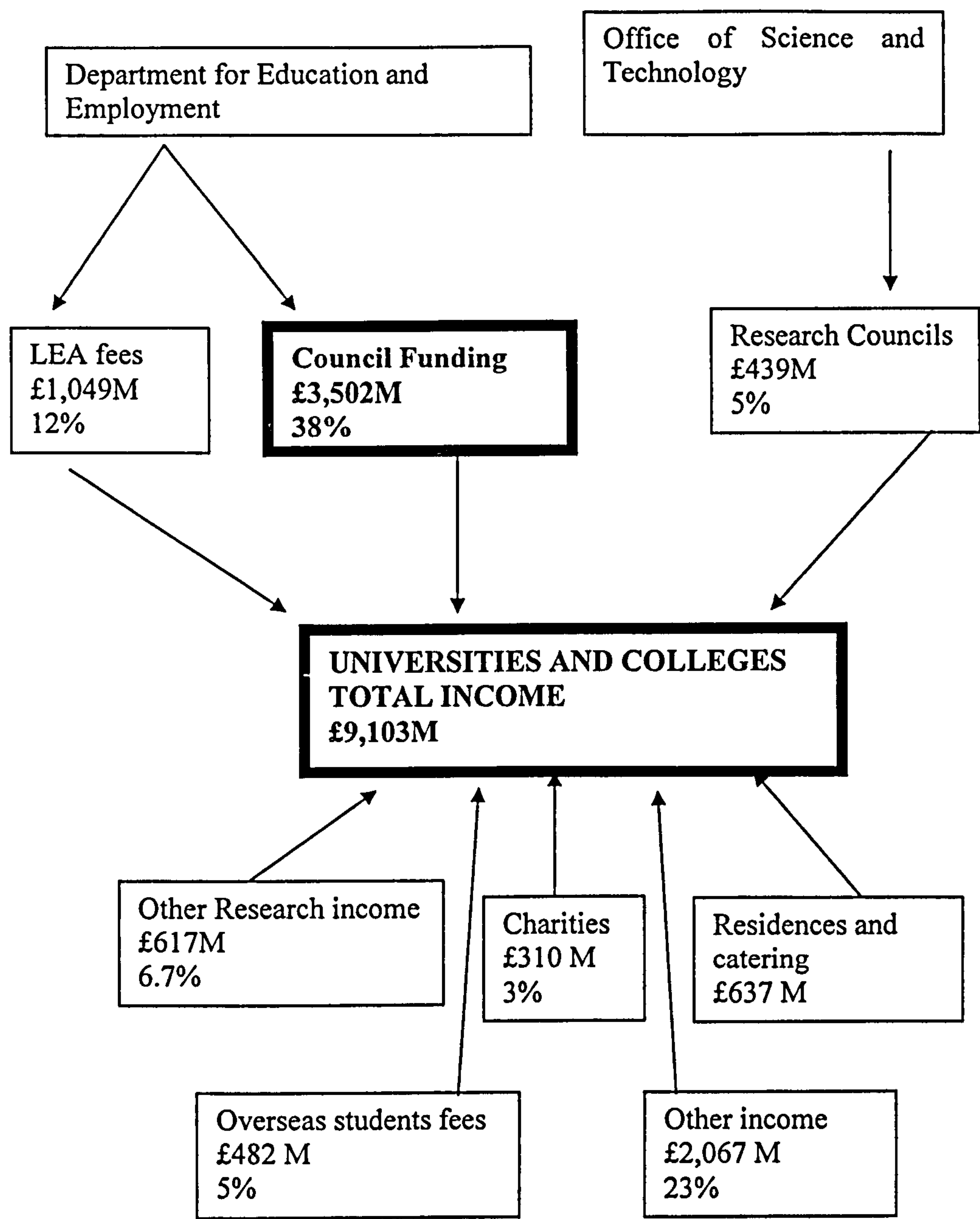
⁵ This section is drawn from interviews held with the RAE manager at HEFCE, and from the HEFCE publication, “*Funding Higher Education in England*,” November 1998/67.

Formulae are used to determine how most of the money is allocated between institutions. After the amount of funding is determined, it is provided in the form of a block grant for which institutions are free to allocate according to their own priorities within broad guidelines. The institutions are not expected to model their internal allocations on the funding council's own funding method.

The Higher Education Institutions (HEIs) are accountable to the Higher HEFCE through which they are ultimately accountable to Parliament for use of the council funds. The HEIs are independent bodies and are free to raise money from other sources. This provides them with scope to pursue activities alongside those for which they receive council funds.

Figure 4.1 details the main sources of funding for the HEIs and shows that they receive funding from different public and private sources.

Figure 4.1: Main Sources of Funding for HEIs in 1996-97.



SOURCE: “Funding Higher Education in England”, HEFCE, November 99/67, p. 4. (The percentages represent the proportion of total income.).

The HEFCE is the largest single source of income for the institutions of higher education. Each year the total funds are divided between teaching, research and special funding. The proportions are roughly the same from year to year. Table 4.2 shows the breakdown for 1998-99.

TABLE 4.2: BREAKDOWN OF HEFCE FUNDING IN 1998-99

Teaching	£2,689M
Research	£824M
Special funding	£334M
Transitional funding and flexibility margin	£6M
TOTAL	£3,853M

The Office of Science and Technology also provides public funds for research in universities and colleges. The research councils distribute these funds to support research projects and some postgraduate students.

Public research funds are provided under a dual support system. While the HEFCE provides funding towards the cost of the salaries of permanent academic staff, premises and central computing costs, the Research Councils provide funding for direct project costs and contribute to indirect project costs.

The general funds provided by the HEFCE contribute to the cost of research training and provide for ‘blue sky’ type research, which is academia driven and rarely supported from industry. The allocation of funds in a block grant allows for academic freedom in deciding what research should be pursued

and what new lines of research should be initiated.

The total funding for research in 1998-99 was £824 million and was allocated to two main headings:

- quality-related research (QR) funding - £804 million
- generic research (GR) funding - £20 million.

Generic research (GR) funding recognises that collaborative research does not have a single beneficiary. Allocations are made in proportion to the institutions' GR qualifying incomes. The qualifying income is the total sum received from users of research for joint projects where the institution retains the intellectual property and publication rights to the research.

In 1998-99, the QR funding of £804 million was 97.6% of the total research funds provided by HEFCE. The total QR fund is divided among subject areas, also known as units of assessment (UoA). Each subject is assigned to one of three cost weights (see Table 4.3) and these are multiplied by the volume of research in UoA to arrive at the total funding for that UoA, (also called the total vote).

TABLE 4.3: COST WEIGHTS

		WEIGHT
A	high cost laboratory and clinical subjects	1.7
B	intermediate cost subjects	1.3
C	others	1.0

The volume of research for each UoA is measured along five separate components. These volume components are weighted in this manner:

- **research active academic staff:**
1 x “number of full time equivalent (FTE) research active academic staff funded from general funds in departments rated 3b or above, selected for assessment in the RAE”. It is up to the institution to decide which staff to enter in the RAE.
 - **research assistants:**
0.1 x “number of FTE research assistants”.
 - **research fellow:**
0.1 x “number of FTE research fellows”.
 - **postgraduate research students:**
0.15 x “number of weighted head-counts of postgraduate research students in their second and third years of full-time study, or third to sixth years of part-time study.
- research income from charities**
0.25/25,000 x “average of last two years' income from charities”. Income from charities is divided by £25,000 (a researcher's average salary) to obtain a person equivalent.

The number of research active academic staff is the most important measure of volume because it accounts for about two-thirds of the total value. The subject totals are distributed to institutions within each subject, in proportion to the amount of research multiplied by the quality of research in the subject for each institution.

Funding is proportional to Volume x Quality

The quality of research is peer reviewed in a RAE conducted periodically. The RAE carried out in 1996 informed funding decisions until 2001-02. The methodology for the 1996 exercise was similar to that of 1992; the research

submitted was peer reviewed by panels of subject specialists, using evidence supplied by the assessed groups on standard forms⁶. Institutions have the freedom to submit a proportion of their staff as research active and panels are instructed to disregard the work of staff not submitted.

In RAE 1996, each institution was awarded a rating, on a scale of 1 to 5*, for the quality of its research in each UoA for which it made a submission. Table 4.4 shows how these ratings are related to the funding.

Table 4.4: RAE ratings converted into funding weights for each UoA

Funding weights in QR model	Funding weights in QR model
1	0
2	0
3b	1
3a	1.5
4	2.25
5	3.375
5*	4.05

The funding of research is highly selective because ratings 1 and 2 attract no funding, while a rating of 5* attracts approximately four times as much funding as a rating of 3b for the same volume of research activity. For 1998-99, 75% of the HEFCE research fund was granted to only 26 HEIs.

The amount allocated to each institution within each UoA is proportionate to its relative funding score as follows:

⁶The process is described in the HEFCE circular, “1996 Research Assessment Exercise: Guidance on Submissions,” November 1995, (Ref RAE96 2/95)

$$M_{ij} \approx (P_{ij} / \sum_i^n P_{ij}) * V_j \quad (1)$$

where M_{ij} is the money allocated to University i in UoA j .
 P_{ij} is the funding score for University i in UoA j .
 V_j is the total Vote (money allocated) for UoA j .
 n is the number of universities graded in UoA j .
 i is the university.
 j is the subject area.

And where:

$$P_{ij} = G_{ij} * [RAS_{ij} + 0.1 RA_{ij} + 0.1 RF_i + 0.15 RS_{ij} + 0.25 (CI_{ij}/25000)] \quad (2)$$

Where P_{ij} is the funding score for University i UoA j
 G_{ij} is the 'rating score' achieved by University i in UoA j
 RAS_{ij} is the number of submitted 'research active staff' in University i in UoA j
 RA_{ij} is the number of research assistants employed by University i in UoA j
 RF is the number of research fellows employed by University i in UoA j
 RS_{ij} is the number of postgraduate research students in university i in UoA j
 CI_{ij} is the average of last two years' income from charities by University i in UoA j

The number of research active staff should include only those funded from the institution's general fund. The detailed rulings on classifications of research active staff are in the Funding Councils circular "1996 Research Assessment Exercise: guidance on Submissions" (RAE 96 2/95, November 1995) and "Research Assessment Exercise 2001: Guidance on submissions" (RAE 2/99, May 1999).

4.6 FORMULA FUNDING AND THE RAE

The "New Public Management" emphasises the importance of Accountability and Performance Evaluation. Accountability for Public expenditure became

more stringent and “value for money” was the aim in public management. The restriction of resources made available for the education sector meant that the allocation of these limited resources had to be more selective. Formula funding was introduced to give transparency and objectivity to the selectivity of resource allocation. One of the advantages of budget allocations based on formulae is that it allows budget cuts and the redistribution of budget allocations with minimal political costs. The recipients can see the redistribution (and the budget cuts) as being objectively arrived at.

Incentive funding, in particular formula funding, can be established to reward movements in specific directions that embody policy goals of the central funding agency. Maassen and Vught (1994) noted the shift towards the use of financial incentives in the public sector to provide a broad steer towards government objectives. One of the objectives of introducing research assessments in 1986 was to maintain the policy of funding research at universities. During the early 1980s, the government was of the view that universities did not produce sufficient high quality research and considered supporting research at the civil service level instead⁷. The funding council implemented the formal assessment of research output by the universities to defend the support of academic research in the universities at the national level. This objective has been achieved although the funding levels have been reduced.

The RAE has two major functions: (a) basis for resource allocation and (b) accountability for public funds. From the national perspective, formula funding

⁷ Personal interview with Sir Brian Folett.

allows budget cuts with minimal political costs. The objective is to reward research excellence and to develop centres of excellence. The accountability objective would be served if excellence in research could be demonstrated. This also means that financial support may be withdrawn if departments do not meet the required standards. Consequently, through the RAE, financial incentives are used to reward excellence in research.

The policy objective of creating centres of excellence implies that universities should concentrate effort and funds in their respective areas of strength. However, as discussed in Section 4.2, the marginal utility of the additional funds is greater if support is given to weaker departments. Furthermore, there is the issue of the *ceiling effect* discussed in Section 4.7. While the avowed policy objective is to achieve research *excellence*, the RAE actually measures research *output*. Academics may focus on the quantity of output rather than quality of the research. These issues are examined in this dissertation.

The introduction of a policy factor into the funding method would allow the amount provided for each subject (the subject quanta) to be weighted to reflect the nation's relative international strength, or national need, in different subjects. If research capability is effectively matched to the demands of the project fund providers, the introduction of a policy factor may be unnecessary. However, if there are areas where the capability of the higher education sector is significantly out of line with demand from project fund providers, then the introduction of a policy factor might be thought desirable. On consultation with Higher Education Institutions, the funding council (HEFCE) decided to include the policy factor but

maintained it at a factor of one for the meantime. This policy factor can always be activated when required.

The 1990s were a transition period. Significant changes took place in the funding of Higher Education Institutions in 1992. The Binary divide was abolished and higher education institutions previously funded almost wholly for teaching by the Polytechnic and the Colleges Funding Council (PCFC) became eligible for research funding. The number of staff who could attract research funding almost doubled overnight, but there was no proportionate expansion in funds for research. Selective allocation became more crucial. These developments prompted a change in thinking about how to measure the volume of research conducted in institutions. Before 1992, when the 'old' universities were being funded for both teaching and research, the underlying assumption was that all academic staff were involved in both teaching and research. Hence, the volume of staff could be regarded as a measure of research volume. It was the full-time equivalent of the funded student load that was used to determine the allocation. Institutions were allowed to recruit as many students as they wished, but the funded student number remained constant. The funded student number in any particular subject was regarded as a reasonable proxy for the relative distribution of research active staff within subjects and between institutions.

The assumption that all academic staff carried out teaching and research was not sustainable post 1992 mainly as a result of the disproportionate increase of number of staff attracting funding and the level of funds available. The allocation of research funds had to be selective to avoid it being diluted and to

ensure that it is allocated to institutions that carried out research. It was decided that, instead of total volume of staff, the volume of research active academic staff was to be used as part proxy for research volume. The 1992 RAE allowed institutions the choice of selective submissions. The volume of research active staff submitted under the RAE was used as a part proxy for volume. The former PCFC- funded institutions experienced an immediate benefit from the abolition of the binary divide. They received a total of only £8 million of research funding in the academic year 1992-1993 under the old regime. This increased to £42 million in the academic year 1993-1994 after the abolition of the binary divide.

During this period, the immediate focus was on allocating research funds to institutions that were active in research and were achieving the objective of research improvement. Institutions that did not improve their relative research quality were expected to receive fewer funds. Thus, the funding gap between the highly rated institutions and the low rated ones would increase.

The autonomy and freedom of behaviour given to institutions enables them the flexibility of concentrating resources in areas that have the potential to be centres of excellence. As only a few institutions have the capability to achieve research excellence in many areas, it is only realistic for the large majority of them to focus on fewer disciplines. However, universities have strong traditions and values that may differ with this expectation. The situation is a much more complex web of contrasts. Apart from barriers to entry in some research areas, some universities regard that it is important to have a wide range of disciplines and a wide range of research activities because research can have positive effects

on teaching. Universities value academic freedom highly and the arrival of selective funding for research can be seen as an intrusion on their academic freedom and autonomy.

The outcomes of the 1992 RAE and the 1996 RAE show a predictable gap in research performance between the old and the new universities. It is unlikely that the new universities will have the necessary funding and skilled researchers to achieve research excellence across a range of subject areas (McKenna, 1996). In competing for selective funding, a viable strategy for new universities is to develop a small number of centres of excellence.

A strategic behaviour elicited by the transparent RAE funding formulae is that of the attempts to shadow the formula (Whittington, 1997) in order to establish the financial implications of their decisions in allocating resources between departments. Some universities (Bourn 1994a; 1994b) have adopted devolved budgeting systems. Interviews with university administrators reveal that a number of institutions are adopting devolved budgeting and departments are allocated the total amount earned from the RAE exercise after 'top slicing' for central expenses⁸. Other universities have internal formulae for distributing the RAE block grant to the various departments with the RAE rating achieved by the department as a contributing variable.

If research performance generally improves, then universities with the highest ratings would receive a progressively smaller share of the available research

⁸ See Chapter Six for details.

funds (Williams, 1993). This is accentuated by the *ceiling effect* (see Section 4.7). However, to concentrate resource allocation in centres of excellence, it would be necessary to progressively increase the proportion of funds allocated to the “top tier” universities. Williams’ assertion will hold if the funding scale remains constant, *i.e.*, if the 1996 funding scale was the same as the 1992 funding scale. To illustrate, assume the scenario where the total funds available for distribution by the HEFCE is fixed at the same level for a period straddling two RAEs, and where the funding methodology and formulae are unchanged. Suppose also that the number of staff in the UoA and the level of research volume are constant, and the only change is in the quality of research, which is increasing. As the total funds to be allocated to a subject area would be based on research volume and not the quality, then each area would receive the same total amount, *i.e.*, the vote, over the two RAE periods. The RAE research funding is allocated to departments based on a point system. The RAE rating is converted into a score (see Table 4.5) that is multiplied by the volume measure to arrive at the total points for the department (*i.e.*, UoA), that is the quality-weighted volume. For example, a department with a rating of 5 in the 1992 exercise would have that rating converted to a score of 4 (the score for a rating of 5 in the 1996 exercise was 3.375). If a department submitted 60 *FTE* as research active, then the quality-weighted volume for the department would be 240 ($= 4 \times 60$). The quality-weighted volume for each department under that subject area would then be aggregated. Thus, if the total funds allocated to the subject area is £2,000,000, and the total value of the weighted volume measure for all the departments for that subject area is 2000; the value per point is £1000 ($= £2,000,000 \div 2000$). The hypothetical department will receive £240,000 ($=$

£1000×240).

Suppose the research active department also achieves a rating of 5 in 1996 RAE and, the ratings and score of RAE 1996 are not different from that for 1992. If it does not increase its volume measure, then the relative amount of funds it receives would decline. Further, assume that the total allocation to the subject area remains at £2,000,000, all the departments' volume measures were held constant, and the only change is in the quality of the other departments. Suppose three departments improved their 1992 ratings of 3 to ratings of 4 in 1996, and the other two departments improved from 4 in 1992 to "5" in 1996, and each department had a volume measure of 40 FTE staff. These five departments would account for a total quality weighted volume in 1992 that is equivalent to 480 ($= 3[2 \times 40] + 2[3 \times 40]$). As a result of their improved ratings in 1996, they would have a combined total quality weighted volume of 680 ($= 3[3 \times 40] + 2[4 \times 40]$) that is an increase of 200 points. Since the total quality weighted volume would have increased from 2000 to 2200, the value per point would be £909 ($= £2,000,000 \div 2200$). The hypothetical department would then receive only £218,160 ($= 240 \times 909$). Thus, if the rating scores are unchanged, the departments with the highest rating would have lost out in subsequent funding distributions resulting in what is termed here as the *ceiling effect* (see Section 4.7 for an elaboration).

4.7 THE RATING SCALE AND THE CEILING EFFECT

A significant change in RAE 1996 was the rating scale, which rates institutions on a scale of 1 to 5*. Table 4.4 shows the conversion of these ratings to funding

scores, and Table 4.5 provides a comparison with the 1992 funding scale. A rating of 1 or 2 would not attract any funding in the 1996 exercise, while the rating of 2 was eligible for funding in the 1992 exercise. The intent seems to be to withdraw funds from the low rated departments and to intensify the support for centres of excellence. For a particular volume of research activity, the rating of 5* attracted 20% more funding than the rating of 5. This new rating rewards research improvements as centres of excellence that do not improve.

Table 4.5 Comparison between 1996 funding scale and 1992 funding scale

Rating 96	Score 96	increase	Rating92	Score 92	increase
5*	4.05	20%	NA		
5	3.375	50%	5	4	33%
4	2.25	50%	4	3	50%
3a	1.5	50%	3	2	100%
3b	1	NA	NA		
2	0	NA	2	1	NA
1	0	NA	1	0	

The scale for the 1992 funding score was not proportionate. For example, for the same volume of research activity, the funding difference between a 2 rating and a 3 rating is one-fold or 100% more funding for the "3" rating, while the increase in funding from a 4 rating to a 5 is only 33%. The scale for 1996 was more proportionate in that for every increase in rating the funding increased by 50%, except when the increase was from the 5 rating to the 5* which then earned only 20%. In 1992, the highest rated department received 4 times the amount of funds that was accorded to the lowest funded department for the same volume of

research activity, while in 1996 they obtained 4.05 times more. According to a HEFCE, the 20% for the 5* rated departments is intended for maintaining centres of excellence in research (HEFCE Circular 4/97, February 1997, para. 37). This was to compensate the highest rated departments since it is not possible to increase ratings beyond the upper limit. If the funding scale remains stagnant, then the only way for the highest rated departments to get more funds would be to increase their research volumes. The difficulty is exaggerated when we consider that the competitors will endeavour to increase ratings. Hence, the denominator in equation (1) [the summation of institutions' funding score] will increase, reducing the value per point. This is what we termed the ceiling effect.

To illustrate this point further, we examined the fund allocation in Business and Management Studies resultant from the RAE 1996. The quality related research (QR) funding distribution for 1997 - 1998 under the RAE 1996 funding scale and simulated under the 1992 funding scale is depicted in Table 4.6 at end of this chapter. The simulated distribution using 1992 funding scale is to enable us to postulate what the funding distribution would have been like had the funding scales not changed in the 1996 RAE.

For RAE 1996, there were eight institutions rated 5 and 5* that shared £8,404,269, or 46.22%, of the total £18,184,901 allocated for Business and Management studies. These were institutions with research quality that were equal to international standards in at least some sub-areas of activity and attainable levels of national standards in virtually all other areas. The 13 institutions rated 4 shared 33% (£5,942,619), 12 institutions rated 3a shared 13%

(£2,325,756), and 11 institutions rated 3b shared the remaining 8% (£1,512,257).

Table 4.6 displays what the budget distribution might have been under the 1996 RAE results had the 1992 RAE funding scale been maintained. The higher rated institutions would have received a lower share. The funds per unit of quality-weighted volume would have decreased from £4,802⁹ to £3,486¹⁰ due to the increase of the quality-weighted volume to 5217.19. The London Business School (LBS), for example, would have received only £1,165,300 (83.57x4x3486) in 1997-98 as opposed to the current level of funding of £1,615,781 (only 72%). It is similar with the other 5* institutions. However, a department rated 5 would experience a different effect. For example, Warwick Business School would have received £1,505,210 which is 86% of current funding. The differences for the other levels of ratings are shown in Table 4.6.

This variance is basically due to the difference in the funding scale and the funds per unit of quality-weighted volume as follows:

$$\text{Difference (\%)} = (3486 \div 4802)^{11} \times (1992 \text{ funding scale} \div 1996 \text{ funding scale})$$

If the 5* rating had not been introduced, *i.e.*, if the same 1992 funding scale were retained, the 5* rated institutions would have obtained only 72% of the current funding due to the better performance of the competitors (even though they would still be the leaders in the field). This ceiling effect is contrary to the policy objectives of the formula allocation. It would seem that to overcome this

⁹ 18,184,901÷3786.89

dilemma the ceiling imposed is a moving ceiling. The 20% premium given to departments rated 5* is explicitly to reward top rated departments that improve their research excellence.

The HEFCE have been cognisant in changing the funding scale. The new funding scale re-directed £2,120,373¹² from the lower rated to the higher rated institutions. Of this amount, £77,073 (3.6%) was passed on to the 3a rated departments, £192,886 (9.1%) to the 4 rated institutions, £512,947 (24.2%) to institutions rated 5; and the remaining £1,337,468 (63%) to institutions rated 5*. This re-allocation of funds, leading to further concentration of funds in centres of excellence, was achieved through the changes in the funding scale. Funds were withdrawn from institutions that had a 2 rating. The funding scale was 50% lower for 3a, 25% lower for 3b and 4, 15.6% lower for 5, but 1.25% higher for institutions rated 5*. The lower the institution's rating, the higher the reduction in the funding scale, thereby leading to a higher concentration of funds in the top end of the rating scale.

4.8 CONCLUDING REMARKS.

The *ceiling effect* illuminates the need for continual increase in the multiplier gap between the high ratings and the low ratings to achieve the policy objective of creating and supporting *centres of excellence*. In response, the HEFCE has introduced the eventual 5* category and amended the ratings funding scale.

The points raised in this chapter are relevant to formula based allocation of

¹⁰ 18,184,901÷5217.19

¹¹ The ratio of the value per point.

public funds in general, where the variables in the formula will determine strategies adopted by the recipient bodies. Through the formula funding mechanism, viz., the research selectivity exercise, research funds are being concentrated in a relatively small number of departments for each discipline to develop into *centres of excellence*. Nevertheless, the HEFCE asserts that the objective is to fund excellence in research wherever it flourishes, and that the intention is not to lead to the concentration of research into a limited number of *centres of excellence*. The official position is that that formula funding is essential for establishing transparency and objectivity. But, modification of the funding scale with effect from the 1996 RAE has resulted in a greater concentration of the funds in the high rated departments. This is accentuated with the introduction of the 5* rating in the 1996 RAE that was meant to sustain the centres of excellence by alleviating the restrictive ceiling effect to ensure that the flow of funds is not prejudiced. Ultimately, it is likely that the greater portion of the quality related research (QR) research funding would be designated for a small number of institutions.

To steer research towards national needs and priorities, a policy factor has been introduced to influence the allocation of research funds. Currently, the HEFCE sets it at a level of *one* so that it is neutral for the time being. Universities opposed the use of the Policy factor, as it would impinge on their tradition of academic freedom and autonomy in determining priorities for funding and research.

¹² (1439437 + 2193193) – 1512257 [see Table 4.4].

Though this thesis is concerned mainly with the quality related research (QR) funds from HEFCE, which is the dominant stream of funding, there are other streams distributed by HEFCE designed to encourage/reward specific kinds of research activity. These non-QR research streams are smaller and are set-up for specific goals.¹³ Alongside most systems of formula funding of large amounts of money, there are sub-streams of funding designed to meet specific policy goals. These marginal sub-streams of funding affect the sector in a disproportionate way.

Policy makers, in pursuit of accountability for public funds, attempt to ensure that public funds are efficiently utilised in line with national policies and objectives. They would want the variables included in formula based allocation of public funds to influence institutional and individual behaviours and strategies in line with national policies and objectives. Universities have traditionally had a number of other value-related traditions that may conflict with the view that 'national policies and objectives' are primarily, if not exclusively, the ones that should be followed. The most significant of these goals is academic freedom and autonomy to determine their own priorities. Another is that research and in particular 'blue sky' research is important for all universities and academics to pursue. Universities have also traditionally held the view that research and teaching are linked, and innovation and freedom to carry out research is not necessarily best confined to a few monopoly centres of funding.

The paradox in formula based allocation of funds in the higher education sector

¹³ Some of these streams are described in the HEFCE publication, "*Funding higher education in England*," November 1998/67.

is to achieve accountability for public funds (including their application to achieve national policies and goals), and to maintain universities' freedom and autonomy to set their own priorities.

TABLE 4.4

Extracts from the 1997-98 funding model (Business and Management Studies)

Rating from 1996 RAE	Number of HEIs	QR funds (£) for 97-98	% of total QR for BMS	QR Volume Measure	Funding Scale for 1996	Funding scale for 1992	Quality-weighted Volume for 97-98	Quality weighted Volume under 1992 derived quality scale	Simulated funding under 1992 funding scale, all else being equal	% of total QR for BMS (under simulated funding)	Difference (simulated as % of 1997-98)
1	10	-		84.12	0	0	0	0	0	0%	
2	28	-		412.97	0	1	0	412.97	1,439,437	8%	
3b	11	1,512,257	8%	314.61	1	2	314.61	629.22	2,193,193	12%	145%
3a	12	2,325,756	13%	322.57	1.5	2	483.86	645.14	2,248,683	12%	97%
4	13	5,942,619	33%	549.86	2.25	3	1237.19	1649.58	5,749,733	32%	97%
5	5	3,663,766	20%	225.99	3.375	4	762.72	903.96	3,150,819	17%	86%
5*	32	4,740,503	26%	244.08	4.05	4	988.52	976.32	3,403,035	19%	72%
Total	82	£18,184,901	100%	2154			3786.89	5217.19	£ 18,184,900	100%	

CHAPTER FIVE

THE RESEARCH ASSESSMENT EXERCISE:

STRATEGIES AND TRADE-OFFS

CHAPTER FIVE

THE RESEARCH ASSESSMENT EXERCISE: STRATEGIES AND TRADE-OFFS¹

5.1 INTRODUCTION

This chapter explains the strategies institutions can adopt when making their RAE submissions. For instance, choosing which staff to submit as *research active* in the RAE submissions is a strategic trade-off between quantity and quality. The chapter develops a theoretical model for RAE submissions that would yield an optimum funding strategy. It also discusses the resultant impact on human resource management issues.

Our submission strategy model has the maximisation of funding as the sole objective, although in practice, such a funding maximisation principle would not be the sole objective for universities or their departments. As discussed in Chapter Three (see Table 3.1), the RAE ratings that the recipient obtains are important since it is also vital for attracting and retaining staff and students. Nevertheless, the immediate objective in the model is the funding. The inclusion of subjective variables such as reputation would muddle or dilute the objectivity

¹ Substantial parts of this chapter have been published in two papers: A. Talib & A. Steele "The Research Assessment Exercise: Strategies and Trade-offs", Higher Education Quarterly, Vol. 54 (1) January 2000, pp 68-88; and A. Talib "Simulations of the Submission Decision in the Research Assessment Exercise: the 'who' and 'where' decision", Education Economics, Vol. 7 (1), 1999 pp 39-51.

and reliability of the model.

The RAE is a budgeting tool that allocates funds to eligible recipients (units of assessment) based on their past performances that are benchmarked against the other units of assessment (UoA). The UoAs are permitted to selectively submit their past performance. This gives scope for biasing and filtering. Biasing is the result of choosing from a set of possible messages the one that is likely to be accepted and is most favourable to the sender. *Filtering* occurs when the data are filtered such that the more desirable elements are communicated and the less desirable are omitted. The procedures of the budget allocation for higher education allow for some discretion. For example, the university can decide on the number of staff to submit. This *biasing* behaviour in submitting just the optimal staff list is a *creative submission* that is analogous to *creative accounting*.

There are two decisions in the submission strategy in order to achieve the optimal or maximum funding. The first decision – the *who* decision – is the *quality vs. quantity* trade-off that involves the number of staff to be submitted as *research active*. The second decision – the *where* decision – entails to which UoA panel to submit. The two choices are interactive since the *who* influences the *where*, and vice-versa.

This chapter formulates a theoretical basis for some of the issues discussed in the case study interviews (see Chapter Six). The next section of this chapter provides a brief description of the research funding process and the research

funding formula. Section 5.3 crafts an argument for an optimum strategy of coalition formation. The marginal analysis is in Section 5.4. Section 5.5 discusses some human resource management strategies relevant to the RAE, in particular the value of a mentor. The *where* decision – the choice of panel to submit under – is in Section 5.6. The last section offers some concluding remarks.

5.2 RESEARCH SELECTIVITY AND FORMULA FUNDING

Although many articles and papers have been published on the RAE, the majority of them have been descriptive. Only the Johnston study (1994) explicitly dealt with submission strategies by evaluating the financial consequences of the interaction between volume and grade for the Politics departments. In order to derive an optimal submissions strategy, this chapter extends Johnston's trade-off matrix for various scenarios of grade and research active staff coalition.

The funding process is characterised below: The total sum, or *vote*, is first allocated to each subject area also known as UoA. The amount for each institution within each subject area is proportionate to its relative funding score as follows (see also Chapter Four):

$$M_{ij} \approx (P_{ij} / \sum_i^n P_{ij}) * V_j \quad (1)$$

where M_{ij} is the money allocated to University i in UoA j .
 P_{ij} is the funding score for University i in UoA j .
 V_j is the total Vote (money allocated) for UoA j .
 n is the number of universities graded in UoA j .
 i is the university.
 j is the subject area.

And where:

$$P_{ij} = G_{ij} * [RAS_{ij} + 0.1 RA_{ij} + 0.15 RS_{ij} + 0.05 (CI_{ij}/25000)] \quad [2]$$

Where P_{ij} is the funding score for University i UoA j

G_{ij} is the 'ratingscore' achieved by University i UoA j

RAS_{ij} is the number of submitted 'research active staff' in University i UoA j

RA_{ij} is the number of research assistants employed by University i UoA j

RS_{ij} is the number of postgraduate research students in university i UoA j

CI_{ij} is the volume of research money obtained from charities by University i UoA j

The rating score G_{ij} of university i in unit of assessment (UoA) j is a function of the ratings achieved in the research assessment exercise (RAE). The rating score corresponding to each rating is summarised in Table 5.1. The rating grades of the RAE 1996 themselves correspond to a 7-point scale. For example, a 5* rating has a rating score [G_{ij}] of 4.05 and a scale value of 7. The procedures for classifications of *research active* staff are in the circular from the Funding Councils, "1996 research assessment Exercise: guidance on Submissions" (RAE96, 2/95, November 1995).

TABLE 5.1:

1996 RAE Grade	Scale	1996 Rating Score **	1992 Rating Score **
5*	7	4.05 (5*)	4 (5)
5	6	3.375 (5)	3 (4)
4	5	2.25 (4)	2 (3)
3a	4	1.5 (3a)	not applicable
3b	3	1 (3b)	1 (2)
2	2	0 (2)	0 (1)
1	1	0 (1)	not applicable

The terms in brackets are the grading codes adopted by the HEFCE. In financial terms the Code 2 in 1992 is the same as the Code 3b in 1996; Code 1 in 1992 is the same as Code 2 in 1996 and so forth.

G_{ij} in Equation [2] is the rating score that has been determined by an aggregation process. The assessment procedure, according to HEFCE², is not as automatically algorithmic as in this characterisation, but the aim of simplification is to be instructive. The assessment process that involves subjective judgements is summarised here in a manner that is analogous to the Examination Boards' classification of degrees as these are a combination of rules and subjective judgement (also see Whittington [1997] for criteria and procedures employed by the Accountancy Assessment Panel). It is emphasised that the assessment process described here is an idealisation of the rating process so that the strategy can be modelled mathematically. The model is a proxy for the approach used in the RAE. Johnes and Taylor (1992) noted that the quantity of research output is not ignored since the requirement in RAE 1996 of up to four publications by each member of staff implied that a minimum number of research publications were expected of all submitted staff. Therefore the spread of research output

across individuals in each department is taken into account. This was unmistakable for the 1989 exercise (Johnes and Taylor, 1992). The basis for the 1989 5-point scale is as follows:

Rating Point	Attainable levels of national excellence reached by:				Attainable levels international excellence reached by:	
	<i>Proportion of department</i>	<i>Proportion of department</i>			<i>Proportion of department</i>	<i>Proportion of department</i>
	<i>none</i>	<i>Up to 50%</i>	<i>Majority</i>	<i>All</i>	<i>None</i>	<i>Some</i>
1	+				+	
2		+			+	
3		+				+
4			+			+
5				+		+

Source: UFC (1989) as reported in Johnes and Taylor (1992).

Furthermore, the HEFCE has solicited comments on complementing peer review by quantitative indicators (RAE 2/97 para. 31) and expresses this optimism:

“And it would be novel if performance of individuals became the explicit focus of assessment” (ibid, para. 34)

The Assessment Process

Each academic staff member submits up to four pieces of published work for assessment. The assessor’s task is to categorize and describe the *quality* of the work. The works are to be categorised A, B or C. Category A is equivalent to work published in international refereed and reputable journals. Category B is

² HEFCE “1996 Research Assessment Exercise: Guidance on Submissions” 2/95, November 1995, (para. 5).

equivalent to papers published in nationally ranked journals. All other submissions fall into Category C. It is noted that the Accountancy Panel avoids listing the approved or ranked journals, though the members of the panel deliberate on the relative quality of the journals (Whittington, 1997: p. 184).

The grade for each academic is the summary of the percentage work in each category. This descriptive summary may not be applicable to disciplines where assessment of quality is based on measurement units other than journal articles as in the case of the Performing Arts. Disciplines in most social sciences would fit the process explained. Table 5-2 illustrates how summary grades are mapped from categories of the papers. This mapping is not necessarily how the assessment panels actually assessed the ratings but is offered as an example of the proxy process presented here. The process summarises the attempts to substitute the subjective judgement with objectivity that can be captured in a mathematical model.

TABLE 5.2:

No of category A

papers

4	5*				
3	5	5*			
2	3a	5	5		
1	2	3a	4	4	
0	1	2	3b	3a	4
	0	1	2	3	4
	<u>No. of category B papers</u>				

RAE grade

The feedback from academics who served on RAE panels is that the algorithm is too stark, and that qualitative judgements have played a larger role than merely producing a summary statistic as a description. The attempt here is to idealize the rating process in order to surmount the criticism that different panels using different assessment criteria and the associated subjectivity have resulted in non-uniformity in awarding the ratings. It is an issue that has also been raised by the HEFCE in the *Research Assessment Consultation Document*³, which seeks responses on the inclusion of quantitative aspects in the assessment.

The non-uniformity in standards of assessment by different panels is crucial because some academic groups, e.g., Business Schools and Engineering, have a choice of panels under which to make their submissions. Thus, an Accounting group in a Business School can choose to submit either under the Business and Management (BMS) panel or under the Accountancy panel. It is worth noting that the Accountancy Panel advises the BMS Panel on all accounting submissions (Whittington 1997).

The rating that a UoA achieves can be viewed as a descriptive summary statistic describing the percentage of work in each category. A UoA would submit n number of staff with each staff submitting four pieces of work. This submission generates a table of $4 \times n$ matrix for assessment as follows:

³ HEFCE, "Research Assessment: Consultation," ref. RAE 2/97, Nov. 1997 (para. 31, Question 16).

$$\begin{bmatrix} X_{11k} & X_{12k} & \dots & X_{1nk} \\ X_{21k} & X_{22k} & \dots & X_{2nk} \\ X_{31k} & X_{32k} & \dots & X_{3nk} \\ X_{41k} & X_{42k} & \dots & X_{4nk} \end{bmatrix}$$

Where X_{ijk} represents the publication i ($i=1...4$) of academic j in a unit of assessment k .

Through their judgement, the assessors categorise the papers as either A, B or C.

At this stage, the submission is reduced to a $2 \times n$ matrix:

$$\begin{bmatrix} X_{1a} & X_{2a} & \dots & X_{na} \\ X_{1b} & X_{2b} & \dots & X_{nb} \end{bmatrix}$$

where X_{1a} and X_{1b} are the simple counts of the number of papers in Categories A and B. Based on the number of papers in Categories A and B, a grade is allocated to each staff using the conversions in Table 2, further reducing the matrix to a $1 \times n$ matrix:

$$[g_1 \ g_2 \ g_3 \ \dots \ g_n]$$

where g = grade per member of staff

The overall grade for the UoA is then a summary of this vector.

The g_i 's are sorted into rank order and the RAE grade for the unit is G'_i ; the median of g_i . If G'_i is the grade for a sub-unit, then the grade for the UoA (G_i) will be the median of G'_i . The assessments are based on the median values to develop a mathematical model that can represent the RAE process. This is a

reasonable proxy given that the rating scale descriptions make frequent reference to the *majority* of work being classified at a particular level. (see Whittington, 1997, Appendix A: p. 192). In the presentation in this thesis, the limitation from oversimplification of the rating process is counteracted by the need to integrate a reasonably objective and quantifiable proxy for the subjective element of the assessment process.

Equation [2] is the total *funding score* for a UoA in a university. The sum of the terms in the square brackets is the *volume measure* (V_o). The most significant influence on the *volume measure* is the number of *research active* staff that is submitted. The *volume measure* is the only item that is not re-computed annually for funding purposes. The total funding that a UoA receives is therefore a function of the relative rating and *volume measure*. The inclusion of weaker researchers as research active staff may decrease the median grade and hence the funds. This is acknowledged by the HEFCE when it states:

“The great majority of staff in former UFC institutions will have entered employment as both teachers and researchers. In 1992, most of these were returned to the exercise. In many instances, the quality of research will not be even across a group or unit, and the inclusion of “weaker” researchers may bring down the grade and hence the funds. Overall, it appears that UFC institutions have been more selective, as a result, in returning staff for the 1996 exercise”
(M6/97, p. 143)

5.3 A SUBMISSION STRATEGY

As pointed out in Section 5.1, funding may not be the most important factor for a department or university when making this submission. Nevertheless, the model

presented hereafter focuses on the strategy of maximising the financial outcome, viz., the funding allocation. It is worthwhile to point out the differences between the optimum long-term strategy and optimum submission strategy. The optimum objective in the long run is obviously to attain the highest rating with submissions of the highest number of *research active* staff, i.e., maximum volume of full time equivalent staff (FTE). This objective cannot be achieved overnight except with the massive hiring of 5* researchers by the institution.

For an institution, the variables influencing its share of the funds are the total *vote* for each UoA, research active staff that it and other institutions submit (volume), and the RAE ratings of the institution and that of the other institutions (quality measure). The total vote affecting the aggregate level is a political decision and beyond the jurisdiction of any institution. As the staff submissions and ratings of other institutions are exogenous to the model, the optimum strategy for an institution would be to maximise its funding score (see Equation [2]). Except for the research active staff, the variables in the volume measure (V_o) are updated annually for funding purposes. The number of staff submitted for the assessment continues to be used as the volume measure until the following round of assessment. The focus in this analysis on the strategic submission of research active staff is motivated by the constant staff measurement, the internal decision on which staff to be classified as research active, and the high weight (viz., weight of one) given to research active staff in relation to the other volume measures.

Assuming that the rating achieved by the UoA is the median of the ratings achieved by that UoA, the optimum submission level can be determined with this maximisation function.

$$MAX [G_{ij} \times V_{Oij}] \quad [3]$$

Subject to the following constraint :

$$V_{Oij} \leq [2\bar{V}_{Oij} - 1] \leq V_{Oij}^*$$

Where :

G_{ij} is the grade score for a rating by university i in UoA j .

V_{Oij} is the number of research active staff submitted by university i in UoA j .

\bar{V}_{Oij} is the number of research active staff at univ i in UoA j rated $\geq G_{ij}$.

V_{Oij}^* is the total number of staff available in university i in UoA j .

The variable G_{ij} in Equation [3] being the grade score attached to the numerical rating (4.05 for a 5*, 3.375 for a 5 rating, and so on) has only one of six possible values (see Table 5.1).

It is easy to enumerate the possible outcomes and arrive at the optimum coalition of research active staff. Define G_{ij}^* as the grade score attainable if all the staff in UoA $_j$ were submitted as research active by university i . This represents the initial solution. The only feasible moves from this initial solution is to reduce staff size submitted as research active (the volume measure) to see if a higher grade (the quality measure) is achieved, and if it improves the overall funding. This process of eliminating the tail ends of staff is repeated until the optimal coalition is obtained.

The volume measure (V_o) in Equation [3] pertains only to research active staff. It differs from the volume measure in Equation [2] that includes research

assistants, research students and research money received from Charities. V_{oij} is the optimum size of research active staff submission by university i in UoA j , given their current staff distribution in terms of research quality.

The data requirements for applying Equation [3] are the total staff rating distribution. Institutions may be able to judge relative quality of individuals with some reasonable certainty but may find it difficult to make ex-ante judgements of absolute quality with the same level of certainty. Making judgements of relative quality and then applying sensitivity analysis to evaluate submission strategies can resolve this dilemma. The evidence in the McNay study (1997) suggested that many institutions pursue internal evaluations of research performance. In some institutions, group or departmental reviews are held with full cross-institutional representation. These reviews aimed to identify research strengths for input into the funding decisions and for planning future assessment exercises.

The objective to be maximised in Equation [3] is the total funds to be obtained from the selective funding exercise. The equation does not take into account other hidden costs and benefits of a low-rating or high-rating in research such as reputation halo effects in student and staff recruitment. The constraint in the optimisation arises from the fact that as the staff submitted as research active increases, the median rating changes. At some point when the research active staff submission is increased by a number of weak-rated staff who are below the current median, the overall rating attained and hence the grade score will drop. The best combination of grade score and volume must be one that is feasible under the prevailing scenario. To ensure that the volume is feasible for a

particular grade then the majority of the submissions must at least be of that grade's quality level. Based on the median as a summary measure, at least half of the submissions must be rated at a score equivalent to G_{ij} or higher.

5.4 MARGINAL ANALYSIS

The two strategies for institutions to increase funding are: (1) decrease research active staff who are full time equivalent (FTE) for an increase in rating; or (2) increase FTEs at the cost of a reduced rating. These strategies are discussed below.

5.4.1 Case 1: Reduced Submission and Increased Rating

One strategy to increase the funding would be to reduce the number of staff submitted to achieve a higher rating. The increase in the funding multiple from a higher rating is shown in Table 5-1. For example, submissions by the University of Warwick and London School of Economics (LSE) under Business and Management Studies for RAE 1996 were rated 5 overall. They could have obtained the same level of funding had they been rated 5* with just 83.3% of the staff size submitted. In this case, any coalition that is greater than 83.3% would have secured more funds. It was noted that the 20% premium for a 5* rating was not made known before the submissions. Moreover, at the time of the 1996 RAE submissions, universities were under the impression that ratings of 5 and 5* would attract equal funding.

The strategy of increasing the rating by one point by reducing the size of research active staff submitted would result in higher funding only if the revised

submission size is higher than the minimum submission size required. This minimum is the submission size that would achieve the same level of funding at the higher rating as the present level of funding at the current rating.

To sustain the same level of funding for an incremental rating, the following Equation [4] must hold:

$$gn = g^y \quad [4]$$

where

g is the rating score of the current rating (i.e., 4.05, 3.375, and so forth.).

n is the size of the current submission (FTE).

$g^$ is the rating score at the rating one point higher than current rating.

y is the size of submission at the new rating ($g^$).

$g^$ can also be expressed as :

$$g^ = [1 + p]g$$

where :

p is the premium in the rating score. (i.e., 20% for 5* and 50% for the rest).

Equation [4] can be re-stated as Equation [5] below to obtain the minimum submission size required for maintaining the current funding level.

$$y = gn / [1 + p]g \quad [5]$$

Therefore

$$y = n \left(\frac{1}{1 + p} \right)$$

where

y is the minimum submission size.

g is the rating score.

n is the size of the current submission

p is the premium in rating score on increasing the ratings one level from current rating.

The premium (p) is 20% for a point increase from 5 to 5*. The other one point increases have a 50% premium. The minimum submission size (y) is therefore a percentage $[1/(1+p)]$ of the current submission size. The percentages for each rating point increase are as follows:

5 to 5*	$[1/(1+0.2)] = 83.3\%$
4 to 5	$[1/(1+0.5)] = 66.67\%$
3a to 4	$[1/(1+0.5)] = 66.67\%$
3b to 3a	$[1/(1+0.5)] = 66.67\%$
1 or 2 to 3b	any submission (as it moves from a position of no funding to funding)

5.4.2 Case 2: Increased Submission and Reduced Rating

Another strategy to increase funding would be to increase the number of staff submitted at the expense of a lower rating. This strategy is feasible only if the revised submission size is higher than the minimum submission size required. This minimum is the submission size that would result in the same level of funding at the lower rating as the present level of funding at the current rating. Institutions rated 3b do not have this option, as any reduction in their ratings would result in them losing their funding.

The minimum staff submitted is the inverse of Equation [5], i.e., $y = n(1+p)$.

A 5* rated department that aspires to increase its funding by increasing its submission at the expense of lowering its rating to 5 would need to submit an increase of at least of 20% of staff. A department rated 5 or below can only

increase its funding level at a one point lower rating if its submission size is increased by a minimum of 50%. Therefore a 5* rated department can adopt this strategy if, and only if; its current submission size is less than 83.34% of total staff size⁴. A department rated 5 or below can adopt this strategy only if their present submission size is less than 66.67% of total staff, since they need to increase the submission by 50%.

5.5 HUMAN RESOURCE STRATEGY

An area of great changes in institutions affected by the RAE is the management of human resources. This has been anticipated by the HEFCE:

“Possibly the most traumatic human resources effect linked to the RAE is the requirement for institutions to decide upon, and return to the exercise, research active staff.”

(HEFCE report M 6/97: para. 82)

The evidence in McNay (1997) and this thesis show that institutions are concerned over who they recruit for research, and how they should reward and retain existing staff.

The RAE assesses institutions on the performance of the staff in post at the census date. The institutions are then funded for the ensuing four years based on that assessment and the submitted staff numbers. It is critical then, who were in post at that date. This is one explanation for the frenzied transfer market in the run-up to the 1996 RAE. Using an analogy from the football industry, the *Economist* made references to the transfer market for academics (August 24th,

⁴ Since the submission needs to be increased by 20%. If the current submission is 83.34% of total staff, the minimum submission required to sustain funding level would be 100% of total staff.

1996). The hiring of star researchers could influence four to five years of funding. One direct benefit of hiring a particular staff member is his potential in contributing to the formula for funding. As an illustration, each staff member in a grade 5 Business School would account for an extra funding of £13193 per annum⁵. This is valid only if the new staff member is submitted as research active. To raise an institution's rating the staff member's rating has to be at least equal to the institution's present rating. Of course, the median could be maintained or increased by tangible quality improvements of research by the existing staff. Another viable strategy is to appoint staff to undertake an increased teaching load so as to free research-intensive staff from teaching duties. This would give the research active staff more time to concentrate on research to help improve the institution's ranking. The submission of an additional staff in Business and Management Studies can result in total extra funding for the four years⁶ of £63,330 for a 5* rated department, £52,772 for a 5 rated, £35,183 for a 4 rated, £23,455 for 3a rated, and £15,637 for 3b rated.

The value of hiring a staff member who does not reduce the median can be expressed as:

$$x_{ji} = (g_i)(f_j)(t) \quad [6]$$

Where :

x_{ji} is the extra funding from one staff member hired by a department rated i in UoA j .

g_i is the multiplier (score) for rating i .

f_j is the funding volume per (FTE) point for UoA j .

t is the time period in years for which the volume measure is used (ie.4).

⁵ Based on a value per point for BMS of £3909 for RAE 1996.

⁶ This is the resultant funding that does take the staff cost into account.

Equation [6], however, is not the full story. Based on the median concept, an appointment of a 5* calibre staff has a gearing effect. It allows the current optimum coalition to expand by two without changing the rating. The appointment of a new staff who is rated equal or higher than the department's rating enables the department to expand its submission due to that staff and another staff member who was not previously submitted as research active. If the appointment is of a 5* mentor who is expected to assist in upgrading some 5 staff to 5* and as a result increase the median, then the value of the appointment is greater still. To account for the additional value from a mentor, Equation [6] is re-expressed as:

A) Non - Mentor Appointment :

$$x_{ji} = 2[g_i \times f_j] \quad [7]$$

Where :

x_{ji} is the additional funding per annum.

g_i is the score for rating i .

f_j is the value per point for UoA j .

B) A Mentor Appointment

$$x_{ji} = z[g_i \times f_j] \quad [8]$$

and where :

$$z = 2[1 + c_i]$$

Where :

x is the extra funding obtained per annum.

c_i is the number of staff members converted by the 'mentor' to rate i .

i is the current rating for the institution.

f_j is the value per point for UoA j .

g_i is the score for rating i .

The additional advantage of a mentor appointment can be incorporated. The new staff member's individual quality rating has to be equal to or higher than the current rating for the UoA of the institution. Equations [7] and [8] show the

extra annual funding obtained. Several hypothetical applications can be made with the model. For example, the value of hiring a 5* academic in Business and Management studies can be demonstrated. Warwick Business School (Warwick) could have attained the same funding with a coalition of 48 staff at 5* and 46.17 at grade 5 or below (*i.e.*, a submission of 94.17 FTE). By appointing an additional 5* staff, Warwick can increase the FTE by another grade 5 or below. Hence, the additional funding would have been £31,665 per annum ($= 2 \times 4.05 \times 3909$). In theory, this is the maximum premium Warwick would be willing to pay for the 5* appointee. If the appointment is a 5* mentor who is expected help convert two grade 5 staff to grade 5*, then the value of the appointment is more. In the case of Warwick that would mean having 51 staff at grade 5*⁷ and the coalition expanded to 101 (where 50 would be of grade 5 and below). That is, six FTE more (the new three in grade 5* allow an additional three non-5* to be included). It can be demonstrated that there are differential values of academic researchers in Business Schools. For instance, the additional funding that would accrue from the appointment of 5* mentor is a total of £94,988 per annum⁸, or about 6% of current research funding. This amount is an upper bound of the premium over the normal teaching salary scale that could be justified. Similarly, a grade 5 department that appoints a grade 5 mentor staff will result in the coalition expanding by six hence worth £79,157 per year⁹ in the Business and Management studies (BMS) UoA. A grade 4 mentor staff would

⁷ the original 48 + 1 new appointment + 2 converts.

⁸ $6 \times 4.05 \times 3909$

⁹ $6 \times 3909 \times 3.375$

be worth £52,772¹⁰. A non-mentor staff is only worth £31,665 (5*) £26385 (grade 5) and £17590 (grade 4)¹¹.

A prospective staff below the institution rating could have zero marginal value¹² in terms of research funding. There is a marginal value if the staff member is hired to take over a large teaching load in order to allow research active staff to concentrate on research. More and more universities are finding ways to relieve their research active staff from teaching (see Chapter Six). Universities, including Warwick University (which prides itself as a research-led institution), are considering the recruiting of staff to undertake only teaching assignments.

The employment of a staff member below the institution's rating is justifiable if the marginal return obtained from that staff are above some threshold and from a different source such as executive training courses. The valuation above is also based on the institution rating not being influenced by the new appointment but only the size of the coalition is influenced. Institutions that have the capacity to increase their ratings could gain even more (but only in exceptionally borderline circumstances).

In the near future, changes in universities will include different premium schemes, pay rises¹³ or even multiple appointments for academic researchers. Some researchers could be appointed to serve as mentors. International

¹⁰ $6 \times 3909 \times 2.25$

¹¹ non-mentors would only increase the coalition by 2

¹² possibly even negative value if that staff is included in the coalition and reduces the median.

¹³ It is reported in *THES* (Feb 5th 1999) that Sir Keith Peters, Head of Cambridge University Medical School, told the House of Commons Science and Technology Committee that the pay of university professors should be doubled. ("about £80,000 a year seems appropriate")

researchers could be offered visiting (research) positions for research collaboration with staff members.

The employment conditions of academic staff are likely to be *a major management issue* (Wilson, 1993). The emphasis on quality research has already increased the pressure on academics to spend time on research (McNay, 1997). This has reduced the time available for consultancy and outside earnings. Some writers have other observations:

“ a reduction in the amount of committed time required from academic accountants might be sufficient compensation to some individuals who were making a direct trade-off between outside earnings and promotion, but it would tend to reduce the research output of accounting departments at a time when universities are sensitive about their overall research ratings.”

(Arnold and Sherer, 1988: p. 270).

This paradox could ultimately lead to an increase in academic salaries and/or multiple posts; particularly for mentor-type researchers.

5.6 THE “CHOICE” OF UNIT OF ASSESSMENT (UoA) DECISION

Besides the trade-off decision between volume and quality, a number of university departments have to make a UoA decision. The increased multidisciplinary approach to higher education produces such departments as the norm rather than the exception. Clear examples would include the Business Schools, Engineering and Economics. The dilemma Engineering Schools face, for example, is whether they should submit under the General Engineering panel or enter individual groupings under Electronics, Computing, Mechanical and Aeronautical, or Civil. To illustrate this dilemma, the example of Business Schools is used. The issues raised from the analysis, however, are not specific to

Business Schools but a general problem existing in most disciplines.

The conventional UoA for the Business Schools is UoA number 43 - Business and Management Studies. A typical Business School, would cluster academics in various disciplines such as Accountancy, Statistics, Operational Research, Economics, Public Policy, and Social Policy. Universities have to decide whether or not their business schools staff are to be submitted under the Management and Business Studies (BMS) UoA or under their respective subject areas. A criticism of the 1996 RAE is that some panels in closely related subjects, adopted significantly different assessment methods, and that there was no provision for moderation of the marking standards¹⁴.

According to the Jones report (1989) the same principle was adopted for all UoAs in 1989 in order to achieve consistency between subjects. In the case of submissions by accounting and finance sub-areas within BMS, the assessments were performed by the Accountancy Panel on the same basis as if they had all been Accountancy submissions (Whittington, 1997: p. 184). Thus, the same assessment standards are applied regardless of whether the submissions fell under the general coverage panel or the specialist panel. This is in contrast to the belief that general coverage panels apply less rigorous standards compared to “specialist” panels. Whittington (1997), however, acknowledges that institutions might have taken strategic decisions to include high quality accounting groups in BMS submissions to gear up the BMS submissions to achieve a higher rating over a larger number of staff. Conversely, weaker accounting groups may be

¹⁴HEFCE document RAE 2/97, November 1997 para. 44.

hidden amongst large groups of competent researchers in a BMS submission.

The issue of whether the BMS should submit as a group or as sub-areas may not be easy to resolve. The problem is compounded by the absence of the value per point at the time the decision is made. The value per point for BMS (£3,909) is lower than the value per point for Accountancy (£4,169), Economics and Econometrics (£5,148), Social Policy and Administration (£4,517), and Statistics and Operational Research (£8,863). Therefore if the inclusion or exclusion of the BMS sub-areas would not have influenced the rating of BMS and the sub-areas would have obtained the same rating under their respective subject area panels, it would have been more beneficial to submit each group under their respective panels. This seems unlikely because the exclusion of a subject group from the BMS submission would affect the BMS rating, and the group could obtain a different rating than if submitted under their panel as an integral group.

Suppose there is a business school department that wishes to submit 40 full time employed staff (FTE). Further assume it has 10 staff in Statistics and Operational Research (SOR), 10 in Accountancy, five in Economics, and five in Social Policy, and the remaining 10 in other disciplines for which their own UoA, such as Marketing do not exist. If the department submits under the BMS Panel it will get a rating of grade 4. An option the department has is to submit the sub-areas under their respective Panels. Let's further assume a scenario where the Accountancy group consists of excellent researchers who would have obtained a 5* rating had they been submitted separately under the Accountancy panel, and the Statistics and Operational Research group were weaker and would

have only obtained a 3a rating. The Economics group would have got a 4 rating while the social policy would have got a grade 5 and the remainder submitted under BMS would have only got a grade 3a. Under this hypothetical scenario, what would have been the cost/benefit of submitting the sub-areas to the BMS panel?

A submission of 40 staff obtaining a grade 4 in BMS would have earned a funding of £351,810. If the 40 staff were submitted under their various subject panels, the resultant funding would be different. The 10 staff submitted under Accountancy on 5* would have earned £168,845. The five in economics on grade 4 would have obtained £57,915. The five staff in Social Policy on grade 5 would have obtained £76,224, the 10 staff in statistics and operational research on grade 3a would have obtained £132,945, and the remaining 10 in BMS on grade 3a would have obtained £58,635. The total funding generated by the business school staff (*i.e.*, the 40 research active staff) would then have been £494,564 ($= 168845 + 57915 + 76224 + 132945 + 58635$), yielding an extra £142,754. For the hypothetical BMS with the 40 FTE, it would have been more advantageous if the sub-area groups were submitted under their own panels. It should be noted that the objective function is to maximise the funding awarded. There are, of course, other goals such as reputation from high ratings and high submission bands.

Following the above scenario, simulations of various combinations can be performed as illustrated in Table 5.3. Referring to this table, it would be optimal to submit submission Scenario 13. In the illustrative example, the inclusion of

the high rated Accounting group in the department under the BMS panel was able to increase the BMS rating to grade 5 and also allowed for including the tail end of the Statistics and Operational Research (SOR) group. This allowed a higher rating to be obtained by SOR benefiting from the high value per point. (The higher rating for the five staff submitted under SOR achieved a higher funding than including all 10 staff under SOR panel). The simulations can be further extended. Table 5.3 does not take into account the possibility of choosing not to submit the tail end under any panel. There can be the case where a lower selective submission size obtains higher funding because of higher ratings. There are manifold combinations but a simulation program can arrive at the effect of each feasible combination.

The choice decision is made more difficult by the uncertainty on the value per point for each subject area. Departments have to rely on historical data and prevailing policies to place an estimate on the value per point. Universities and their departments are increasingly being run like businesses with the associated market risks (Johnston 1994) and so, it could be argued that the uncertainties in the trade-offs and the choice set are not substantively different from those encountered by businesses.

5.7 CONCLUDING REMARKS

Johnston (1994) illustrates the financial outcome of varying strategies with respect to the classification of staff as “research active” by using a tabulation. Different strategies by individual departments regarding classification would result in different levels of funding. This chapter develops a submission strategy

based on the maximisation principle, and by the reductionism view of the panel's assessments in the RAE, viz., the median concept. There are, nevertheless, difficulties in evaluating the probability of the grade increase when some staff are excluded from the research active staff submitted.

The RAE is destined to remain as a feature of university funding in the UK for the near future. However, it is fraught with issues regarding the manner in which it is viewed and adhered to. On the one hand, because of some uncertainties inherent in the RAE, there is some scope for gaming (Glass *et al*, 1996) and strategic management of the RAE submissions. On the other hand, the HEFCE's introduction of more transparency in RAE 1996 has made it more difficult to conduct assessment exercises without them becoming instruments of policy (HEFCE Report M6/97, May 1997: p. 7). The HEFCE is also cognizant of the risk that the process of assessment may change the behaviours being assessed. In a funding climate dominated by RAE grades and the number of submitted staff, departments have to invariably make trade-off decisions; between size and grade, and also between funding and prestige. The mathematical model developed in this chapter addresses only the direct financial benefits, thus it ignores the possibility that departments do evaluate the relative importance of the prestige of a high grade and the funds received by entering more staff for a lower grade. To maximise returns from the RAE submission, departments have to evaluate:

- (1) Their likely grade and funds received if all staff were entered as research active.
- (2) The probabilities of obtaining a higher grade if some staff were omitted from the submission.
- (3) The financial outcomes for different coalitions of staff.

- (4) The financial costs and benefits of hiring top-notch researchers, and the difference between mentors and non-mentors.
- (5) The consequential impact of the submission, in the short-term and the long-term.
- (6) The university's strategic goals and objectives and the role of the submission strategy in achieving them.

In the endeavour for maximum funding, the trade-off decision between quality (or ratings) and quantity (or submission size) is crucial. Feasible strategies are analysed and built into a model. These strategies for the RAE will impact the way academic staff are hired, managed and compensated. For example, the hiring process can deliberately include the need to boost ratings for the sake of gaining more research funding. This can be done by recruiting academics who can mentor lower-rated staff to achieve higher ratings. Such mentor-type academics and star researchers will inevitably command premia. In a recent report, it is known that over 275 academic staff earn over £100,000 a year and the fact that only 12 universities have 10 or more staff earning over £100,000 (*THES*, February 5th, 1999).

Using the specific example of the business school, the choice of the UoA panel can also complicate the trade-off decision between submission size and grade. The value per point for each panel can vary significantly. Nevertheless, departments can examine the trade-off matrix tables of all the UoA that their staff can submit under so that a feasible and optimum coalition is submitted.

This chapter explores some strategies for the trade-off decisions for the RAE. Not unusually, departments need to decide which staff should be submitted as research active and which should be excluded. Besides this *who* decision

business schools and other departments also faced the *where* decision - the assessment panel choice decision. As Glass *et al* (1996) note, the scope for gaming is significant, and universities will take up strategic positions and play the game. As advised by Johnston (1994):

“... if you play it well, you may at least maintain equilibrium, and you could just, if you were very clever, come out as a winner...”

Scenarios	<u>Business and Management</u>			<u>Accountancy</u>			<u>Econometrics and Econ.</u>			<u>Social Policy and Admin.</u>			<u>Statistics and Op. research</u>			Total Staff	Total Funding
	FTE	Grade	Funding	FTE	Grade	Funding	FTE	Grade	Funding	FTE	Grade	Funding	FTE	Grade	Funding		
1	10	3a	58,635	10	5*	168,845	5	4	57,915	5	5	76,224	10	3a	132,945	40	494,564
2	20	5	263,858	0			5	4	57,915	5	5	76,224	10	3a	132,945	40	530,942
3	15	4	131,929	10	5*	168,845	0			5	5	76,224	10	3a	132,945	40	509,943
4	25	5	329,822	0			0			5	5	76,224	10	3a	132,945	40	538,991
5	30	5	395,786	0			0			0			10	3a	132,945	40	528,731
6	25	5	329,822	5	5*	84,422	5	4	57,915	5	5	76,224	0			40	548,383
7	30	5*	474,944	0			0			0			10	3a	132,945	40	607,889
8	20	5	263,858	5	5*	84,422	5	4	57,915	0			10	3a	132,945	40	539,140
9	20	5	263,858	2	5*	33,769	5	4	57,915	3	5*	54,882	10	3a	132,945	40	543,369
10	15	3a	87,953	10	5*	168,845	5	4	57,915	5	5	76,224	5	4	99,709	40	490,646
11	15	3a	87,953	10	5*	168,845	5	4	57,915	5	5	76,224	5	5	149,563	40	540,500
12	20	4	175,905	7	5*	118,191	5	4	57,915	3	5*	54,882	5	5	149,563	40	556,456
13	25	5	329,822	0			5	4	57,915	5	5	76,224	5	5	149,563	40	613,524

SIMULATIONS OF POSSIBLE SUBMISSION COMBINATIONS.

CHAPTER SIX
INSTITUTIONAL BEHAVIOURAL IMPACT
OF THE RAE

CHAPTER SIX

INSTITUTIONAL BEHAVIOURAL IMPACT OF THE RAE

6.1 INTRODUCTION

This chapter investigates the impact of the Research Assessment Exercise (RAE) on the behaviour of institutions, in particular their strategic behaviour as a result of the RAE. For this purpose, interviews are conducted with senior administrators in 13 universities, focusing on four primary areas: (1) their internal allocation of research funding; (2) their submission strategies; (3) their labour market effect; and (4) their research management. The sample of universities chosen consists of “old” and “new” universities¹ with different levels of research excellence in order to uncover any systematic differences in strategies adopted between the two institutional types.

The chapter is organised as follows: Section 6.2 reviews the previous studies on the institutional impact of RAE. Section 6.3 discusses the issues investigated by this study. The methodology (interviews) is explained in Section 6.4. After presenting the interview findings in Section 6.5, the concluding remarks are stated in the final section.

¹ The term “new” universities refer to the former polytechnics that were previously funded by the Polytechnics and Colleges Funding Council (PCFC), while “old” universities refer to those previously funded by the Universities Grants Committee (UGC).

6.2 PREVIOUS STUDIES

The effect of formula based funding on teaching and research has been studied by Mace (1996). Two “old” universities form the study’s sample - one is ranked high and the other is ranked low in the research selectivity exercise – to observe any systematic differences between them, in their responses. The Mace study consists of interviews and a questionnaire distributed to staff of the two universities. The questionnaire part of the study is carried out in late 1992 and 1993, while the interviews are conducted in 1994 and 1995. The questionnaire is designed to elicit the staff’s perceptions of changes in their teaching and research responsibilities since 1986, the first year of the funding changes. The interviews reveal that staff with a low research output are encouraged to leave. While some staff who are good teachers but are unproductive in research had been retained, the prevailing recruitment policy in both the universities is one of recruiting and retaining only staff members with good research records. In that study, both universities actively engaged in the recruitment and headhunting of individuals with good research and publication records to improve their institutional ratings. This careful targeting has increased the average age of recruitment and could lead to a great deal of untapped potential (Mace, 1996: p. 27). One conclusion that may be drawn from the study is that funding methodology is capable of determining teaching, appointments, retirement and research. The pressures within institutions to adhere to the HEFCE prescriptions also intensify when institutions understand and react to the funding formula.

Another study based on interviews with senior staff in 16 universities examines changes in the funding of higher education (William, 1991). A key finding is

that in all the universities except those with the highest research ratings, the new funding policies had a considerable impact on the extent, nature and organisation of research activities. Many universities have since undertaken the following initiatives:

- Early retirement of less productive senior staff and recruitment of leading research professors.
- Closure or merger of low rated departments.
- Encouraging group work and developing larger departments.
- More collective planning and monitoring of research with research committees established at several levels.
- Creation of funds for special development initiatives based on internal competitive bidding.

There is no instance of resource transfers from lower rated departments to higher rated ones, and the best way to increase funding is to raise the lower rated departments by one or two grades. This is consistent with the marginal utility analysis (see Chapter Four, Section 4.2).

Undertaken for the HEFCE, the McNay (1997) study is conducted between July 1995 and July 1996. From the case studies of 32 institutions on research

strategies, there has been an increased awareness of the importance of research within universities, especially the “new” universities. Since publications are the main basis for judgement by the RAE ratings panels, scholars are encouraged to publish in academic rather than professional journals. This has encouraged premature publications of research findings. The RAE 1996 attempts to avert this problem by requiring only the four best outputs rather than all publications of each staff. However, the evidence² in this thesis suggests that premature publication and premature attempts to publish are still being practised.

In his study, McNay identifies three trends among the U.K. universities:

1. The first trend is the separation of teaching and research. In the former polytechnics, this is in the form of creating research centres that are distinct from departments. The staff in such research centres have lower teaching loads.
2. The second trend is the expansion of team-based research, and the decline in the number of lone researchers. McNay reasons that this is needed for selective allocation of funds and that the synergy of group work produces better research and increases the chances of the work being familiar to others. Also, higher grades are awarded to work that the RAE panel members are more familiar with (Martin and Skea, 1992).

² See Chapter Eight for results of the survey of academic, and Chapter Seven for results of the editor survey.

3. The third trend is the emergence of offices to support, monitor and inform the work of researchers. This is evident in the “new” universities interviewed for this thesis.

There are also behavioural differences between the “old” and “new” universities. The “old” universities have established research traditions and tend to focus their strategies at the devolved level. In many cases, departments with a potential for improvement are identified and SWOT³ analyses is conducted. The changes wrought by the RAE are the most profound to those who are new to the RAE, and have to institute a research culture.

Bourn's (1994a) description of the process at work in Southampton University highlights the pattern of decentralisation and devolution of control of resources that the new transparent funding mechanisms make possible, and indeed appear to demand. Organisational structure and process follow the strategy, and the strategy responds to environmental changes. In other words, significant changes in an organisation's environment are expected to lead to changes in its strategic stance. This in turn requires changes in its organisational process and structure. Changes to organisational structure and process are thus an indirect response to environmental changes. The development of schemes of devolution by universities is interpreted in this thesis as their indirect response to changes in the external environment, particularly those changes that lead to a more transparent funding system (Bourn, 1994a: p.6). Arising from the turbulent changes promulgated by the funding cuts of 1981, the higher education sector is

³ SWOT is acronym for Strengths, Weaknesses, Opportunities and Threats.

embracing a quasi-market stance that fosters greater transparency in its affairs. Universities now know for what and how much each academic unit earns, and within the dual funding system, financial resources from research councils, the HEFCE and elsewhere are readily identifiable. Bourn and Ezzamel (1986), however, argued that a devolved system must be based on units that are large enough to allow for some internal discretion to shape changes. Accordingly, schools and faculties are a better budget unit than departments, even if funding is distributed at the department level.

An academic staff survey on the internal allocation procedures reveals that departmental cross-subsidisation within universities is taking place (Angluin and Scapens, 2000). The study analyses cross-subsidy with a horizontal dimension, by identifying three possible levels in delegated budgets across which subsidy may occur:

1. in the attribution of income;
2. in charges against income; and
3. in the use of surpluses or deficits.

Firstly, in income attribution, a university may choose to attribute a greater or a lesser extent of the income to budget centres. Universities can also choose to attribute income to academic budget centres on the same basis as it is earned, i.e., mirroring the HEFCE funding formula. This has three consequences. One, the university needs to charge central services against the attributed income. Two, the university would be importing and adopting externally defined systems of

rewards. Such an adoption can compromise university autonomy. Three, any cross-subsidy has to be explicit and may conflict with the imported system of rewards. Universities may wish to avoid these consequences and choose their own internal formulae for income attribution. In the survey, a frequently cited method for dealing with the cost of central services, which may create or accompany cross-subsidy at the level of income, is top-slicing. A quantum is set aside so that charges for central services do not appear on the academic budgets. Effectively, there is overhead recovery without a stated basis, and academic centres make a differential contribution to central services.

The second horizontal dimension is that of charges against income. Apart from top slicing, the highly noticeable method is that of charging a flat percentage rate, akin to a tax. This standard overhead recovery charge across budget centres actually entails the cheaper departments cross-subsidising the more expensive departments. The third dimension on the use of surpluses has resulted in some universities clawing back surpluses from departments to meet unplanned deficits. This is a visible form of cross-subsidy, though not directly related to the RAE outcome.

This section provided a brief review of past studies on the institutional impact of the RAE. The next section delineates the research issues and questions addressed in the case studies.

6.3 THE RESEARCH QUESTIONS/ISSUES

One of the questions uppermost in many academics' minds is what impacts the RAE and its funding procedures have on the behaviour and strategies of both institutions and individuals. Developing upon past research described in Section 6.2, this thesis gathers new information particularly subsequent to the 1996 RAE. The emergence of reshaped and new strategies reinforced by new realities and beliefs warrant a thorough scrutiny and analysis. This chapter also provides an insight into the cumulative effects of the RAE on institutions, while the cumulative effects on academics are discussed in Chapter Eight⁴.

McNay's findings of differential impacts of the RAE on the ex-UGC universities and the ex-PCFC institutions do not come as a surprise, considering that the polytechnics became universities only in 1991 and the RAE 1992 is their first RAE. This chapter further contributes to the debate about whether abolishing the Binary-Divide has been successful in assimilating the former polytechnics with the "old" universities, or whether these ex-polytechnics have embarked on strategies that are distinct from the "old" universities.

To facilitate the presentation in this chapter, Table 3.1 from Chapter Three is reproduced here as Table 6.1. We also briefly reiterate and detail the four main areas addressed in the interviews.

⁴ Also see Talib, A., "The continuing behavioural modification of academics since the 1992 Research Assessment Exercise", *Higher Education Review*, Vol. 33, No. 3, Summer 2001.

Table 6.1: Short-term and long-term objectives

	Department objectives	University objectives
1. <u>Submission strategy.</u> a) Short-term b) Long-term	<div>Reputation and staff morale.</div>	Funding level Reputation
2. <u>Allocation of RAE funding</u> a) Short-term b) Long-term	Not applicable (distribution decision taken at university level)	To maximise benefits. (marginal implications) Equitable distribution and enhancement of reputation, in particular strategic areas.
3. <u>Hiring strategies.</u> a) Short-term b) Long-term	To fulfil teaching duties Teaching duties and research output, to enhance department reputation.	Teaching needs and inclusion in RAE submissions. Teaching duties and research performance to enhance university reputation.

6.3.1 SUBMISSION STRATEGIES

RAE submission strategies have been analysed in Chapter Five and an optimal funding-maximisation submission strategy was developed. Chapter Five also illustrates the trade-off between quality and quantity in deciding which staff to submit as research active. The maximisation model is based on the objective of

maximising funds. The discussion in Chapter Three (section 3.3.2.1), however, raised other objectives such as ratings to be achieved from the submission.

The analysis and discussions in Chapters Three and Five motivates the investigation of the submission strategies that universities adopt. The interviews uncover whether universities attempt to maximise research funding by selective submissions. Do universities attempt to optimise the coalition of staff to submit as research active? Is funding or the achieved rating more crucial to universities?

An aspect covered in Chapters Three and Five is the choice of unit of assessment (UoA) under which to make the submission, i.e., the where decision, arising from the difference in values per point. Furthermore, it is believed that higher grades are given to submissions that the RAE panel members are more familiar with (Martin and Skea, 1992). This means that the RAE panel membership influences the submission decision. This choice of panel factor is probed during the interviews.

6.3.2 AUTONOMY: INTERNAL ALLOCATIONS AND CROSS-SUBSIDY

There are three key problems in the funding of higher education: (1) how to raise the money; (2) how to allocate it to institutions; and (3) how institutions should allocate it internally. The first problem is beyond the scope of this thesis. The research selectivity exercise is one mechanism for allocating funds to institutions. The HEFCE also has other forms of funds allocation (see Chapter Four). However, the focus of this thesis is the research selectivity exercise, viz., the RAE. The procedures for allocating funds to institutions can substantially

affect the way they are allocated internally. The block grants from the HEFCE are distributed to universities based on the performance of individual UoAs. However, universities are free to distribute the grant as they choose. This leads to differences in the way universities treat and allocate funds to the low rated and high rated departments (Johnes and Taylor, 1992). Some universities have to decide between supporting low rated departments and high rated departments. Other goals and internal policies would also determine the distribution of funds.

Universities may cross subsidise departments because of the tightly constrained public funding and the relative inflexibility of their costs. As many academics are tenured, a large portion of the salaries is fixed, increasing with promotions and annual increments. The RAE funding mechanism has made funding more unpredictable. This can increase the need for cross-subsidy. To achieve the RAE's objective of creating centres of excellence, the funds earned from the RAE would have to be internally allocated in accordance with the formulae (see the discussion on policy objectives in Chapter Four). However, to maintain university autonomy, policy makers do not have explicit requirements on the way funds are allocated internally. We investigated the internal allocation methods which universities administer and examined if cross-subsidy of departments was practised.

6.3.3 LABOUR MARKET EFFECTS (HUMAN RESOURCES MANAGEMENT)

The endemic impact of the RAE has universities reviewing their human resource policies, including who to recruit for research, and how they should reward and retain existing staff (see Talib and Steele, 2000: p. 80). In the McNay (1997)

survey of academics, 12% of the recent appointees (those with less than one year in post) acknowledge that the RAE is the dominant factor in their appointment, with 30% admitting that it is a significant factor.

The compensation for academics at the international level is the result of complex interactions among national legal systems, tax regimes, culture, employer and union organisations, government policy and so on (Wilson, 1993). In the U.K., the pay system is simpler. It is based on a grade scale that applies to all staff with a very limited discretion across all subjects. There is discretion, however, with the compensation of professors in most universities.

There is no necessary connection between the funding system and the labour payment system. However, highly volatile funding that is unpredictable necessitates highly flexible payment systems, including for example, the use of short-term contracts or part-time work (Wilson 1993). The potential volatility of funding could also lead to the minimisation of contractual pay obligations, particularly the case of tenured staff in universities. Thus, it is a conceivable consequence of the research selectivity funding formula that universities use it to minimise contractual pay obligations through early retirement schemes. This is addressed in the interviews conducted in the case studies.

Since the funding changes are done partly for the sake of efficiency, only efficient and productive staff will be maintained (Wilson, 1993). In practice, there is no equilibrium between the demand for and the supply of efficient and productive staff and universities may be forced by market conditions to offer

premiums to attract specific candidates. But a free market for academics is non-existent. The demand for academics is made up of a cartel of universities with a rigid pay structure. To circumvent the rigid pay structure, universities may be forced to offer the premium in non-monetary forms such as rapid promotions, appointments at a higher grade, reduced teaching loads, research project assistance or provision of avenues for additional income such as paid executive training. These different and new compensatory initiatives are investigated in the case studies.

The fate of good teachers who are not productive in research hangs in the balance. The Teaching Quality Assessment (TQA), introduced in the 1990s, has changed the environment. Though the TQA has no direct funding outcome, it has a reputation value. It creates a need for good teachers.

6.3.4 RESEARCH MANAGEMENT AND STRATEGIES

Evidence from the McNay 1997 study suggests that the RAE has become a driver for institutional planning of research based on the RAE schedules, and has prompted some institutions to devise strategies for managing their research agenda. The 1997 study also notes that research has become a prominent item in annual staff appraisals and workload planning. There is a regular scrutiny of research productivity and output. Research is now given more management attention and central support. The Research Development Office and Pro-Vice-Chancellors responsible for research are now taking a more active role in supporting and directing research. Part-time and casual staff and PhD students are fulfilling the teaching tasks in order to free the core staff to focus on research.

Not unusually, there is interest in swelling the numbers of PhD students because they contribute greatly to research and publications (McNay, 1997).

The distinction between polytechnics and universities is abolished in 1991, and the former PCFC institutions (ex-polytechnics) are included in the 1992 RAE. The funding council in 1992 provided a total of £12.5 million as a special “devR” fund-meant to assist the development of research in the “new” universities. These “new” universities began the 1993-94 academic year with approximately thrice the amount of block grant research funding that was available to them in previous years (McKenna, 1996: p. 112). It is timely to reflect on how these institutions use the extra funding to alter their approach to managing research. Furthermore, the “new” universities cannot be expected to match the “old” universities easily. Despite the increase in funding of the “new” universities, the ratio of such funding in 1993-94 in the “old” versus the “new” universities is still more than 11:1 (ibid., p. 113).

Given the noticeable gap in research performance between “old” and “new” universities during the 1992 RAE, the ex-polytechnics face the challenges of narrowing the gap (McKenna, 1996). As the “new” universities of the 1990s have neither the funding base to achieve research excellence across a wide range of academic areas, nor the opportunity to recruit many new academic staff of high research calibre, a viable strategy would be to achieve research excellence in a small number of selected areas. Nevertheless, a “new” university with QR earnings of over £1 million in research grants has the necessary resources to develop one or two areas of research excellence and to recruit entire research

teams. But, this would require the senior university management to commit a significant amount of resources to the targeted areas.

All the above personnel and research management strategies are probed in the interviews with the universities in the sample to identify trends and differences in strategies adopted by the “old” and the “new” universities.”

6.4 METHODOLOGY

The ensuing sub-sections detail the methodology involving the case study of 13 universities. The basic design is a series of interviews conducted with senior administrators.

6.4.1 THE SAMPLE

The sample of universities interviewed consisted of eight “old” universities and five “new” universities. The “old” universities chosen are: Warwick, Bath, Birmingham, Bradford, Durham, Leeds, Liverpool and Reading. The “new” universities are: Bournemouth, Leeds Metropolitan, De Montfort, Middlesex and London Guildhall.

The combination of “old” and “new” universities is chosen with the objective of identifying if there are differences between the two types as well as to study the common behavioural trends, as these pertain to institutional size and strategy, research excellence, and other responses to the RAE regimes since 1992. The “new” universities in the study are the former polytechnics funded by PCFC until 1991, and RAE 1992 is their first RAE experience.

Even within the same institution type, there may be varying research cultures and levels of research excellence that encourage different strategies and represent different behavioural implications. For this reason, the sample includes a former polytechnic with limited scholarly research (Bournemouth) as well as with financial crisis (London Guildhall).

Of the “new” universities, De Montfort is chosen for its emphasis on research and its high rating. Leeds Metropolitan and Middlesex are interviewed because they are renowned for their excellence in teaching accounting and other professional courses during their polytechnic years. While Bournemouth represents an institution with low research activity, London Guildhall is chosen for the financial crisis it is in. The “old” universities represent a range of research excellence, size and geographical locations. Though Warwick University is an obvious choice as it is the author’s university, it is also chosen for its reputation and success as a research-led institution. Warwick University was created in the 1960s to be a teaching and research institution. With no pre-existing staff, the university’s hiring policy ensures that all staff are research-oriented. Birmingham University is included in the study for its claim to have one of the most complete systems of devolved budget management of all the U.K. higher education institutions.

6.4.2 THE INTERVIEWS

The in-person interviews, averaging two hours, are conducted at the participating universities during the summer of 1998. Only one interview is conducted over the telephone with the executive assistant to the Vice-Chancellor of Bath University. This telephone interview lasted around 40 minutes and is conducted after a visit to Bath University during which a two-hour interview is done with a planning officer. For Warwick University, the interview with the Vice-Chancellor of Warwick is held over two-and-a-half-days.

Table 6.2 lists the interviewees, all of whom are competent to respond to issues pertaining to the RAE.

Table 6.2: Person(s) interviewed.

	Position of Person(s) interviewed
Warwick University	1. The Vice Chancellor 2. Assistant Registrar 3. Finance officer 4. Professor responsible for the Business School RAE submission
Bath University	Executive Assistant to the Vice Chancellor
Birmingham University	Head of the Planning Division
Bradford University	Head of the Planning Division
Durham University	Deputy Registrar
Leeds University	Head of Research Office
Liverpool University	Senior Assistant Registrar, Planning and Development Division
Reading University	Acting Pro-Vice Chancellor
Bournemouth University	Research Development Manager
Leeds Metropolitan University	Head of Research Development Office
De Montfort University	Pro- Vice Chancellor
Middlesex University	Pro- Vice Chancellor
London Guildhall University	Senior Assistant Academic Registrar

6.4.2.1 INTERVIEW STRUCTURE

The issues for the semi-structured interviews are in Section 6.3. A checklist of questions and topics form the basis and the interviews are flexible enough to allow the discussion of other relevant issues (see Table 6.3 for the checklist). The checklist is not given unless requested by the interviewees before the interview. The checklist serves as an informal guide so as to enable the discussions to flow productively. The next section summarises the key findings of the interviews.

Table 6.3: Interview Checklist

INTERVIEW CHECKLIST
<div><div>1. The methodology for internal allocation of RAE research funding block grants.</div><div>2. Does cross-subsidy exist?</div><div>3. Is there devolved budgeting?</div><div>4. Is there an allocation strategy to support low rated departments or high rated departments?</div><div>5. Does your university have any specific strategies to improve the ratings of low rated departments?</div><div>6. Are there any funds earmarked for supporting RAE 2001? And, how are they utilised?</div><div>7. What is the impact of the RAE on your university’s hiring strategy? Does your university practise headhunting of researchers? Are they paid a premium? In what form?</div><div>8. Are there any strategies to retain good researchers and/or good teachers? Is early retirement encouraged for non-performing staff?</div><div>9. Are there staff that are not submitted as research active for the RAE submissions given an additional teaching load? Are there any strategies to encourage the productivity of staff, such as mentoring?</div><div>10. What are the submission strategies? Is optimal coalition of staff considered?</div><div>11. Is there a concentration on areas of research strength?</div><div>12. Are there any other strategies and/or impacts from the RAE?</div></div>

6.5DISCUSSION OF FINDINGS

The key findings of the universities are summarised in Table 6.4. To maintain confidentiality, we have not identified the universities by name in the table. The universities are coded A to M: where universities A through H are the “old” universities and I through M are the “new” universities. From Table 6.4, the common trends and differences between the “old” and the “new” universities are categorised by the four primary areas of inquiry discussed in Section 6.3.

TABLE 6-4

University	A	B	C	D	E	F	G	H	I	J	K	L	M
Internal allocation follows HEFCE formula	Y		Y	Y	Y				Y	20	Y	Y	Y
Internal allocation follows internal formula		Y				Y		Y					
Devolved budgetting exists	Y	Y	Y	Y	Y			Y	Y		Y	Y	Y
Cross-subsidy exists	Y	Y	Y	Y	Y	Y	Y	Y 10	Y 16	Y	Y	Y	Y
strategy supports high or low rated depts	H	H		L	H	H		8	H	H 19	H	H	H/L
Submission strategy exists	Y	Y 3	Y	Y*	Y*	Y	Minimal	9	14	Y	Y 22	Y*	Y
Panel choice considered	1	3	Y		Y	Y	Y		14	Y 21	Y	Y	Y
strategies to improve ratings	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
funds earmarked for RAE 2000	Y		Y	Y	Y	Y	Y	Y 11	Y	Y 18			Y
head hunting exists	Y	Y 2	Y	Y	Y	Y	Y	Y	15	Y		**	Y
RAE influences Hiring	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	**	Y
Premium paid to star researchers		Y	Y	Y	Y	Y	Y 7	Y				**	
Proven researchers induced to remain	Y	Y	Y		Y	Y	Y	Y		Y		**	
Early retirement--weeding out	Y	Y	Y	Y	Y 5	Y	Y	Y					
teaching load changes	Y	Y 2	Y	Y	Y	Y	Y	Y 11	17	Y		Y	Y 23
mentoring exists			Y		Y	Y	Y	Y	Y	Y			
research centres creation								12	Y				Y
encouragement for publications	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
other strategies					4		6	A	13	18	4	RS	24

LEGEND AND EXPLANATORY COMMENTS

- Y
- Identified as explicitly existent within university.
- Blank
- Not identified as explicitly existent within university.
- H
- High rated department is supported.
- L
- Low rated department is more supported.
- 1
- The panel choice was to be considered for RAE 2001.
- 2
- Decisions were left to be taken by individual schools.
- 3
- Submission strategy taken at school level.
- 4
- Strategy was to focus research in areas of strength.
- 5
- Budget cuts strategy (not RAE related).
- 6
- Strategy at this university included the split and/or closure of departments, as well as the hiring of proven researchers from overseas as visiting professors (to act as mentors).
- 7
- The “premium” paid here is more in terms of providing support for the professors including research equipment.
- 8
- Warwick University has a policy of supporting departments that have declined in ratings (these tend to be departments rated 3 or 4). However, the internal resources allocation formula (the Matrix) serves high rated departments. The high RAE ratings result in more funds being allocated to the department via the matrix.

- 9 The central management submission strategy of Warwick University was to have a 100% submission (or at least in band “A”), as
the university prides itself on being a research university and that all staff engage in research. However, for RAE 2001 more
strategic thought will go into submissions.
- 10 Cross subsidy exists via the workings of the Matrix (the internal resource allocation methodology) and also the strategy of
supporting departments that are relatively low rated and/or declined in ratings.
- 11 Funds are available for staff to “buy-out” their teaching to concentrate on research and publications. Staff can bid for this fund.
Newly appointed staff are given reduced teaching load to concentrate on research.
- 12 The university has a tradition of establishing research centres, but not as a result of the RAE.
- 13 The university appointed a Pro-Vice-Chancellor and a Research Development Manager to install research culture within the
university. the university strategy is to focus their research into specialist groups.
- 14 Has not been done for RAE 1996 but is being considered for RAE 2001.
- 15 This was only done for RAE 2001 not for RAE 1996.
- 16 Via top-slicing for research centres.
- 17 Staff in research centres have reduced teaching load.
- 18 University has strategy of research niche concentration. A notable strategy of this new university is the hiring of research fellows
to increase research output, as well as the increase in research students. Funds earmarked for RAE 2001 is used for hiring
research fellows.
- 19 Concentration on niche areas.
- 20 Was being considered for RAE 2001 funds.

21 The value per point issue was considered as well.

22 Strategy adopted was, in large, similar to maximisation model proposed in chapter 5.

23 Funds available for staff to “buy-out” teaching time.

24 The appointment of a Pro-Vice-Chancellor for research to promote research and a strategy of increasing research students.

* Submission strategy totally left to department decision.

** This was mainly due to the financial crisis experienced by the university at the time.

A Warwick university had an established strategy of hiring high calibre academics and providing an atmosphere conducive for research.

RS University had a strategy of increasing research students.

6.5.1 SUBMISSION STRATEGIES

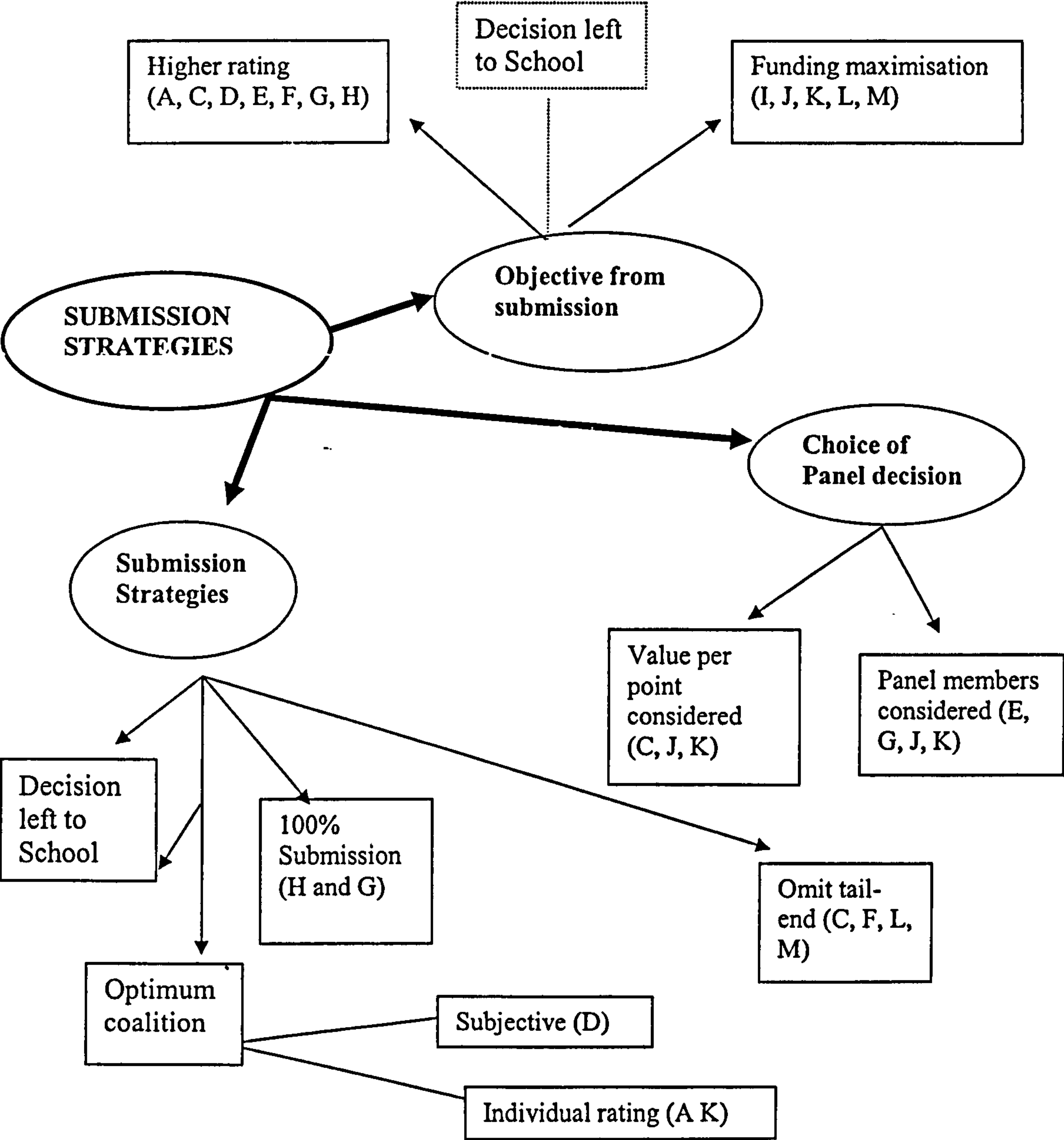
In the sample, three universities left the submission decision to the departments, and one made the submission decision at the school level. One of the most common submission strategies is the exclusion of the tail ends from submissions. Figure 6.1 summarises the submission strategies, including the objectives and the choice of panel.

Most of the “old” universities recognise the importance of having research excellence and consider it vital to obtain high ratings in the RAE and to submit research active staff in Category band A or B. Warwick University’s central strategy is that of submitting, as far as possible, all staff at the Band A level. For the 1996 RAE, Warwick submits 750 staff from a total academic staff strength of 762. With effect from the RAE 2001, this central decision will be changed to reflect the aim of a Category B submission, and more strategic thought will go into submissions to achieve higher ratings. In contrast, the “new” universities are not constrained by the proportion of staff to be submitted as research active. This could be due to the fact that they do not consider themselves as research-oriented universities where the staff need to be active in research. They regard the RAE as a funding exercise and the optimum coalition of staff they submit as research active would be with the objective of maximising funds. One “new” university has a maximising strategy similar to the model presented in Chapter Five. The “old” universities are more anxious about obtaining high ratings rather than high incomes, while the “new” universities placed higher importance on the funding aspect. The “old” universities are also conscious of the proportion of staff submitted as research active. On balance, the maximisation model

discussed in Chapter Five resembles the thinking in the “new” universities. University A, however, attempts to establish individual ratings for its staff to arrive at the optimum coalition to submit, with high ratings as its main objective.

FIGURE 6.1

(Alphabets in parenthesis represent the university)



A working group in University *C* undertakes the submissions by establishing optimum coalitions that subjectively leave out the tail end of the staff. The overall objective of University *C* is for all departments to achieve a rating of at least 3. Besides the importance of ratings, consideration must be made regarding the choice of panels for the increased value per point. However, the overriding factor has been the “marketing” aspect as the choice of panel needs to be reflective of department.

At University *D*, the Economics department submits under the Business and Management Studies (BMS) because its research is not quantitatively oriented and it does not expect their submissions to be well regarded by the economics panel. For University *D*, the composition of the panel members plays a role in its submissions strategy.

The departments in University *E* have full autonomy, but have to adhere to central management guidelines of aiming for high ratings by eliminating the tail end of staff. The university had a 100% submission in 1992. In the case of its Engineering Department, the submissions are done under a different panel because it can capitalise on its good reputation in engineering. Furthermore, university *E* is less confident in the cross-referencing between panels; thus, it has decided that its departments’ submissions would be to the panels that are familiar with the research by its respective staff.

Universities *F* and *E* strategically considered the choice of panel for the submissions; with higher ratings as the objective rather than value per point. The

objective for University *J*, a “new” university, in its 1996 RAE is to secure funds that are much needed in order to build their research capabilities that are in a state of transition. Their budget target is an average rating of 3.5 with 555 submissions. Their objective for RAE 2001 is to elevate the rating to an average of 4. Departments submit the RAE returns to the Deans who report to the Pro-Vice-Chancellor. Submissions are reviewed with the help of external advisors who recommend on the coalitions to submit. These external advisors are mainly former RAE panel members. The choice of panel is an important consideration in their RAE 1996 submissions. Heads of departments give suggestions on how to package submissions in light of members of the panel. The value per point issue was considered and some thought went into submitting under high value panels but not much was done due to the uncertainty involved and because most staff did not feel comfortable to submit under panels different from their natural panel.

To London Guildhall, funding is more important than ratings because of the financial crises they had been experiencing. University *M* also has the maximisation of income as their goal, so they opt for lower ratings with high volume as a strategy based on their mistaken assumption that a department rated 2 would continue to receive funds.

Only one university actually considered the “expected” value per point when considering the choice of panel. However, a number of universities do consider panel choice and were planning to consider it for RAE 2001. The factors influencing the panel choice does not appear to be the value per point

discrepancy, mainly due to the uncertainties involved in the value per point. The panel choice decision was more to do with panel members and the likelihood of obtaining a higher rating. It seems that universities were swayed by the Martin and Skea (1992) argument that RAE panel members are more willing to grant higher grades to work they are familiar with.

The interviews reveal the trend of gaming in the submissions between 1992 and 1996, with a propensity for greater strategic behaviour being planned for RAE 2001 especially in regard to submissions to panels.

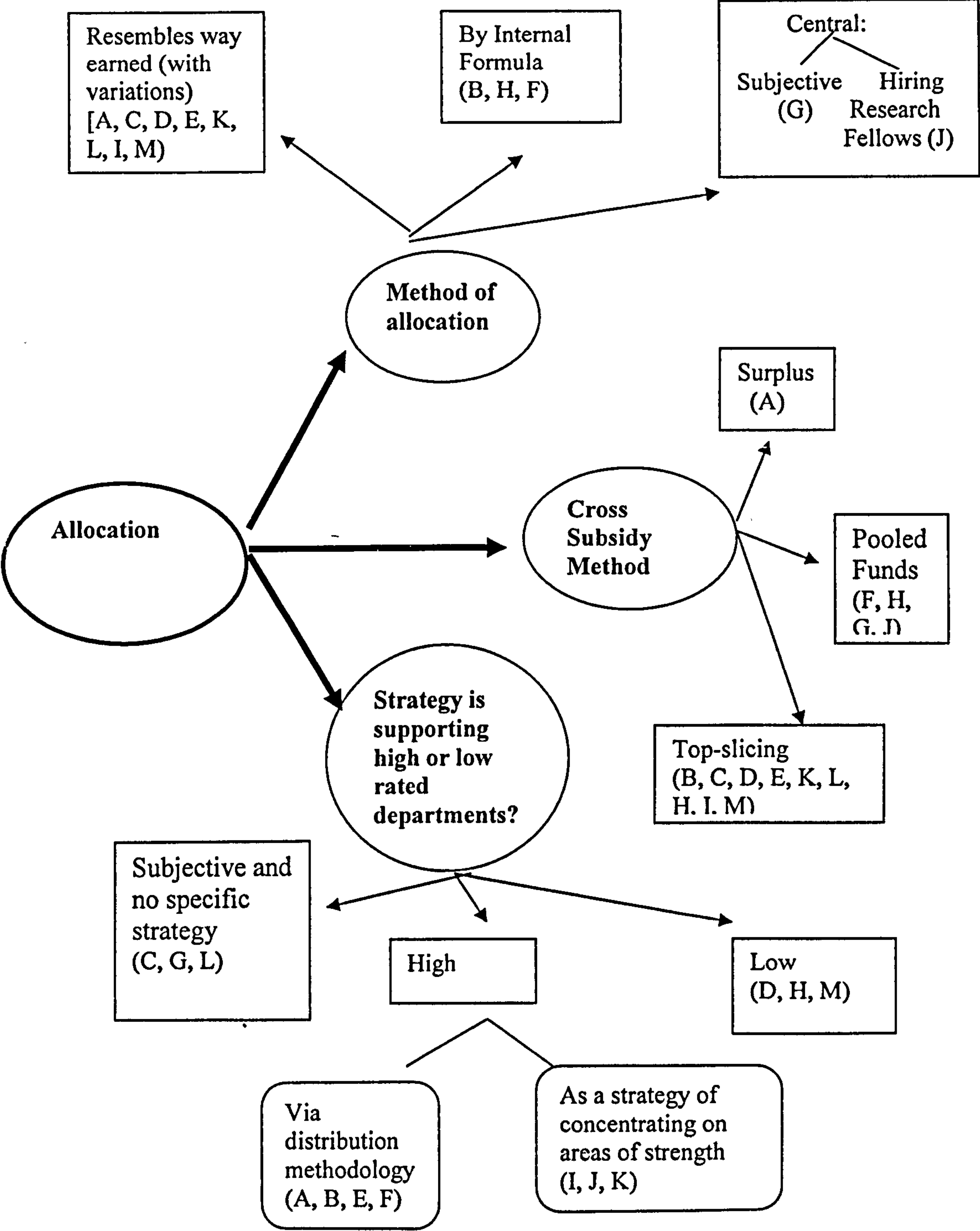
6.5.2 AUTONOMY: INTERNAL ALLOCATIONS AND CROSS-SUBSIDY

6.5.2.1 ALLOCATION METHODS AND CROSS-SUBSIDY

As displayed in Table 6.4, eight universities in the sample have an internal fund allocation policy that takes into account the HEFCE allocation formula. However, the internal allocation does not exactly mirror the fashion in which the RAE funds are earned. A number of universities distributing funds directly to the departments or schools that earn the funds charge a tax or top-slice it. For instance, University *D* levies the departments a 40% top slice charge for central overheads, while University *L* imposes a top-slice tax of 6%. The funds from the top slicing are meant for subsidising departments that do not get adequate RAE funding. University *M* allocates 70% of the research quality related funds to the schools, 25% to central overheads, and 5% to the research office. Cross-subsidisation exists in all the universities interviewed. Figure 6.2 illustrates the cross-subsidy and internal allocation methods applied by each university

interviewed.

FIGURE 6.2



University *A* allocates the funds to the department earning them in the first instance, and then claws back any surplus. An example is its Department of Biochemistry, which submits 14 staff and obtains a grade 5. Initially the total amount of money earned is allocated to the departments as income. However, as the Biochemistry department ends up with more income than its budgeted expenses, the funds are re-distributed to other departments. Hence, cross subsidy exists explicitly, in line with the Angluin and Scapens (2000) surplus treatment.

The general desire in University *E* is to abolish cross-subsidisation in the long term, but it exists in order to avoid abrupt changes in funding of departments as a result of changes in the RAE ratings obtained. The policy is not to allocate research monies only to departments that are rated above 2. However, departments that receive a rating of 3a have their allocations withheld until they have submitted a report detailing how they will improve their ratings in the next round. In practice, all departments rated 3a have their allocations released. The university imposes a ceiling variance on the change of funding allocated to departments, which currently is set at 7%. Therefore, the 1996 RAE resultant funding for each department could not vary by more than 7% from the 1992 RAE funding. If a department did well in 1996 RAE relative to the 1992 RAE and receives more funding, then it is allocated only 7% more, and the difference is held back. If a department did poorly and had its funding reduced, then it is reduced by only 7%, and the difference is subsidised by the monies held back from the other departments. The university can manoeuvre in this manner because its university-wide funding has increased. The next round of RAE is expected to widen the variance gap, and in fact it is intended that this gap widens

gradually until department funding is stabilised and the university reaches the stage where cross-subsidisation is eliminated. The strategy of gradual elimination of the cross-subsidies is to soften the impact of fluctuating funds.

The University of Warwick, Birmingham University, and University *F* use their respective internal distribution formulae to allocate the RAE funds. In Warwick University, the RAE funds are pooled centrally with other sources. The allocation incorporates an elaborate distribution formula, but identifies some specific research elements, and includes research levers relating to the quality, as assessed by the RAE. The department that earns “soft income”, for example income earned by the Business School from the distance-learning MBA, retains and can spend such funds to hire staff, sponsor conference participation and so forth. Part of the income from overseas students goes into the main pool and part of it to the departments involved. The allocation of funds is done on the basis of student to staff ratios. A funding matrix decides this ratio in which the RAE rating is a variable in the formula. Departments that are rated high in the RAE are rewarded. However, this allocation can be subjectively amended. After each RAE, external specialists who tend to be members or former members of the RAE panels review the departments that obtain low ratings. The review recommends an action plan to improve ratings and some additional funds would be allocated to these departments to enable them to improve their ratings. This is manifestation of the steps taken to cross-subsidise weaker departments.

Birmingham University’s response to the autonomy in distribution of HEFCE funds internally is to have a devolved system of budgetary and management

responsibility. The schools within the university have complete autonomy in their decisions, and heads of schools are directly responsible to the Vice Chancellor for the management of their schools. It is vital to place management responsibility as close to the research and teaching activities of the university as possible in order to create responsive, innovative and well-informed local management that is able to integrate resource, space and academic planning. Heads of schools have to provide implementation plans that specify details for one year ahead and general objectives for the following five years in respect of academic staffing, and non-staff and capital plans for the units. Of importance is how the schools use the available funds to improve or sustain their RAE ratings. Although the general principle is that they will merely use the funds available to them, there is the occasional bargaining for additional funds. This is deliberated with the Vice Principal who is responsible to the Vice Chancellor on matters pertaining to the planning and resource allocation portfolio. These implementation plans are regarded as an important control tool by the university's central management.

Birmingham University's internal formula driven Resource Allocation Model (RAM) and the Indirect Cost Allocation Model (ICAM) drive the internal allocation of funds. These formulae are used to allocate income to the schools and the costs of the services, administration and premises.

The Resource Allocation Model (RAM) has four sections:

- The first allocates the grants for teaching received from the HEFCE

and income from home/EU tuition fees. The basis of the calculation is home/EU teaching load multiplied by a Unit of Resource weight. The Postgraduate teaching load is weighted by 1.2 to take into account the additional length and cost of such courses.

- The second allocates income from overseas tuition fees on the basis of overseas student load multiplied by the overseas fee appropriate to each school.
- The third allocates the research element of the HEFCE grants. There are three elements to this section: (a) SQR (student and quality related); (b) DR; and (c) GR. The DR and GR are small allocations. The SQR element is comprised of SR (student related) and QR (quality related).

$SR = [A / \text{Sum of } A] \times SR$ (with SR at 80% of funding council total QR allocation less DR sum)

$QR = [B / \text{Sum of } B] \times QR$ (with QR at 20% of funding council total QR allocation less DR sum)

Where

$A = [\text{Actual load (i.e., UG + PGT + (PGR} \times 4))] \times \text{Unit of resource weight for Research} \times 1996 \text{ RAE score}$

(UG = undergraduate students, PGT = Taught postgraduate students, and

PGR = Research postgraduate students).

$$B = [1996 \text{ RAE Research Active staff} + (\text{PGR Actual Load} \times 0.15) + ((\text{Research Assistants} \times 0.1) + (\text{sum 4 years of charities Income}/25,000) \times 0.05)] \times 1996 \text{ RAE score} \times \text{unit of resource weight for research}$$

(The formula translates the 1996 RAE score of 5* as 5.3, score 5 as 5, score 4 as 4, score 3a as 3.3, score 3b as 2.6 and score 2 as 2. Each of these is then reduced by 1)

Therefore, a department that is rated 2 gets no funding from the HEFCE but would still be allocated resources. Hence, cross-subsidy exists. The higher rated departments, however, get higher allocations based on the formula.

The use of the RAM in allocating funds to schools means that all the incomes (except interest) have been allocated to the schools without top-slicing for central costs. The ICAM is the means of allocating central costs to the academic budget centres. The method of allocating costs to schools varies across the range of services and administrative budget centres.

Internal budgeting and allocation of resources are controlled centrally in University F. There are two budgets: one is for salaries and the other for non-salaried items. The non-salaries budget is calculated by formula, where the RAE rating score is a variable. The research postgraduate students and academic staff are multiplied by the RAE score. Another variable in the formulae is the budget centre's cost factor that reflects the different costs of disciplines. The

RAE, therefore, plays a small part in this budget allocation.

The salary budget in university *F* is performed by negotiations. Discussions are held with department heads chaired by the Pro-Vice-Chancellor who examines the budget submissions by the departmental heads, the RAE obtained, and any potential for improvement. Hence, the RAE has a direct effect. As it permits cross-subsidisation, departments do not necessarily receive what they earn from the RAE. It is also difficult to establish exactly how the RAE money is spent as all the incomes are pooled together.

University *J*, a “new” university, and University *G* do not directly allocate the RAE funds to their departments. University *G* allocates the funds subjectively. The Deans of faculties submit the faculty’s budgets to the Vice Chancellor (VC) requesting for resources with details of their requirement and priorities. Basically, department heads submit to the Dean who collate the submissions and prioritise them. The VC chairs a committee with the deputy VCs and pro VCs. The committee and the deans decide on the allocation subjectively. The committee takes into consideration the university’s overall policies and strategies. Though the RAE ratings do not directly influence the allocation, the committee utilises the RAE ratings to inform its final subjective decision.

The RAE funds in University *J* are utilised for research development via a Senior Research Fellow Scheme (SRF). The block grants from the RAE are managed centrally. “Teaching” money and some external grants finance the department budgets. University *J* needs to ensure that the research selectivity formula

money is used to enhance research and is used effectively. Their strategy is one of niche concentration. University *J* initially identifies 20 units of assessment that can be improved and creates a SRF by using the RAE grants for their salaries. The majority of the research fellows come from the “old” universities. In total, these universities appoint about 40 SRF based on the 1992 RAE funding. The SRF are appointed to increase research output, and the RAE ratings. The other leg of the strategy is to increase the number of research students. Around 100 studentship schemes have been introduced. The university views research students as a means of increasing the research culture and publications, as well as increasing the volume multiplier in the funding formula.

University *J* has a clear concentration of its areas of strength. However, to be a reputable university, they realize they must offer a wide range of subjects. The departments that are supported by the RAE 1992 funds have to submit research plans for the RAE 1996 which are reviewed and monitored. If the monitoring shows that some departments are not achieving targets, then the funding support may be withdrawn. The objective is to improve the quantity and quality of publications, and improve the gearing between RAE funds and external research funds from the current 1:1 to the target of 1:2. The university regards the ability to attract external research funding as one measure of their research capabilities.

After the results of the RAE 1996, University *J* reviewed all the departments (units). Ex-panel members visited 15 units to give advice on each unit's potential and what could be done, identifying any strengths that could be built upon. About 20 units have been identified for improvement and are supported.

In an 18-month period, 50 new senior research fellows were appointed.

As discussed in Chapter Three, from the marginal utility analysis, resources should be distributed to departments that are rated low as opposed to high in the RAE. However, these interviews reveal that only three universities (D, H, M) that support the low rated departments. Four of the universities fund their high rated departments as a result of their distribution methodology, which results in more funds allocated to them. Three of the “new” universities have the strategy of supporting the high rated departments as a consequence of their niche concentration in research. This concentration is in line with the McKenna (1996) argument, mentioned in Section 6.3.4.

6.5.2.2 AUTONOMY

One issue the research selectivity formula funding mechanism raises is the question of university autonomy vis-à-vis accountability. U.K. universities have a formal status as autonomous corporations. Direct government regulations or interference is considered unlikely. Indeed, in response to the EC Commission’s Memorandum on Higher Education (EC 1992), the Department for Education (DFE) states that it will resist standardised approaches to higher education policy, and that “the government opposes intrusion into what it sees as the most decentralised and autonomous higher education system in Europe” (THES, 15 January 1993: p. 7). Nevertheless, while the policy of the government may be described as one that aims to increase the operational freedom of universities and their staff, this is paralleled by a policy of requiring more specific accountability by those universities and their staff (Bourn, 1994a: p. 7). An example of the

increased accountability is the RAE and the resultant research funding allocation that is linked to performance. Another example is the TQA and accountability for teaching performance.

Defining autonomy is an elusive undertaking. While autonomy may be described in relation to the authority of the state, all proposals implemented appear to result in residual control by the state (Wasser, 1995). The necessity of viewing autonomy as contextually and politically defined means studying the role of the state since it is the state that sets down the boundary within which autonomy may be exercised (Neave, 1988). Historically, there has been the Bologna model that applies the notion of autonomy to the student constituency, and the Paris model in which autonomy is the freedom to teach (which is applied mainly to academics). The more recent Humboldt model gives the state the right to intervene only to guarantee the universities' right to choose its staff and to guarantee their freedom to work. Tight (1988) sums up four slightly different forms of autonomy: (1) Kantian, where the state interferes only in certain subjects; (2) Humboldtian, where state has a largely facilitating role; (3) Napoleonic, where the state makes most of the decisions; and (4) British, where the property-owning corporations of scholars are supported by the state but are left on their own.

Andersson (1985) describes an autonomous university not as one that is completely free from state control or totally independent of public funds. In this view, a university is autonomous, even if it is heavily dependent on public funds, as long as it has the freedom to govern itself: to set its own standards and

priorities in teaching, curriculum and research; to raise funds from other sources; and to decide on its own organisation. The increasing cuts in public funds could lead to more autonomy as universities seek other forms of funding more rigorously and eventually have less reliance on public funds; to such a degree that they have the power to say “no” when necessary (Andersson, 1985). But, on the flip side of the coin (which might emerge soon) there are risks with this new freedom. The liberalisation from state controls and funds may turn into a reliance on other financial sources to an extent that gives rise to other restrictions on the autonomy.

6.5.3 HUMAN RESOURCES MANAGEMENT

An area in which the RAE would have a great impact in the consequences of its funding implications is the management of human resources (HR). It is not just about the direct effect of designating the appropriate staff as research active for the periodic submissions, but also an equally great concern about the materialization of a transfer market for academic staff. The greater and more explicit focus on research has led to significant revamps in job descriptions, recruitment criteria, and the creation of new posts, appraisal systems, career patterns, and rewards.

Institutions have to make major decisions about the twin consequences of the RAE, viz., the nature and role of research in academia, and the strategic development of academic staff. Institutions would have to be more proactive in personnel decisions such as early retirement and recruitment. Nine of the 13 universities have been headhunting researchers that can add value to their

capabilities as well as help boost their ratings for the sake of the RAE funding.

Figure 6.3 summarises some of the strategic initiatives.

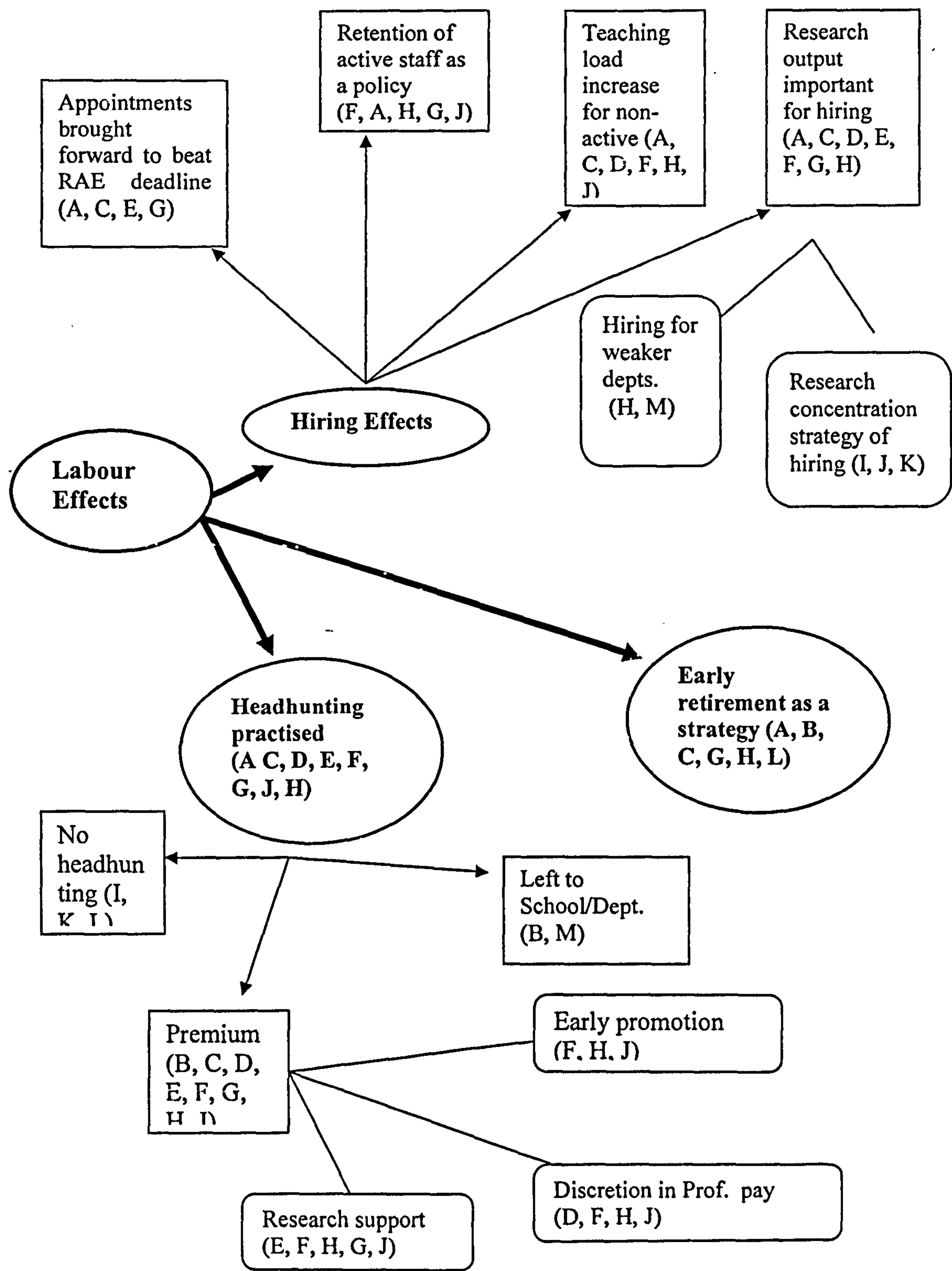
Even if the RAE has increased staff movement, some observers have argued that it is constructive to increase the rewards to gifted researchers, most of whom are able to reciprocate with greater and high quality research. Academia's rigid compensation schemes (see Section 6.3.3) may have to begin incorporating incentives other than monetary ones. Some universities have instituted early promotions, additional research support, and so forth. Figure 6.3 depicts the modifications to the compensation plans by the universities interviewed.

One of the concerns, however, related to the costs of movement, is the possibility that institutions might not be able to meet the targets of increased research if they do not subsequently receive sufficient research funding. University *M* was mindful of this concern. The 1992 RAE fund was distributed subjectively and used for recurring staff costs. University *M* took the view that this was risky, as the RAE funding was subject to changes. As a consequence, its distribution methodology was amended for the 1996 RAE, as described in section 6.5.1. Teaching funds support the department budgets, and pressure by the schools to use research money to hire teaching staff is resisted. But, one department did not have sufficient teaching funds for staff salaries and had to re-direct one-third of the research money for hiring lecturers.

The results shown in Table 6.4, show that all "old" universities in the study engage in head-hunting. Only two "new" universities did not engage in

headhunting. Almost all the universities are aware of the need to introduce premiums in the compensation packages, sometimes in the form of additional research support. There are also cases of early appointments to take advantage of the RAE snapshot deadline. Some universities appointed visiting fellows to act as mentors. Although the “new” universities engaged in head hunting, they found it more difficult. This was partly due to the inability to pay premiums for most “new” universities. De Montfort University top-slices its teaching budget to pay the salaries of its researchers.

FIGURE 6.3



University *F* has a policy of hiring people for the RAE submissions. For this purpose, its departments identify and headhunt the researchers that they need, and offer inducements and premiums to attract them. For example, in Medicine, staff were previously hired on the basis of their clinical experiences, but the present prerequisite is that they must also have relevant publications for the RAE submissions. As a part of its overall human resource strategy, visiting fellows from engineering and other industry sectors are sought for their potential to do collaborative research. However, no real attempts were made to bring forward appointments to meet RAE deadlines. On one particular occasion, the university hired a whole research team. On the other hand, there have been at least 10 staff from University *F* who have been “head-hunted” by other universities.

Some appointments in University *G* have been brought forward, and others have been axed even more aggressively with enforced early retirements so that the university can meet the RAE deadline. As the early retirement scheme is meant to reduce the number of non-performers, especially those who are older, the good researchers who opt for it have been denied. Some good teachers in University *G* who have no research records are also encouraged to retire early.

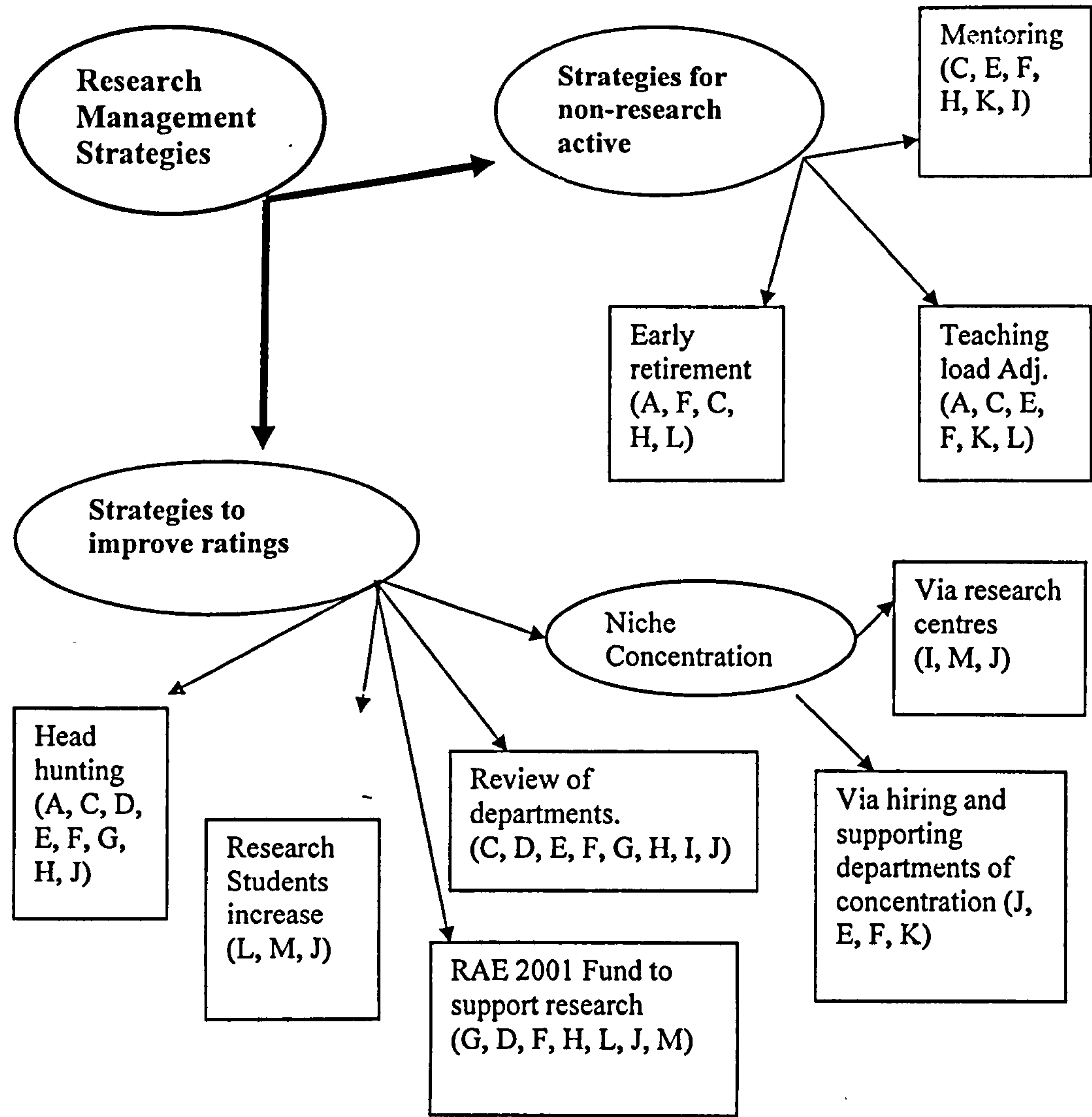
6.5.4 RESEARCH MANAGEMENT AND STRATEGIES

The senior management of the “new” universities are committed to developing research as part of their institutional landscape. They are actively re-considering their missions, and the potential role that they might have in research. At these universities, the importance of nurturing a strong research culture is reinforced by the appointments of either Pro-Vice-Chancellors who are responsible for

research activities or the creation of Research Development offices. In some “new” universities, research centres are created and operated by those who have lower teaching loads in order to concentrate on research. Others such as University *J* have Senior Research Fellow Schemes (see Section 6.5.2.1).

University *K* implements the policy of hiring academics to complement their current research expertise. University *L* offers teaching scholarships for graduate students for direct impact on the research culture and to generate more funds via the volume multiplier effect on the RAE funding formula. Figure 6.4 shows the flow of the research management strategies. After the RAE 1996, many institutions carry out internal strategic reviews of their departments. The “new” universities enlist the help of external reviewers, including some who are RAE panel members, in the reviews to overcome their institutional disadvantage of being less familiar and experienced with the RAE.

FIGURE 6.4



The McNay (1997) study also observes that at the former PCFC institutions, the vision for research is often linked with other areas of strategic importance, such as relationships with industry, commerce and professional services. For University *J*, the objective is to improve the gearing between RAE research funding and external research funding, from a ratio of 1:1 to 1:2, i.e., to double the external funding relative to the RAE funding. It also uses the RAE funds to hire research fellows to enhance their niche research areas of strength.

University *K* also has a policy of focusing on its areas of strength. They support the departments that have been identified as their strong departments. University *I* supports its research centres by financing staff in the research centres to buy out their teaching commitments.

After the 1996 RAE, universities began to review the ratings and to develop strategies for each of their departments. At University *E* this resulted in the identification of areas of concentration where research excellence may be established, and the need to hire senior researchers to act as mentors, to assist in promoting research activity, and to encourage publications. At University *F*, one department is closed down as a result of the review.

At University *C*, where the RAE 2001 objectives are detailed and monitored by the annual research audit, the departments that performed poorly between the two RAEs had to explain the reasons for the decline. Its objective is to have 80% of staff submitted as research active. Non research-active staff are given heavier teaching loads, and there is an early retirement scheme to weed out specific non-performers prior to the RAE 1996. Furthermore, the hiring of new researchers is expedited to beat the RAE 1996 cut-off date. A number of these researchers had to be persuaded with incentives.

A few universities have earmarked some funds for RAE 2001 in order to “buy out” teaching commitments so that those who are involved could publish in time for the RAE 2001. Additional research support would be provided in the form of sabbatical leave and conference funding. One “new” university’s research office

even disseminates advice on how to publish. The expansion in the number of research students in order to instil a vibrant research atmosphere is noticeable in the “new” universities. The volume effect of research students is also a definite factor for the funding formula.

6.6 CONCLUDING REMARKS

The environment in which universities operate has changed radically during the recent two decades. The government has introduced changes that include new regulations and authoritative advice (notably the Jarrat and Dearing Reports). The sources and methods of university funding have also changed. Formal quality assessments of teaching and research in the universities are now being undertaken as a standard practice. Because of these environmental shifts, not least of which are the budget cuts of the 1980s, universities have had to alter their structures, objectives, strategies and processes; in short, their entire *modus operandi*.

It is difficult to isolate the impact of the research selectivity exercise, or the changes and new strategies the universities have adopted, in response to the new regime. Even where the RAE is seen to have improved the strategic development and the management of research, it may be erroneous to attribute any such improvements entirely to the RAE. Impacts from the policies of other funding agencies, not to mention the individual institution’s internal development, growth and strategic intent that are independent of the RAE cannot be overlooked.

Teaching and research have always been important hallmarks and of all universities. The recent funding developments and the RAE have introduced unease. While there is now a strong link between the quality of research and research funding provided by the HEFCE, there is virtually no funding impact from the teaching quality assessments. This can lead to the unwholesome situation wherein the perception that there are not as much incentives and emphasis to improve the quality of teaching relative to the quality of their research, would result in passion to do research only for research's sake. While this may be viewed by some as merely creating additional stress and conflicts for those particularly in the "new" universities that have a strong tradition in teaching, the RAE has actually driven a wedge between the twin goals of academia.

The "old" and "new" universities are adopting markedly different strategies. The former polytechnics concentrate their research resources in their areas of strength, and could devolve into specialised universities. This research niche concentration is also being adopted by some of the "old" universities. Since not all universities can undertake excellent research in all areas, this niche concentration is perhaps one of the positive effects of the RAE. This would be a step in the right direction in the endeavour to establishing centres of excellence given that research funds are scarce both in theory and practice. Moreover, the RAE has ensured that competition for research funds is no longer between institutions as a whole, but between discipline areas, thus encouraging specialisation. In this light, the "new" universities should be able to compete with the established "old" universities in a number of disciplines. The

experience of RAE 2001 should corroborate such success among the “new” universities.

The commercial practice of headhunting for top executives has captured the imagination of academia that now actively seeks out researchers to help enhance their universities’ reputation, ratings and research funding. The “new” universities find it difficult to attract well-published scholars because of the perceptibly greater interest in them even by the “old” universities. One solution for the “new” universities is to recruit new PhD graduates, something that the “old” universities would also continue doing for the sake of securing potential researchers. One trend to expect would be that of new PhD graduates joining “new” universities to gain experience in research and publishing, after which the more successful ones would move on to the more research-oriented universities. At any rate, the more forward-looking PhD students would be attempting to publish in order to be noticed by the research centres and the more research oriented universities where the research resources and incentives are. The PhD students themselves would be important to the extent that they would form part of the volume measure for the purposes of the RAE.

This chapter has addressed the impact of the RAE on institutions in regard to the four primary areas of the internal allocation of funds, submission strategies, labour effect and research management. The interviews verify the fact that the RAE has significantly influenced institutional behaviour.

The remaining chapters of the dissertation focus on the impact of the RAE on the reactions and behaviour of academics.

CHAPTER SEVEN

***THE RAE AND PUBLICATIONS:
THE VIEW OF JOURNAL EDITORS***

CHAPTER SEVEN

THE RAE AND PUBLICATIONS: THE VIEW OF JOURNAL EDITORS¹

7.1 INTRODUCTION

While there has been substantial literature published on the Research Assessment Exercise (RAE), thus far there has been no attempt to survey journal editors for their views on the RAE. This is an important task given that the RAE infers research quality in universities by assessing publications in academic journals, and that the RAE mechanism relies on journals and their editors. In the attempt to provide this relevant input, this chapter presents survey evidence from journal editors who are in a unique and good position to appreciate the implications for publications arising from the RAE.

The chapter is organised as follows: the next section delineates the key questions and propositions addressed, and the survey design. Section 7.3 discusses the results obtained from the survey and these results are compared with the results of the survey of academics in section 7.4. Concerns about ethical publication issues are raised in section 7.5.

¹ This chapter has been published as: A. Talib, "The RAE and Publications: A view of Journal Editors", in *Higher Education Review*, Vol. 33 (1), Autumn 2000, pp 32-46.

7.2 METHODOLOGY

A questionnaire is mailed to 130 journal editors in various disciplines to obtain their views regarding the impact of the RAE on publishing and publications. The other objective is to gather evidence to support findings from the survey of academics. This helps minimize the biases that are typical of self-administered surveys which is the data gathering methodology for the academics, although the large sample size and control questions aim to reduce bias by testing for consistency. A copy of the questionnaire mailed to the editors and the accompanying letter is in the Appendix to this chapter.

7.2.1 KEY QUESTIONS ADDRESSED

The survey addresses key issues such as the submission of manuscripts, research quality, management of publications, refereeing process, and proliferation of journals and in-house journals.

7.2.1.1 RESEARCH QUALITY AND QUANTITY

According to the Goodhart Law, when a performance indicator is defined, ways will be found to improve one's performance as measured by the indicator (Goodhart, 1975). With respect to the RAE, researchers will increase their publications since these are measured. As discussed in Chapter Eight, 48.5% of the respondents spend more time on research than they did six years ago before the RAE was introduced. 35% of the academics in the survey said that they were spending more time on research as a direct result of the RAE. Almost 40% of the sample claim that the RAE has had positive effects on their research

productivity, and 28% state that the quality of their research in universities has improved.

HEFCE attempted to avoid the manipulation of quantity of publications in RAE 1996 by limiting published papers to four per RAE and having the publications only as input into the informed peer review. However, one cannot ignore the fact that the reputation of the journal is taken into consideration when quality assessment is undertaken by the panel. It is speculated (and imperative) that the assessment panels do regard the journal review process as a preliminary quality evaluation. All this would lead to academics seeking to publish more, especially in prestigious journals.

Those who have not been actively publishing feel the peer pressure the most. In fact, academics not included in RAE submissions in the "old" universities feel marginalized. Undertaking research is not the same thing as publication, which is the performance measure. For those who are playing catch up, to fulfil the four-paper requirement per RAE cycle may lead to premature attempts at publication especially by middle tier academics. While this four-paper effect seems most pertinent to those who are moderately active in research, the very active scholar, who is capable of producing more than four papers per RAE cycle, may not experience any undue effect from the RAE. On the other hand, the RAE will overwhelm the non-active researchers, because they already have difficulty in achieving the four-paper target.

Any academic submitting less than four papers in the RAE (returns) alludes that he/she has only produced the submitted papers during the RAE cycle period. Therefore, the marginal utility, to the academic, of the first, second or third paper is equivalent to one paper. However, the marginal return of the fourth published paper is infinite. The marginal return of the fifth paper is nil (for RAE purposes), as it is not counted in the submission. If an academic submits four papers in the RAE return, then the actual total number of papers that he/she has produced in the RAE cycle period is not explicitly known. This induces academics to achieve the “magic figure” of four papers, at least to alleviate peer pressure. By submitting less than four papers in the RAE return the academic exposes himself to pressure from his peers as it becomes apparent that he had not been productive. However, by submitting four papers he mitigates the peer pressure, particularly as the quality of the papers is “lost” in the department aggregate submission. This consequence will have most impact on the middle tier academics.

Another consequence of the four-paper effect is academics smoothing the number of publications by scheduling the fifth paper to the next RAE round. This is investigated by the survey of academics in Chapter Eight. The four-paper effect could also lead to a lowering of the average quality of submissions and publications. The effect of the RAE on research quantity and quality can be visualised as a 2x2 matrix in Table 7.1. The RAE would probably have no effect on the quantity or quality of papers from the very active (good) researchers. The middle tier researchers would have to produce enough to achieve the target of four papers with a possible reduction of their quality. Overall, there would be an

increase in the aggregate quantity of papers, but at a lower average quality. As a result, a higher number of papers with a lower average quality would be submitted to journals. This could also prompt the increase of journals and other publication outlets to accommodate the potential increase in manuscripts.

TABLE 7.1

	“Good” Researchers	Middle Researchers	Tier
<u>No RAE</u>	6		8
Number of papers	5 (rating)	2	4.75
Average Quality of papers		4	$\frac{(6 \times 5) + (2 \times 4)}{8}$
<u>RAE</u>	(no change)		
Number of papers	6	4	10
Average Quality of papers	5 (rating)	3	4.2
			$\frac{(6 \times 5) + (4 \times 3)}{10}$

Humphrey et al (1995) argue that scholars may be discouraged from rendering services such as refereeing for journals and participating at seminars, or only undertaking supervision of PhD students as a means to tap research resources, or, in the extreme case, set up their own journals to assure outlets for departmental publications.

The New Scientist editorial (November 9, 1996) states:

“what might help is for someone somewhere to curb the growing pressure on researchers to squeeze as many pages as they can out of each project...this emphasis on quantity rather than quality persists... leaving experienced scientists too busy keeping their own publications rolling off the press to spend much time checking the work of others.”

There is no doubt that the pressure to publish exists. The issue that arises is if middle-tier academics, who feel this pressure the most, will be induced to emphasise quantity rather than quality in order to achieve the four-paper target set by the RAE. In this respect, journal editors are in an excellent position to report the increased quantity and quality of submissions though only at the aggregate level. The increase in submissions at this level is likely to be caused by the moderately active scholars trying to raise their normal pace of publications to attain the four-paper target. The aggregate increase in submission is less likely to come from the good researchers because they would have maintained the same level of activity. As suggested above, the four-paper requirement could result in a reduction in quality. Academics who have already published four papers would be tempted to defer additional papers to future RAE rounds. This may not be the case with very active researchers whose average output per RAE cycle is six or more papers. Some researchers might just postpone submission of papers if their average output per RAE cycle is three to five papers. This smoothing of publications by academics is explained in Chapter Eight, and the role of the level of research activity in smoothing activities tested in Chapter Nine².

Proposition 1: Academics in their attempt to increase publications have placed emphasis on quantity in place of quality.

This proposition is tested in the survey by direct questions on the increase of submission rates by British academics and the improvement in quality over the last six years. These two questions are asked again with the additional question

²Also see A. Talib "The Research Assessment Exercise and Motivation: A note on the difference in the impact on the active researchers and the non-active", *Higher Education Review*, Vol 34 (2), Spring 2002, pp 51-59.

of whether editors think that the increase in submission and/or quality is a result of the RAE. If the quantity increases are due to less able researchers trying to meet the target of four publications, then the average quality may decrease. The questions (and their numbering order) are:

- Q2: Has the rate of submissions of manuscripts by British academics to the journal increased in the last 6 years?
- Q3: Has the quality of the manuscripts submitted to the journal by British academics increased in the last 6 years?
- Q10: Do you think as a result of the RAE more manuscripts are being submitted by British academics?
- Q11: Do you think as a result of the RAE the quality of manuscripts submitted by British academics has improved?

As an additional control question, the survey asks if the rejection rate by the journals has increased in the preceding six years. If there has been an increase in submissions, then the rejection rate should have increased in tandem unless there is a corresponding increase in the number of published articles. The survey, also asked for the reasons for any higher rejection rates.

7.2.1.2 PUBLICATION MANAGEMENT

Observing that the RAE has modified behaviour, Sir David Phillips, then Head of the Advisory Board for the Research Councils commented:

I suspect many scientists have been changing their behaviour or even the natures of the research they do in order to optimise their performance in the RAE. If that leads to people always doing research that leads to publishable research in three years time, I certainly do not think it is a good thing.

(Times Higher education supplement, 4 Dec. 1992)

Several strategies can be employed to increase publications. Some academics could be tempted to “cut corners” or take advantage of the ethical ambiguities in the publication process, with methods such as: (1) making trivial changes to manuscripts to be submitted and published as different papers; (2) submitting substantially identical manuscripts simultaneously to two or more journals; (3) milking data in order to increase number of publications; (4) employing students to do significant parts of the research without assigning due credit; (5) altering data to fit theory or increase statistical significance; (6) joint authorships of what would otherwise be single-authored papers so as to increase the number of papers; and (7) re-writing or editing student assignments without assigning due credit.

There is sometimes a rush of submissions in the run up to the next RAE. This is particularly since in RAE 1996 only published papers were included, with the exclusion of papers accepted for publication. Academics therefore have to publish before the deadlines.

The following propositions are investigated:

- Proposition 2: Academics will increase collaboration with colleagues for increased publications.
- Proposition 3: The RAE deadlines and “requirement” of four publications will result in a rush of submissions just prior to the deadline.
- Proposition 4: Academics will attempt to “milk-out” as many papers as possible from the same research project.

7.2.1.3 REFEREEING

Willmott (1995) suggests that research selectivity encourages academics to willingly restrict their work to those duties and activities that provide the greatest measurable output at the lowest risk and least effort. Humphrey et al (1995) concur and raise the following concerns:

“...Is it implausible to see a future (in academic accounting) in which staff are actively discouraged from refereeing for research journals; seldom participate actively in research seminars or conferences; only undertake the supervision of PhD students if a publishable paper looks likely; are tempted to referee unfavourably (i.e., reject) papers which they suspect as emanating from rival institutions; or seek to set-up their own journals so as to provide a guaranteed outlet for departmental publications?”

The survey of academics finds that 41% of them admit devoting less time to voluntary academic activities such as refereeing (see Chapter Eight). Also, 54% agree that they now concentrate less on activities that are not recognised by the RAE. Acting as a referee for a journal is an activity that is not “recognised” by the RAE as a research activity. Therefore, in accordance with Goodhart’s Law (Goodhart, 1975), scholars focusing on activities that they will be assessed on will be reluctant to act as referees, among other activities not valued by the RAE process.

Proposition 5: Academics will be reluctant to devote time for refereeing papers for journals.

As a member of the academic community at large, scholars may not refuse outright to referee or review papers, but assignments such as refereeing would be given less priority. Thus, journal editors are surveyed to see if the turnaround time for papers under review has increased.

7.2.1.4 PROLIFERATION OF JOURNALS

Another one of the unintended consequences of the RAE might be a proliferation of quantity to achieve the four-paper target. Here, it is predicted that the increase will come mostly from the middle tier academics, sometimes at the expense of quality. Quantity proliferation per se is not undesirable, but the journal rejection rate may increase if submissions are of inferior quality. The high rejection rate could lead to a proliferation of journals to accommodate the increase in papers seeking publication outlets. Another likelihood is the increase of in-house journals by university departments. This is also a consequence of the RAE, as having “in-house” journals could be perceived as influencing department RAE ratings. The proliferation or emergence of “in-house” journals however raises a concern that these journals favour papers by department staff. These issues were addressed in the survey.

Although the proliferation of journals allows a wider dissemination of research, there are issues about the popularity and quality of the journals themselves. In this case, the market will probably act as an effective quality control mechanism. Journals publishing manuscripts of low quality will eventually be driven out of the market unless there is demand for them. Without a doubt, a few heavily subsidised low quality journals will remain in contention.

Proposition 6: The RAE resulted in a proliferation of journals.

The first survey question is set up to ask journal editors if they detect a proliferation of journals in their respective fields. The next question asks if the

editor regards this proliferation as due to the RAE. A further question allows the editors to cite the reasons or their opinions for the proliferation, bearing in mind for the thesis that there are multivariate reasons for the increase in journals, and not due just to the RAE.

The emergence of in-house journals or journals produced by university departments creates several scenarios. Some departments may count on it to raise their research image to better their RAE ratings. It has also been suggested that it could be an additional outlet for departments' staff to publish their works (Humphrey et al, 1995).

Proposition 7: Emergence/proliferation of in-house journals is attributed mainly to the RAE.

Proposition 8: In-house journals favour publishing manuscripts submitted by in-house staff.



7.2.2 THE SURVEY DESIGN AND SAMPLE

The survey methodology involved sending a questionnaire to editors of British journals. The survey is used for its time and cost effectiveness. The survey instrument is in the Appendix to this chapter.

The questionnaire survey is mailed to 130 randomly chosen editors of British journals in various disciplines in 1998. Only the British journals are surveyed because non-British journal editors may not be aware of the RAE and the associated impacts. Moreover, the middle tier academics tend to publish in British journals. A total of 72 replies are received for a 55% response rate, the breakdown of which is in Table 7.2. The sample of journal editors represents a variety of disciplines. This is essential as the research is on the general impact of the RAE across academics and disciplines.

TABLE 7.2: ANALYSIS OF EDITORS RESPONDING TO SURVEY, BY DISCIPLINE.

Journal Area	Total in Survey	%	Response	%	% Responded
Education	15	11.5	9	12.5	60
Public Policy & Mang.	5	3.8	3	4.2	60
Finance	7	5.4	5	7	71
Business & Mang.	12	9	9	12.5	75
Economics	10	7.7	6	8.3	60
Engineering	11	8.4	5	7	45
Sciences	15	11.5	6	8.3	40
Planning & construction	6	4.6	6	8.3	100
Social Sciences	32	24.5	14	19.4	44
Statistics & Maths.	8	6	2	2.8	25
Medical	9	7	7	9.7	78
Total	130	-	72	-	55

TABLE 7.3: RESULTS OF SURVEY

Q no.		Total	<u>Yes</u>	<u>Yes</u>	<u>NO</u>	<u>NO</u>	<u>Unsure</u>	<u>Unsure</u>
			No.	%	No.	%	No.	%
2	increase in submission of papers	72	46	64	18	25	8	11
3	increase in quality of submissions	72	33	46	26	36	13	18
10	submission increase result of RAE	72	39	54	15	21	18	25
11	quality improved as result of RAE	72	11	15	32	44	29	40
6	rejection rate increased	72	42	58	20	28	10	14
4	increase in co-authorship	72	16	22	39	54	17	24
5	increase in co-authorship from same institution	72	11	15	42	58	19	26
8	increase in not agreeing to referee	72	17	24	48	66	7	10
9	increase in turnaround of referee report	72	25	35	38	53	9	12
12	increase in submissions before RAE deadline	72	31	43	16	22	25	35
13	proliferation of journals	72	31	43	37	51	4	6
14	proliferation of journals due to RAE	49*	21	29 (43)	12	17 (24)	16	22 (33)
16	manuscripts submitted are shorter	72	7	10	56	78	9	13
17	research findings reported in a number of papers (milking papers).	72	28	39	22	31	22	31
18	in-house journals favour manuscripts submitted by dept. staff.	62*	17	24 (27)	21	29 (34)	24	33 (39)
19	in-house journals proliferation due to RAE	72	21	29	7	10	44	61

* Not all respondents responded to the question. The percentages calculated are based on the total of 72, however the percentages based on the actual number of respondents is shown in the parentheses.

7.3 DISCUSSION OF RESULTS

Table 7.3 summarises the proportions of agreement to the survey statements and questions by journal editors. The ensuing discussion pertains to the four key areas under analysis.

7.3.1 RESEARCH QUANTITY AND QUALITY

Almost two thirds (64%) of the editors surveyed felt that submissions to British journals have increased in the last six years. A number of factors can account for this increase, one of which is the increase in research activities by British academics, but not all of this can be attributed to the RAE and only 54% of the responding editors believed the increase is due to the RAE.

The issue of quality also meets with different responses. For instance, 46% perceive a quality increase as opposed to 36% who do not see any increase. Furthermore, when asked if the quality increase can be attributed to the RAE, only 15% of them agree, 44% do not agree, and 40% are undecided. Even where the editors believe that quality of submissions has increased, they do not attribute it to the RAE. This perception differs markedly when compared with the surveys on academics. In the McNay 1997 survey, 64% of the responding academics are of the opinion that their research had improved, but only 34% claimed that this is due to the RAE. In our survey of academics, only 39% felt the quality of their research has increased and 28% felt the quality of research in general in universities has increased. McNay attributes the difference between self-assessment and assessing quality of research in universities to academics being more positive with regard to direct experiences than about broader system issues

where views may have been gained via critical media. The media has been critical of the RAE (see Elton, 2000: p. 280). It is likely that the media and public opinions that are largely critical of the RAE have swayed the journal editors. The HEFCE may need to redress the undesirable perceptions through awareness, public relations and other promotional media.

We further analysed the responses of the editors agreeing that the number of manuscripts by British academics has increased in the last 6 years. These were a total of 46 editors out of the total responses of 72. We analysed their responses to other questions in the survey. The results are produced in Table 7.4.

Although 33 editors (46%) judge that quality of the manuscripts has improved, only 11 (15%) relate it to the RAE. Half of the editors, who felt quantity has increased, also felt that the RAE (a total of 23 editors) has not improved the quality. A total of 32 editors felt that the RAE did not increase quality (see Table 7.2). However, a majority of editors felt that the RAE resulted in more manuscripts being submitted; this was a total of 39 editors (54%) but only 33 of them also responded YES to increase in manuscripts.

TABLE 7.4: ANALYSIS OF EDITORS WHO FELT THE NUMBER OF SUBMISSIONS HAS INCREASED

SURVEY QUESTION	YES	NO	UNSURE
Has the quality of the manuscripts submitted increased in the last 6 years?	25	15	6
Have you noticed an increase in the submission of co-authored manuscripts by British academics?	12	24	10
Have you noticed an increase in the submission of manuscripts co-authored by British academics from the same institution?	10	25	11
Has the rejection rate by the journal of manuscripts submitted by British academics increased in the last 6 years?	32	9	5
Do you think that <u>as a result of the RAE</u> more manuscripts are being submitted by British academics?	33	5	8
Do you think that <u>as a result of the RAE</u> , the quality of manuscripts submitted by British academics has improved?	8	23*	15

* Includes two responses that felt quality had declined.

Table 7.5 contains the cross-tabulation of responses between these two questions:

- Q3:

Has the quality of the manuscripts submitted to the journal by British academics increased in the last 6 years?
- Q11:

Do you think as a result of the RAE the quality of manuscripts submitted by British academics has improved?

The requested responses are “Yes”, “No” or “Unsure” for Question 3, and “Yes”, “No”, “Unsure” or “Quality Declined” Question 11. From Table 7.5, it can be

seen that, according to 34 editors, the RAE does not improve the quality of the submitted manuscripts.

TABLE 7.5: QUALITY INCREASE AND THE RAE

QUESTION 11					
QUESTION 3	YES	NO	UNSURE	QUALITY DECLINED	TOTAL
YES	10	10	13	0	33
NO	0	17	8	1	26
UNSURE	1	5	6	1	13
TOTAL	11	32	27	2	72

The editors are surveyed for their opinions for the high rejection rate. Of the 42 editors who indicate incidence of a high rejection rate, one did not give reasons. On the other hand, two editors who responded as “not sure” on high rejection rate gave reasons for rejection. One was an editor of a reputable accounting journal while the other was an editor of a journal in social policy. The accounting journal editor cited stringent quality control and stringent refereeing as reasons, while the social policy editor cited high submission rates and poor quality as reasons. Respondents were asked to rank reasons for rejection. They were given four alternatives and were also given the option of including other reasons. The most cited reason (not surprisingly) was the high rate of submission. Out of the 43 respondents on this question, 24 cited the high submission rate as the main reason for the high rejection rates (out of which 6 did not rank the reasons). The second ranked reason was “stringent quality control” as cited by 18 respondents, followed by stringent refereeing (10 respondents

ranked as main reason) and only 3 cited the poor quality as the main reason. Table 7.6 below shows the reasons and their rankings.

TABLE 7.6: REASONS FOR REJECTION

REASON	Total times cited	RANKING			
		NA	1	2	3/4
High rate of submissions.	32	6	18	4	4
Quality of submissions declined.	12	2	1	5	4
More stringent referring.	25	4	6	3	12
More stringent quality control applied by Journal.	32	9	9	10	5

The NA column represents responses that did not rank the reasons. The results in Table 7.6 validate the high rate of submissions.

While the majority of editors are willing to attribute the increase in submissions to the RAE, only a small handful would accept that it helps to raise the quality.

7.3.2 PUBLICATION MANAGEMENT

The RAE is shaping the nature of scholarship and publishing behaviour. Since “output” is basically journal articles in refereed journals. One responding editor reveals that:

“Researchers try to get maximum publications from one piece of research. They often simply report findings rather than breaking new ground, or report others’ research and the literature rather than innovative work”.

Another educational journal editor also comments:

“It is a pity that in trying to get their four publications authors will submit substandard articles to journals. It does not do them any good in the long run. The sheer volume of articles in 1994-1995 did put pressure on editors and referees and if anything probably made journals even more conscious of the need to maintain quality control even at the risk of offending well-known authors. It also led to a pecking order of journals, i.e. those that carry most weight in the RAE.”

Although there is speculation that the RAE would encourage joint authorships as a means to increase one's publishing track records, more than half of the editors responding to the survey do not believe that there was an increase in co-authorship. Only 22% felt there was an increase of co-authored manuscripts, and 11% note that there is an increase of papers from joint authors from the same institutions.

Some editors (28%) detect the trend of attempts to craft many papers from a single research project. Since the RAE requires certain performance within the time cycle, 31 (43%) editors notice the rush to publish prior to the RAE deadlines. One editor offers this observation:

“There is certainly evidence of a bunching of submissions to meet the deadline and concern for exact citation of departments.”

During the run up to the last exercise another editor cites an instance of receiving telephone calls from UK academics with forthcoming papers to request for the publication dates to be brought forward to meet the RAE deadline.

There is the impression that RAE panel members do not read all submissions and that they rely on the reputation and diversity of the journals. This could have prompted some academics to publish papers with similar content in different journals. Alternatively, some will use their data sets and research projects in such a strategic manner to develop more and sometimes shorter papers.

An editor made this other observation:

“There is a tendency to publish overlapping (similar) articles in other journals often without telling the editors.”

From the academic survey, 46% of them agree that the RAE time scale has had an impact on their choice of research projects, and 31% avoid projects that would be protracted. Furthermore, 35% of the academic respondents acknowledge that they reject research that is speculative because of the lower chances of publishing and the longer time that would be required. This distancing from research activities pertaining to basic and speculative topic does not augur well. “Dolly the sheep” would not have ever been possible if the researchers had been worried about the time frame. Although research projects should culminate in publications, the imposition of a time schedule by the RAE is forcing researchers to focus on short-term projects. The stipulation for research projects to be completed within four years and the imposition of a four-paper target will force scholars to modify their work ethics and culture. Some schools are expanding their intake of doctoral candidates (see Chapter Six) and encouraging them to publish, especially jointly with their supervisors.

As an editor notices:

“There is an increase in PhD students submitting papers before the degree is examined; which I assume is increased eagerness to get published and a push from department staff to reap the credit.”

7.3.3 REFEREEING

About one-quarter (24%) of the responding journal editors sense the reluctance to referee journal papers, while two-thirds maintain there is no increase in academics not agreeing to referee papers. But, 35% are concerned about the increase in the turnaround periods, as it is symptomatic of the lack of enthusiasm to referee. The extension may be due to the need to focus on activities for which there are due credit and honours. In addition, since refereeing is not recognised by the RAE, there is no incentive to offer such a service. Another factor is the increase in submissions that results in the increase in the average refereeing workload.

According to one editor:

“UK academics expect to receive copious and full reviews of the manuscripts they submit for publication. However, when asked to review papers themselves they are increasingly reluctant to do it and turnaround times are very slow. This has got much worse over the last few years.”

7.3.4 PROLIFERATION OF JOURNALS

It is not clear if there is a proliferation of journals. One-third of the editors seem to notice the proliferation and attribute it to the RAE, while 17% do not agree to

this occurrence. But, 33% claim that the RAE is the impetus for the emergence and increase of in-house journals. Among the journal editors, one-quarter suspected that in-house journals featured papers by staff in the same department, while 29% disagreed that this is the objective. But given the pressure to publish more, there is also a need for more avenues. Journals produced "in-house" allow department staff a venue for publishing their work. The survey asked editors their views and perceptions on in-house journals. When asked if they think that the emergence/proliferation of in-house journals was a result of the RAE, 29% of the editors responded by agreeing with the statement. Only 10% did not agree while the majority (61%) was unsure.

A quarter of the editors responding to the survey felt that in house journals favoured publishing manuscripts submitted by staff of the publishing department. However, 29% did not agree to that statement, while one third were undecided. The reasons for proliferation of journals given by the editors in the survey are presented in Table 7.7. The reasons for "in-house" journals, in the editors' views, are in Table 7.8.

TABLE 7.7: REASONS FOR PROLIFERATION OF JOURNALS

Reasons for the proliferation of journals in the UK.	Number of times reason cited.
Publishers' expansion to meet demand and for profitability.	12
Pressure to publish (need for publication outlets) and RAE.	22
Rise of specialist interests → a route for publication out of mainstream.	7
Control ones own destiny/prestige /want of own journal.	6
Cheaper to produce due to changes in publishing technology.	3
Field growth.	2

The proliferation of journals may be traced mostly to the RAE. Publishers increasing output to meet the growing demand, which is RAE-related as well, compound this further. The growing demand is presumably from the increased submissions of manuscripts arising from the “publication culture” that has arisen from the RAE.

As shown in Table 7.8, the most cited reason for the emergence of in-house journals is the RAE. Other common reasons include raising the department profile and ensuring that colleagues get published. These reasons are induced by existence of the RAE. In general, the editor survey finds that the RAE, directly and indirectly, is responsible for the proliferation of independent journals and in-house journals.

TABLE 7.8: REASONS FOR IN-HOUSE JOURNALS

Reason for proliferation of journals in the U.K.	Number of times reason cited.
RAE	12
To ensure colleagues get articles published.	7
Department profile.	7
Profits.	4
Control and own voice.	3

7.4 RELATIONSHIP BETWEEN THE SURVEY OF EDITORS AND THE SURVEY OF ACADEMICS RESULTS

One objective of the editors' survey is also to provide collaborative evidence for the survey of academics. Table 7.9 reports the results of the academic survey vis-à-vis the editors' survey. The table contrasts the responses of the academics and the editors on similar issues. It helps to establish the similarity or otherwise of the responses, to provide additional reliability of the responses.

Table 7.9

<u>Academics Survey Results</u>		<u>Editors Survey Results</u>	
Question statement	% agree	Question statement	% agree
I now spend more time on research than 6 years ago.	48.5	Rate of submission by British academics increased in last 6 years.	64
I now spend more time on research than 6 years ago <u>as a result of the RAE.</u>	35	As a result of the RAE, more manuscripts are being submitted by British academics.	54
RAE has had a positive effect on my research output	38.8	Quality of manuscripts submitted by British academics has increased in last 6 years.	46
RAE has improved the quality of research conducted in Universities.	28	<u>As a result of the RAE,</u> the quality of manuscripts submitted by British academics has improved.	15

<u>Academic survey</u>		<u>Editors' survey.</u>	
I now collaborate with (in research) overseas researchers more.	43.8	There is an increase in submissions of co-authored manuscripts by British academics.	22
I now collaborate <u>less</u> with English academics from other universities (in research).	24		
I now collaborate with (in research) colleagues in my department more.	44.6	There is an increase in submissions of co-authored manuscripts by British academics from same institution.	15
I now give less time than 6 years ago to "voluntary" academic activities – e.g. referee for journals.	41	There is an increase in British academics not agreeing to referee manuscripts in last 6 years.	24
I now give less time to activities given no or low recognition by RAE.	54	Increase in the time period for the turnaround of British academics' referee report.	35
Because of the RAE time-scales I have published some outputs at an earlier stage than I would prefer.	40.4	There is an increase in the submission of manuscripts by British academics in the two years prior to the RAE deadline.	43
My research topics or projects are influenced by the RAE time-scale.	46	Do you find that in the last 6 years British researchers tend to report their findings in a number of smaller manuscripts dealing with different aspects of the findings; rather than a major manuscript encompassing the overall findings?	39
Because of the RAE time-scale I have avoided some research projects because they would have taken a long time to complete.	31.7		

7.5 THE RAE AND UNINTENDED CONSEQUENCES ON PUBLICATION ETHICS

Commenting on the potential impact of the RAE on publication ethics, a survey respondent from another study supported the practice of simultaneous submission of the same paper to different refereed journals on the grounds that is rational to react to a system which provides explicit rewards to individuals and institutions based on research output. This consequently leads to a suspension of “ethical” beliefs and the adoption of an “anything goes” philosophy (Brinn et al, 1998: p. 321). Has the RAE led to (or could possibly lead to) a suspension of ethical beliefs?

The results and discussions in this chapter highlight the potential influences the RAE has had on publishing ethics. The issue with the RAE here is the time scale. The danger to academia that the RAE potentially poses is that it defines the time period for project completion as four years. It is even more extreme than that. The RAE requires four publications in a four/five year period. That is an average of one publication a year. The publishing time scale creates new problems. On average, papers with minor review adjustments would require between six and 12 months from initial submission to appear in print.

If a project requires six months of data collection and analysis, then it would take about one to two years from commencement of the project to publication of the research results. This makes projects that take more than two years to complete a difficult option, in terms of the RAE. An increasing number of academics seem

to be resorting to publication of preliminary results in order to extract more than one paper out of the same project.

It is arguable if the submission of more than one paper dealing with the same topic and data is ethical. It helps in knowledge dissemination, but it does not add to genuine knowledge creation. Several of the editors surveyed are aware of the fact that there is considerable re-hashing of papers and simultaneous submissions of papers to different journals. One only needs to make enough modifications and alter the title of the paper in a self-serving manner. The outcome is that it helps reduce the duration between submission and publication.

Although a quick response on the fate of submissions is desired, even rejections take between three and six months. Since submissions are increasing, as indicated by 64% of the editors to the survey, the replies from journals may take longer times. This is being compounded by the reluctance of academics to act as referees. According to the academic survey, 41% give less time to voluntary academic activities such as refereeing (see Chapter Eight). In this editor survey, 24% of the respondents noted that there is an increase in the incidence of academics not willing to referee, and 35% noticed the increase in the turnaround rate.

The protracted referee turnaround coupled with the typically sequential rejection format would result in research themes or data being outdated when they are re-worked for submissions elsewhere. Anxious for swift responses from journals, some authors resort to multiple submissions to short-circuit the waiting time.

While editors lament such behaviour, it should be noted that a six-month wait for a rejection reply delays the research cycle. If there were a subsequent similar rejection, it would mean a wait of one year before researchers can re-work their manuscripts. Then, when papers are accepted, there is often another wait of about six months to a year before appearing in print. Some papers are three years old from the time they are conceived to time they are published.

Unless new arrangements can ensure more rapid turnarounds, it is speculated that researchers would continue with simultaneous submissions and submissions of modified papers. It would be useful to conduct longitudinal studies on research practices to establish if and how the RAE is shaping such behaviours. There is already stimulating discourses on the impact of the RAE on publishing behaviour (see also Brinn et al, 1998), but more needs to be done in order to foster a research culture that is vibrant and has integrity.

7.6 CONCLUDING REMARKS

This study provided survey evidence from editors, a source that is extremely helpful in fully understanding the impact of the RAE. One of the obvious effects is that the quantity of manuscripts has increased, and that RAE has resulted in a rush to publish to meet the RAE deadlines. The increased quantity is largely due to the middle tier scholars being pushed to publish more to achieve the target of four papers resulting in a publication culture amongst them. This is evident in the attempts to simultaneously submit papers to several journals, and to re-hash

manuscripts. Some scholars are also skilfully using data and findings from a single project to develop several papers. Others resort to collaboration where the strategy is to jointly author with colleagues outside their own department so as to avoid the “sharing” of the publication. Some are also tying up with foreign researchers to increase the research rate and outlets for publishing.

The longer turnaround times for submissions is also forcing the strategic behaviours. This cannot be easily re-dressed if there is reluctance in the community to be more forthcoming to help out with refereeing of papers. At the institutional level, the need to publish more to meet the four-paper requirement is reason enough for more new journals including in-house ones for internal staff members to emerge.

We acknowledge the limitation in drawing any conclusive results from the survey. Nevertheless, the survey results afford an insight into editors' perspectives vis-à-vis the RAE. The results from the survey, as with other results in this thesis, indicate that the RAE has created a “publication culture”.

APPENDIX:
THE SURVEY QUESTIONNAIRE

Dear Editor,

I am undertaking a research project on the impact of the Research Assessment Exercise (RAE) on academics and research.

Part of my research methodology comprise a survey of journal editors. I am seeking your help in this research project and would be extremely grateful if you could spare the time to complete the questionnaire and then return it in the reply paid envelope provided

All information provided in the returned questionnaire will be treated as confidential and will only be used in aggregate form in combination with all other responses.

I do hope that you will be able to participate in the survey and would be grateful if you could complete and return the questionnaire as soon as possible. If you have any queries please do not hesitate to call me at (01926) 313021 or at (0467) 621644 or email me at: ameentalib@msn.com

I thank you for your assistance.

Yours sincerely,

Ameen Talib

Ameen Talib

RESEARCH ASSESSMENT EXERCISE QUESTIONNAIRE.

ALL RESPONSES WILL BE TREATED AS CONFIDENTIAL. THE SUCCESS OF THIS STUDY IS DEPENDANT ON YOUR RESPONSE; I EXPRESS MY GRATITUDE FOR THE TIME SPENT.

1. Journal Title.

Journal's subject area:

How long have you been the editor of the journal? years

2. Has the rate of submission of manuscripts by British academics to the journal increased in the last 6 years?

Yes ☐ No ☐ Unsure ☐

3. Has the quality of the manuscripts submitted to the journal by British academics increased in the last 6 years?

Yes ☐ No ☐ Unsure ☐

4. Have you noticed an increase in the submission of co-authored manuscripts by British academics ?

Yes ☐ No ☐ Unsure ☐

5. Have you noticed an increase in the submission of manuscripts co-authored by British academics from the same institution?

Yes ☐ No ☐ Unsure ☐

6. Has the rejection rate by the journal of manuscripts submitted by British academics increased in the last 6 years?

Yes ☐ No ☐ Unsure ☐

7. If the answer to Question 6 is yes; what in your opinion are the reasons for the high rejection rate? (please order the applicable reasons with [1] being for the most relevant reason).

- ☐ High rate of submission.
- ☐ Quality of submitted manuscripts has declined.
- ☐ More stringent refereeing.
- ☐ More stringent quality control applied by journal.

Other reasons:

- ☐ _____
- ☐ _____
- ☐ _____

8. Has there been a noticeable increase in British academics not agreeing to referee manuscripts in the last 6 years?

Yes ☐ No ☐ Unsure ☐

9. Has there been a noticeable increase in the time period for the turnaround of British academic's referee report ?

Yes ☐ No ☐ Unsure ☐

10. Do you think that as a result of RAE more manuscripts are being submitted by British academics ?

Yes ☐ No ☐ Unsure ☐

11. Do you think as a result of RAE the quality of manuscripts submitted by British academics have improved?

Yes ☐ No ☐ Unsure ☐ quality declined ☐

12. Is there an increase in the submission of manuscripts by British academics in the two years prior to the RAE deadline (i.e. in late 1994 and in 1995)?

Yes ☐ No ☐ Unsure ☐

13. In your personal view, do you think there is a proliferation of journals appearing in the UK in the same area as your journal?

Yes ☐ No ☐ Unsure ☐

14. Do you think this proliferation of journals in the UK is attributed to RAE?

Yes ☐ No ☐ Unsure ☐

15. In your opinion what are the reasons for the proliferation of journals in The UK?

16. Do you find that in the last 6 years the manuscripts submitted by British academics tend to be shorter pieces?

Yes ☐ No ☐ Unsure ☐

17. Do you find that in the last 6 years British researchers tend to report their findings in a number of smaller manuscripts dealing with different aspects of the findings; rather than one major manuscript encompassing the overall findings.

Yes ☐ No ☐ Unsure ☐

18. Do you think journals published 'in-house' by British university departments tend to favour publishing manuscripts submitted by staff of the publishing department ?

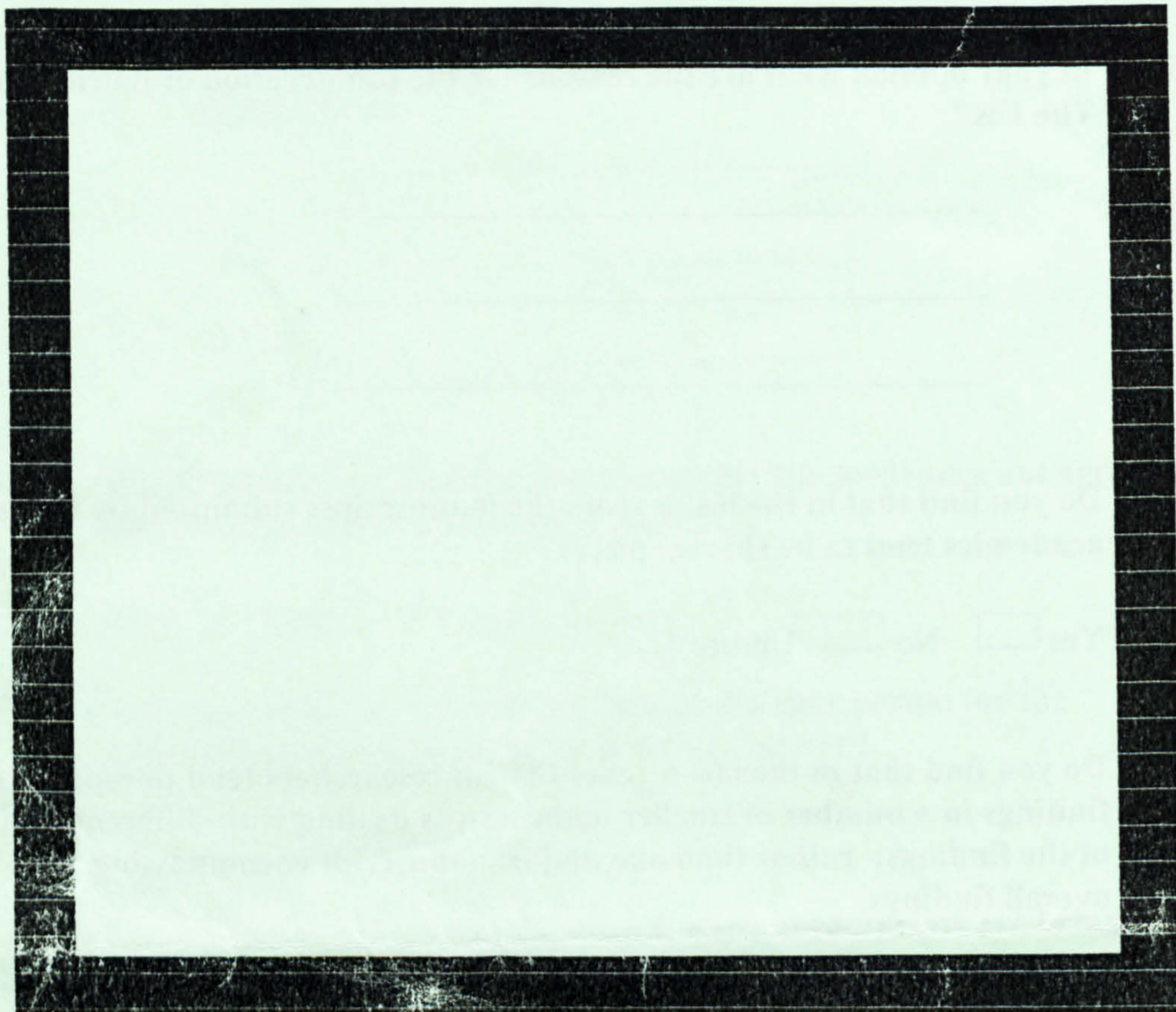
Yes ☐ No ☐ Unsure ☐

19. Do you think that the emergence/proliferation of 'in-house' journals in The UK is a result of the introduction of RAE?

Yes ☐ No ☐ Unsure ☐

20. What in your opinion is the reason(s) behind the emergence/proliferation of 'in-house' journals in The UK?

If you have any comments that you would like to make regarding any of the items on this questionnaire and/or the Research Assessment Exercise, please write them in the space below or attach a separate sheet.



THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY.

When complete, please return the questionnaire in the reply paid envelope provided to:

Ameen Talib
Warwick Business School
University of Warwick
Coventry
CV4 7AL

All comments will be treated as anonymous. All information provided in this questionnaire will be treated as confidential and will only be used in aggregate form in combination with all other responses.

CHAPTER EIGHT
SURVEY OF ACADEMICS:
THE RESULTS

CHAPTER EIGHT

SURVEY OF ACADEMICS: THE RESULTS

8.1 INTRODUCTION

This chapter discusses the exploratory results based on data from the survey of university academics in England in a bid to understand: “What are the behavioural consequences of imposing an outcome control (RAE) on professionals (academics) more suited to self-control?” This chapter addresses these behavioural responses and consequences, that are independent of the respondent characteristics such as age, post, self-assessed level of research activity, discipline (unit of assessment), qualification, experience, institution type (ex-UGC or ex-PCFC), and the RAE rating of the department to which the respondent belongs.

The three objectives of this chapter are:

- i. to analyse the survey results for insights into behaviours of academics in response to the RAE;
- ii. to identify the personal characteristics, if any, that may influence the behavioural orientation, e.g., whether there are significant differences in the responses due to sub-group membership. The

independence and strength of association, including concordance and discordance, were tested by using measures of association; and

- iii. to compare the survey results with the McNay (1997) survey to identify changes in behaviour over time.

8.2 THE SURVEY QUESTIONNAIRE

The survey statements and questions are modified mainly from the McNay (1997) study. Employing the same scales as the McNay report provides the basis for comparison. Survey respondents are requested to indicate for each statement their answers on a Likert-type scale, with its ends anchored “1” for “strongly agree” and “6” for “strongly disagree”. The ordinal scale is a set of six choices with the first three for agreement, and “4” through “6” for disagreement. The questionnaire is finalised after pilot testing and discussions with respondents across several academic disciplines to resolve ambiguities in the instrument.

The questionnaire with a cover letter requesting for survey participation and assuring confidentiality was mailed to 1000 randomly chosen academics in various disciplines in English universities during spring 1998. A note explaining some of the questions and terms is also included. A stamped and addressed envelope is provided for respondents to submit their completed surveys. Appendix 8B shows the cover letter, the questionnaire and the note. A total of 328 replies are collected, of which 305 are usable. Table 8.1 summarises the respondent characteristics.

TABLE 8.1: RESPONDENT PROFILE

								TOTAL
University Type	Old	New						
Totals	215	85						300
Percentages	72	28						100
Academic experience	5 yrs	5-10 yrs	10-15 yrs	15-20yrs	>20 yrs			
Totals	25	57	58	42	123			
Percentages	8.3	18.7	19	13.8	40.2			
Age profile	<30	30-40	40-50	> 50				
Totals	6	75	109	115				
Percentages	2	24.6	35.7	37.7				
Qualification	PhD	Master	Prof.	1st degree				
Totals	215	63	18	9				
Percentages	70.5	20.6	6	2.9				
Post	Prof.	Reader	Prin. Lect.	Sen. Lect.	Lecturer	Other		
Totals	65	27	21	104	82	6		
Percentages	21.3	9	6.8	34	26.9	2		
Research Activity	Inactive	Mod.	Active	Very Active				
Totals	27	67	78	133				
Percentages	8.7	22	25.6	43.7				
Included in RAE return	Def. Yes	Prob. yes	Prob. No	Def No	Unsure			
Totals	240	17	18	28	2			
Percentages	79	5.6	5.6	9	0.8			
Dept rating	5*	5	4	3a	3b	2	1	
Totals	26	50	82	65	37	32	7	299
Percentages	8.8	16.7	27.4	21.7	12.4	10.7	2.3	100

The age profiles of the respondents are compared with the McNay sample and the HESA staff records. Though the age groups are slightly different, the data gathered for this thesis come from a sample that is representative with a slight skew towards older academics.

<u>Thesis sample</u>	<u>McNay study</u>	<u>HESA records</u>
< 30 : 2.0%	< 30 : 4.6%	< 34 : 29.0%
30-40 : 24.6%	31-45 : 43.3%	35-49 : 45.6%
40-50 : 35.7%	46-55 : 36.1%	
> 50 : 37.7%	56-60 : 10.7%	50-59 : 21.1%
	> 60 : 4.8%	> 60 : 4.0%
100.0%	100.0%*	100.0%*

* Rounding errors

8.2.1 SAMPLE SIZE

The sample size is guided by the traditional approach of statistical precision where it is expressed in terms of the maximum sampling error that is acceptable at a given confidence level. In this study some consideration is also given to the time and cost to collect and process the data. For this study involving proportions, the 100(1 - α) % confidence level is given by:

$$CI = \rho \pm Z_{\alpha/2} S_p$$

And the required sample size for a given level of precision is obtained by finding the minimum η such that

$$z_{\alpha/2} s_p \leq \text{Error} \quad \text{where} \quad S_p = \sqrt{\frac{\rho(1-\rho)}{\eta}}$$

Since the McNay survey has 40% of the respondents agreeing to the statements, the a priori estimate of the proportion for this thesis would be 40% (or 0.4), but

the proportion for this thesis is established at a more conservative 50% (or 0.5). This is because the numerator of the standard error takes its greatest value for a given sample size when the proportion estimated is 0.5 and hence the required sample size will be largest.

The confidence interval is set at a 10% chance of an error, i.e., 5% in each direction of the distribution. This 5% margin of error is deemed suitable for this study that involves social behaviour. Hence the minimum sample size must satisfy:

$$z_{\alpha/2}S_p \leq \text{Error} \quad \text{where } S_p = \sqrt{\frac{\rho(1-\rho)}{n}}$$

Where $\alpha/2 = 0.05$ and $Z_{0.05} = 1.64$ approx.

The resultant sample size is:

$$\left(\frac{(1.64)(0.5)}{0.05} \right)^2 = 270$$

As the response rates for postal surveys range between 25% and 40%¹, adopting the lower bound translates to the need for 1080 ($= 270 \div 0.25$) participants. A total of 1000 questionnaires are finally mailed to prospective academics in various disciplines across English universities. From the set of 328 replies collected, 305 are usable, representing a high response rate for research of this nature.

¹ The Brin *et al* (1998) survey of accounting academics has a 33% response rate. As the RAE is of great interest to academics, response to the current survey should be similarly high.

To resolve the issue of non-response bias in this survey, the replies are dated as they are received. Based on the reasoning that late replies would be an indication of non-responses (Wallace and Mellor, 1988), a comparison is made between them and earlier replies. The differences in means are not statistically significant and so, non-response bias is not major problem for this research.

8.3 INDEPENDENCE OF VARIABLES (MEASURES OF ASSOCIATION)

The data for each respondent or observation is a set of 45 variables, of which 32 are response variables, with the rest being respondent profile characteristics that are used as explanatory variables. A cross-classification matrix displays the frequencies of observations for each combination of levels of the variable. The analysis is carried out on tables with only two variables at a time i.e., a response variable and a characteristic variable. This 2-way contingency table has two dimensions, r rows representing categories of one variable and c columns representing categories of a second variable. The rc cells of the table contain frequencies of occurrence of the rc combinations of categories of the two variables.

The cross-classification table provides information regarding the extent to which responses are related to the individual's classification on the explanatory variable. The collection of response proportions at a certain level of the explanatory variable is the sample conditional distribution. If n_{ij} denotes the number of observations cross-classified in the cell of the table that is in row i and

column j , and P_{ij} denotes the proportion of the total sample belonging to that cell, then:

$$P_{ij} = n_{ij} / n$$

where

$$n = \sum_i \sum_j n_{ij} \text{ is the total sample size}$$

$$\text{so that } \sum_i \sum_j P_{ij} = 1.0$$

The set $\{P_{ij}\}$ is the sample joint distribution.

The sample marginal distributions are the row and column totals obtained by summing the joint proportions. Two variables are independent if all the joint probabilities equal the product of the corresponding marginal probabilities, taking the form:

$$\pi_{ij} = \pi_{i.} + \pi_{.j}$$

for

$$i = 1, \dots, r$$

and

$$j = 1 \dots c$$

Independence of two variables implies that the conditional distributions within the r rows are identical. Hence, if two variables are independent, the probability of making a particular response j in the column variable is the same in each row.

8.3.1 Pearson and Likelihood Ratio (LR) Statistics

The Pearson statistic or LR is used to test the null hypothesis of independence, (H_0). The Pearson statistic is an asymptotic approximation of the LR statistic.

PEARSON STATISTIC:

$$\chi^2 = \frac{\sum_i \sum_j (n_{ij} - m_{ij})^2}{m_{ij}}$$

LIKELIHOOD RATIO

$$G^2 = 2 \sum_i \sum_j n_{ij} \log \left(\frac{n_{ij}}{m_{ij}} \right)$$

where m_{ij} are estimated expected frequencies

When “ H_0 : independence is true”, both statistics have asymptotic chi-squared, χ^2 , distributions with degrees of freedom, $df = (r-1)(c-1)$. For either statistic, larger values provide greater evidence against the null hypothesis. Thus the attained significance level is the right hand tail probability of getting a statistic value larger than the observed one, assuming H_0 is true.

Various guidelines have been given for how large the sample size should be in order for the χ^2 distribution to give a good approximation for the exact sampling distributions of the Pearson and Likelihood ratio statistics. A common guideline is that at least 80% of the cells should have estimated expected frequencies exceeding 5 (Cochran, 1954). Some studies suggest that this may be too stringent and should be relaxed (Everitt, 1977; Larntz, 1978; Koehler and Larntz, 1980).

These two statistics for measuring independence do not change under transposition of rows and transposition of columns. This means that both classifications are treated as nominal scales in these tests. If the variables are dependent, the asymptotic expectations of the χ^2 and G^2 statistics are

proportional to the sample size, n . Hence, these statistics cannot be used alone to measure the strength of association, since even a trivial departure from independence, results in an impressively large χ^2 statistic if the sample size is large enough. One remedy is to adjust the statistic by dividing it by some multiple of the sample size, as done with the Phi coefficient, the coefficient of contingency and Cramer measure. These chi-squared based measures and other measures of association are detailed in Appendix 8A.

8.3.2 OTHER MEASURES OF ASSOCIATION

Nominal measures provide an indication of the strength of relationships between variables but not their direction (i.e., positive or negative). There are two types of measures: (1) those based on the chi-square statistic, and (2) those that follow the logic of proportional reduction in error (PRE).

The widely used chi-square statistic, χ^2 , itself is only a measure of independence. As it does not measure the degree of association between variables, other relational measures are required. These association measures modify the information from chi-square statistics to minimise the influence of sample size and degrees of freedom as well as to restrict the range of values of the measure to those between 0 and 1. Such statistical measures include the Phi coefficient, the coefficient of contingency, and Cramer statistic.

With proportional reduction in error (PRE) measures, the meaning of association is clearer and easier to interpret. These measures are all, essentially, ratios of a measure of error in predicting the values of one variable based on knowledge of

that variable alone and the same measure of error applied to predictions based on knowledge of an additional variable (the explanatory variable). Lambda and G&K Tau are designed for cross-classification of nominal data while Gamma is appropriate for ordinal variables. As suggested by Agresti (1984: p. 25), these measures are superior to chi-square based measures. The measures are explained in more detail in Appendix 8A.

Relationships among ordinal variables can also be examined using nominal measures. However, nominal measures do not reflect the additional information available from ranking of ordinal variables. Nominal measures do not answer questions such as "Does Y increase as X increase?" Ordinal variables do not have a defined metric, so the notion of linearity is not meaningful. Therefore, a linear regression relationship cannot adequately describe "the increase in Y as X increases" for interval scale variables using ordinal data. However, the inherent ordering of categories allows consideration of monotonicity, such as whether "Y tends to increase as X increases". Measures for ordinal variables, such as Gamma, describe the degree to which the relationship is monotone.

The most commonly used measures of association for ordinal variables are those based on the numbers of concordant and discordant pairs of observations in the sample. A pair of cases is concordant if the values of both variables for one case are higher (or both lower) than the corresponding values for the other case. The pair is discordant if the subject ranking higher on variable X ranks lower on variable Y. When the two cases have identical values on one or on both variables they are tied.

Several measures are based on the difference between the number of concordant and discordant pairs. If the majority of pairs are concordant, the association is said to be positive. As ranks of variable X increase (decrease) so do ranks of variable Y. If the preponderance of pairs is discordant, the association is said to be negative; as ranks of one variable increase (decrease), those of the other variable tend to decrease (increase). The measures computed for this research are: Gamma, Somer's d, Kendall's tau-b, and Spearman correlation coefficient. These measures are explained in Appendix 8A. The Gamma is most frequently used because it is easy to interpret (Agresti, 1984: p. 165). However, the value of Gamma tends to be more dependent than Kendall's tau-b on the number of categories and the way they are defined. For this characteristic, Kendall's tau-b is a superior measure. The Somer's d is a particularly useful measure for 2 x c tables in which the column variable is an ordinal response variable, even if the rows are unordered. For completeness, measures for nominal as well as measures for ordinal data are computed. The measures of independence statistics are briefly described in Appendix 8A.

8.4 DISCUSSION OF RESULTS

The association (independence) tested here is between the response variables and an individual characteristic (explanatory variable). Other factors are not controlled for when independence of a particular factor is tested. The results could vary when the interactions between factors are controlled for (Agresti, 1984). Though care is required in interpreting these results, we feel it is useful for initial explanatory analysis. The detailed raw results are not displayed here; however, the summary of the results is displayed in Table 8.7. The survey

questions and the overall means of responses and the proportions agreeing to the survey statements are summarised in Table 8.2. The mean of the responses classified by the characteristics is shown in the Table 8.3 series while the proportions are in Tables 8.4 series. These results are also displayed in the chart format for ease of reference. These tables and charts are in the Appendix of the chapter.

Q No.	Statement	No. of responses	Mean	SD	Percentage agreeing		
					Total	ex UFC	ex PCFC
1	I now spend more time on research than 6 years ago	305	3.67	1.83	48.8	44.9	57.6
2	I now spend more time on research than 6 years ago as a result of RAE	301	4.23	1.69	35.6	31.3	43.4
3	I now spend less time in teaching preparation than 6 years ago	304	3.72	1.63	47.3	49.5	42.4
4	I now spend less time in teaching preparation than 6 years ago as a result of RAE pressure on research	301	4.37	1.58	29.8	31.2	25.3
5	I now give less time than 6 years ago to "voluntary" academic activities-e.g. referring for journals	304	3.78	1.74	40.9	41.9	37.6
6	I now give less time to activities given no or low recognition by RAE	304	3.37	1.66	55.0	57.7	47.1
7	The RAE has had a positive effect on my research output	304	4.12	1.6	38.9	33.8	51.2
8	Because of RAE I now spend less time in voluntary academic work	300	3.78	1.69	41.5	43.9	33.3
9	I am feeling more pressure to publish	305	2.45	1.61	78.9	75.9	84.7
10	I now (try to) collaborate more with researchers overseas to demonstrate international excellence	304	3.87	1.53	44.0	45.1	41.2
11	I now collaborate less (in research) with academics from other English universities	301	4.4	1.41	24.1	24.3	22.9
12	I now collaborate more (in research) with colleagues in my departments	303	3.77	1.52	44.8	40.9	52.4
13	Perceived research preferences of RAE panels have affected my choice of research topic	304	4.72	1.5	20.8	18.1	27.4
14	The balance of my research has moved away from the applied end of the spectrum towards more basic pure research	301	4.69	1.39	19.6	21.6	15.5
15	In my view RAE has a negative effect on inter-disciplinary research	299	3.03	1.58	60.1	59.9	60.2
16	I now do less inter-disciplinary research than 6 years ago	294	4.49	1.33	23.9	23.7	22.9
17	Because of RAE time scales I have published some outputs at an earlier stage than I would prefer.	302	3.85	1.65	40.7	38.6	47.0
18	Because of RAE time scales I have deferred the publication of some research output.	303	4.52	1.44	19.9	19.9	19.3
19	My research topics or projects are influenced by the RAE time-scale	305	3.88	1.71	46.2	44.4	51.8
20	Because of the RAE time -scales I have avoided some research topics or projects because they would have taken a long time to complete	303	4.22	1.67	32.0	32.6	31.0
21	Because of the RAE time -scales I have avoided some research projects because they were speculative in nature (more risky in relation to security of output)	302	4.14	1.73	35.8	35.3	37.3
22	I now manage my research publications by smoothing it over the RAE time-scale	299	3.89	1.72	43.5	44.6	40.2
23	The RAE has increased my stress level	304	2.87	1.67	70.8	72.6	65.9
24	The RAE has improved the quality of research conducted in universities	297	4.41	1.46	27.4	26.4	32.1
25	I believe RAE increases staff mobility between institutions	297	3.12	1.59	64.9	64.9	61.0
26	I now spend less time on consultancy work (including external lecturing) to concentrate on research	300	3.99	1.51	37.3	37.3	36.9
27	My dept. has expanded research students numbers beyond the capacity to supervise as well as we wish	303	4.09	1.57	32.7	31.8	34.1
28	I believe that the expansion in research students numbers is due to the RAE funding formula	286	3.51	1.51	53.7	52.2	54.9
29	University appointments are now driven by the RAE	305	1.97	1.21	90.6	91.7	87.1
30	Universities are paying a 'premium' to attract 'star' researchers	300	2.04	1.19	88.8	86.9	92.7
31	Academic researchers pay has increased due to the recognition earned from the RAE	298	4.49	1.4	25.0	23.6	28.0
32	The RAE four year time cycle is not appropriate for my subject area research.	298	3.32	1.57	51.9	53.7	47.5

TABLE 8-2: Questionnaire Survey Results.

TABLE 8.7: SUMMARY RESULTS FOR MEASURES OF ASSOCIATION

Question	UoA^	Exp.	Years-in- Post	Include in RAE~	Dept. Rating	Inst. type~	Post	PhD~	Age	Research Activity
1	A	P	P			A		P		N
2	A	P					N	P		A
3	A			P						N
4	A	P				P	N			
5						A				P
6	A			P		P				N
7	A	P	P		N	N	A	A		A
8				P						A
9			P							A
10				P				N		N
11										
12						N				
13					N	N	N			P
14		P					N			P
15					A					
16										P
17	A		P				N		P	A
18					N		N			
19	A		P		A				P	A
20			P		N				P	A
21		A	P	A	N		N		P	A
22				A	N		N		P	A
23					A	P	N	A		A
24	A	P	P							
25	A							A	P	N
26										A
27				N			N			P
28		P					N		P	
29						P	N			
30										
31		A		N	N	N	A	P		P
32	A	N					N			
Research	N						N			A
Fixation										
Academic Freedom			P		N		N*		P	A
Res. Smoothing	A				N		N			A
Time-Cycle			P		N		N		P	A
Mobility		P					N		P	
Gaming			P		N		N		P	A

Significance

level is 5%

^ = nominal

~ = dichotomous

all else is ordinal

A = Association

P = positive monotone

N = Negative

monotone

* = Significant
at 5.3%

8.4.1 UNIT OF ASSESSMENT (UoA)

The Units of Assessment, UoA, are classified into eight nominal groups that in order are: Science, Physics, Engineering, Business and Management Studies, Liberal Arts, Education, Business Related, and Others. The “Business Related” group is a combination of Accountancy, Economics and Statistics.

There is a strong relationship between the UoA and the time spent on research as a result of the RAE. The extent to which research is published at an earlier stage than preferred is also influenced strongly by UoA. Similarly, the influence of the RAE time scale on the choice of research topic had a strong relationship with UoA. There is a 12% reduction in error when UoA is used to predict the influence of RAE on choice of topic.

The UoA is a nominal measure. A monotone relationship is only for ordinal-ordinal measure of variables, and thus a monotone relation between an ordinal and a nominal variable would be meaningless. However, the results (see Table 8.13) indicate a negative monotone relation between UoA and Research Fixation. Although, this might be meaningless, from classification of the UoA variable, it could be viewed it as an ordinal variable (with a “pinch of salt”). The classification starts with the “Science” discipline and proceeds to the “Art” discipline. These provide a crude ordinal measure. If acceptable, the negative monotone relation indicates that the “Science” academics have a lower Research Fixation. This may be due to the fact that the average publication per academic is related to the unit of assessment.

8.4.2 EXPERIENCE

The ordinal measure for a monotone relation shows that the less experienced staff spend more time in research as a direct effect of the RAE. The measures (Gamma, Tau-b, and Somer's d) are stronger with a positive correlation for the response that increase in research time is due to the RAE. The more experienced the staff, the more they feel that the RAE time cycle is not appropriate. Among the less experienced staff, 60% spend less time on activities that have little or no recognition by the RAE. These staff have a strong belief that the RAE has positive effects on their research, and that the RAE improves the quality of research in universities even though some of the effort is oriented to basic and pure research.

8.4.3 INCLUSION IN RAE SUBMISSIONS

Whilst this explanatory variable is closely related with the self-assessed research activity, it is regarded as important; as inclusion in the RAE submission is recognition of the individual's efforts and gives the individual a sense of belonging to the "clan". It is proposed that inclusion has a motivating effect and the impact of the RAE on behaviour will differ between those who are included and those who were not included in the RAE submission. Academics who believe they were probably not included in RAE submissions are the most influenced to increase research time, with 68.8% increasing research time and 43.8% agreeing it is due to the RAE. This reinforces the discussion in Chapter Seven on the "four paper effect" and the RAE's impact on the middle-tier researchers.

Those included in the RAE submissions were spending less time in voluntary academic activities and other activities given no or low recognition by the RAE. The association measures Gamma and Somer's d reflect a strong association.

8.4.4 DEPARTMENT RATING

The hypothesis of independence could not be rejected between department rating as an explanatory variable and time spent in research, time spent in teaching, collaboration and time spent in voluntary activities. The null H_0 : independence was rejected for all the other responses.

Academics from departments ranked 3a, 3b and 2 are likely to produce more research in response to the RAE than would staff from other departments. Over 60% of respondents from departments rated 3a and 3b also devote more time on research. Forty-two per cent of academics from departments rated 3a and 60% from departments rated 3b also strongly agree that the greater time spent in research is due to the RAE. The greatest pressure to publish is felt by departments rated 3a (87.7% agreeing to the statement), departments rated 2 (85%), departments rated 4 (80%), and departments rated 3b (75%). The effect of the pressure and extra time on research is seen in the staff of departments rated 3a and 3b having the largest proportions agreeing that the RAE has a positive effect on their research output (40% in 3a and 59.5% in 3b). The RAE has resulted in the personal cost of increased stress on some staff. Over 70% of academics across departments rated 3a, 3b and 4 surveyed, claimed to face more intense stress. With respect to the effect on research quality, the RAE impact is felt by 35% of the staff from departments rated 3b compared to an overall

average agreement of 27%.

A large percentage (73%) of staff in departments rated 5-star spend less time in teaching preparation, although about one-third of the staff attribute it to the RAE. This corroborates evidence that departments utilise research funds to “buy out” teaching time (see discussion in Chapter Six). These results raise the prospect that the RAE has increased research at the expense of teaching. There is also anecdotal evidence that high rated departments have used postgraduate students to help out in teaching.

Interestingly, although the association is not significant, the lambda measure is significant for spending less time in voluntary academic work with a 7.6% reduction in error when department rating classification is used to predict this behaviour. Similarly, there is a 9.3% reduction in error when department ratings are used to predict collaboration with foreign researchers, and an 8.6% decrease when the ratings are used to predict collaboration with colleagues within the same department.

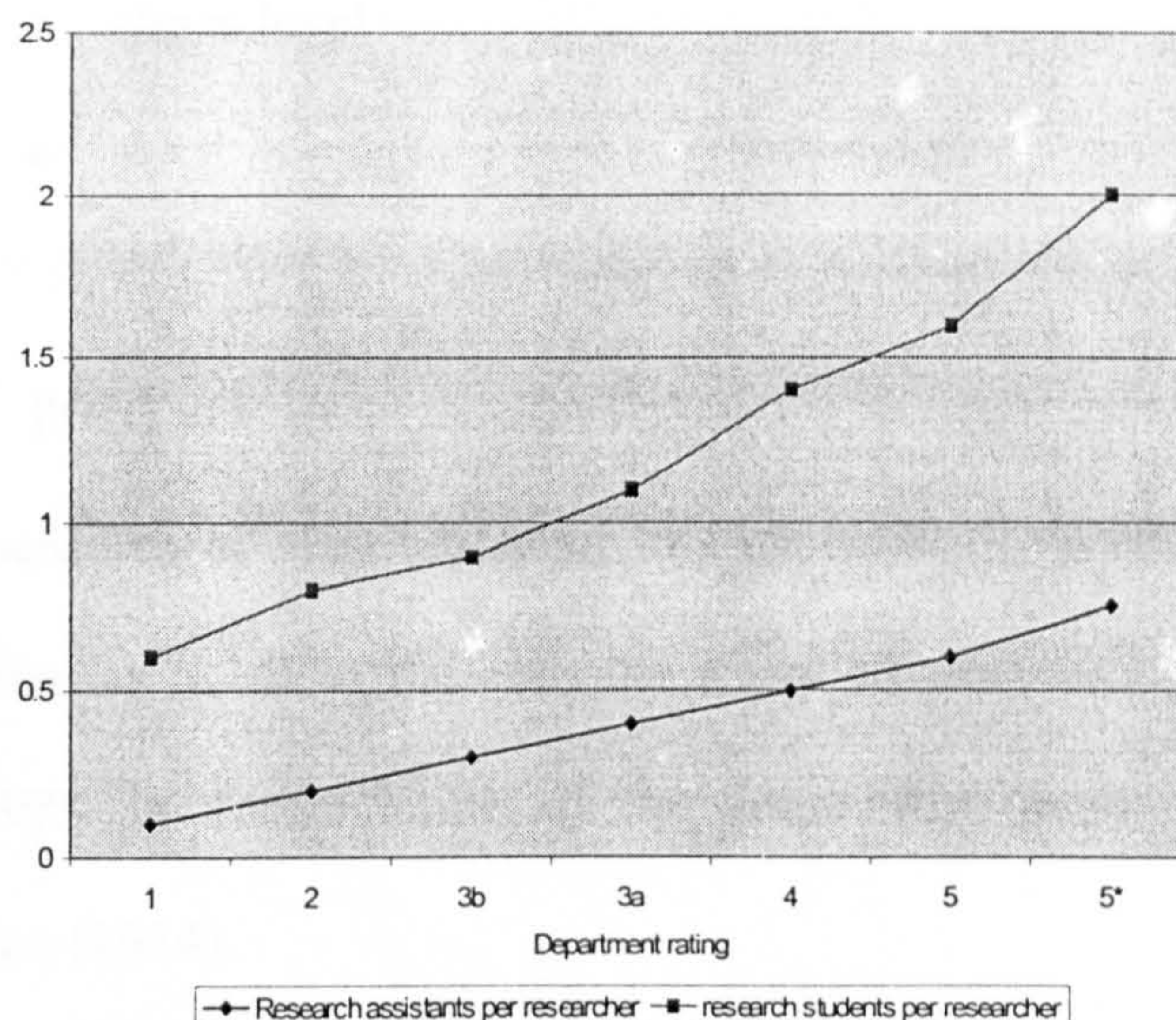
The choice of research topics is dependent on department ratings. Academics in lower rated departments are more likely to choose topics in line with the preferences of the RAE panel members. They were also more likely, because of the RAE time scale, to avoid research topics that would take a long time to complete or are speculative in nature. These results support the “four paper effect” discussed in Chapter Seven. Nevertheless, the statement that research topics are influenced by the RAE time scale does not exhibit a monotone

association but displayed significant dependence as the Phi and the coefficient of contingency display a significantly strong association.

The interviews with university administrators suggest a trend for universities to increase the number of research students to raise the research orientation and culture. About 50% of the survey respondents attribute the increase in number of research student to the RAE, although only one-third laments that the expansion is beyond the capacity for proper supervision. It seems that departments rated 3b have over expanded the number of research students. About 70% of their staff believe that this is due to the RAE formula, and 46% are concerned that such expansion may stretch the capacity to supervise well. The departments ranked low in the RAE may begin to expand the pool of research students to help improve their research income. The problem is that these departments may not have the necessary expertise to provide adequate supervision.

The analysis of the number of research assistants and research students per research active staff by department ratings are summarised in the chart below. There is a positive near-linear increase between research ratings and supervisory load.

RESEARCH STUDENTS AND ASSISTANTS PER RESEARCHER BY DEPARTMENT RATING



Source: Extracted from the 1996 Research Assessment Exercise database.

8.4.5 TYPE OF INSTITUTION

It is hypothesised that there will be a strong association between the responses and the institution type as an explanatory variable. However the results were rather surprising that in many instances the H_0 of independence could not be rejected.

The response variables for which H_0 : independence is rejected are:

- increase in time spent in research
- less time spent in teaching preparation as a result of RAE
- giving less time to voluntary academic activities
- RAE effects on research output

- collaboration with colleagues in own department
- choice of research topic
- stress level
- RAE impacts on appointments and pay

8.4.6 POST

The measures of association for this explanatory variable should be interpreted with care as in all of the cells the expected frequencies exceeding 5 were less than 80%, a contradiction of the commonly quoted guideline attributed to Cochran (1954).

The positive effect the RAE has on the research output is matched with the respondents' positions. The H_0 : independence is rejected, although there is no evidence of a monotone relationship. The lambda shows an 8.4% reduction in error when the post variable is used to predict if the RAE has had positive effects on research output. The G&K Tau and Uncertainty coefficient show a reduction of error of about 3%.

It is observed that as we move down the seniority scale, the consensus that the RAE influences the choice of research topic of staff increases. The junior staff claim that their research is moving away from the applied topics towards more basic and pure areas. Their choice of topic is highly influenced by the perceived preferences of the RAE panels. Topics that are speculative in nature are being avoided because of the RAE time-scales. There is also a weak association,

significant at the 5.2% level that the junior staff are shunning research projects that would require a long time to complete because of the RAE time-scale.

8.4.7 QUALIFICATION

The percentage of academics without PhDs agreeing to the statement that they spend more time on research due to the RAE is 60%. They also disagree that salaries for academic researchers have increased as a result of recognition from the RAE. Those without PhDs are trying to collaborate with foreign researchers in the hope of increasing their performance.

8.4.8 AGE GROUP

Younger academics are spending more time in research as a result of the RAE. For example, 60% of staff below 30 years of age report that they are increasing their scholarly work as a result of the RAE. This deliberate reaction is symptomatic of the lack of job security and emphasis on research placed by universities. Universities have started encouraging early retirement among non-active researchers (see Chapter Six).

Over 40% of the entire sample spend less time in voluntary work because of the need to focus their efforts on work that is favoured by the RAE. This is particularly evident among the younger staff (66%). They practise research smoothing and research output management more than the older staff. There is a moderate monotonic relationship between age and research smoothing. Younger academics are publishing their work at earlier stages than they would have done because of the RAE time scale. Not only are their choices of research topics

influenced by the RAE time-scale, they also avoid projects that require long durations or are speculative.

8.4.9. RESEARCH ACTIVITY

As the RAE is also an assessment of research quality, it is expected that research activity will be a significant explanatory factor. The response variable for which the H_0 : independence is not rejected are these response statements:

- I now spend less time in teaching preparation than 6 years ago as a result of the RAE's pressure on research.
- I now collaborate less (in research) with academics from other English universities.
- I now collaborate more (in research) with colleagues in my department.
- In my view, RAE has a negative effect on inter-disciplinary research.
- Because of the RAE time-scales I have deferred the publication of some research output.
- I believe that the expansion in research student numbers is due to the RAE funding formula.
- University appointments are now driven by the RAE.
- Universities are now paying a "premium" to attract "star" researchers.
- The RAE four year time cycle is not appropriate for my subject area.

All other response variables exhibit significant association. However, not all associations had a monotone relationship (see results in Table 8.7).

Although half of the respondents spend less time in teaching preparation, only one third claim this as the result of the RAE pressure on research. Of the active

researchers, 73% agree that they spend less time in teaching preparation. These findings imply that the correlation between research and teaching may be negative. It also suggests that research activities may be undertaken at the expense of teaching preparation.

The less active researchers are more likely to respond to the perceived preferences of the RAE panels thus allowing their choices of research topics to be influenced. They also shift their orientation from applied to basic and pure research, and conduct a lesser amount of inter-disciplinary research.

Research smoothing activities do not have a monotonic relationship with research activity, though the H_0 : independence is rejected. A closer examination of the mean responses shows that the moderately active researchers are the key group that had the greatest tendency to practice research output smoothing.

8.5 BEHAVIOURAL MEASUREMENT VARIABLES

The survey is designed to measure the six variables described in Chapter Three. They are summarised here for convenience. In this section the association between these measure variables and the characteristics of the academics are discussed. The tests here are the null hypothesis of independence between the measure variables and the explanatory (characteristic) variable.

By using the re-compute command in SPSS, the scores for each respondent for each question in the measure variable are aggregated and divided by 6. The resultant scores are re-computed into four ordinal scores, where:

Score 1	:	1.00 to 2.50	⇒	Strong Agreement
Score 2	:	2.51 to 3.50	⇒	Moderate Agreement
Score 3	:	3.51 to 4.50	⇒	Moderate Disagreement
Score 4	:	4.51 to 6.00	⇒	Strong Disagreement

8.5.1 THE MEASURE VARIABLES

The six measure variables that are detailed in Chapter Three are recapped in this section.

i. RESEARCH FIXATION

This variable measures the impact of the RAE on academics focusing on research at the expense of other activities. The variable is derived from the responses to Questions 2, 4, 5, 6, 8, and 26 (see Appendix 8B for the questionnaire).

ii. ACADEMIC FREEDOM

Academic freedom refers to the freedom of selecting a research topic and the freedom to decide when to publish the research findings. The influence of the RAE on choice of research topic and on timing of publishing output is regarded as an indirect infringement of academic freedom. The variable is the average response from Questions 13, 14, 17, 19, 20, and 21.

iii. SMOOTHING RESEARCH OUTPUT

It is expected that many academics would practice research output smoothing in a similar fashion to that of “income smoothing” under the Agency Theory. As the RAE requires only four publications, academics could defer publication or

publish early in order to smooth their output. Questions 17, 18 and 22, measure this construct.

iv. TIME CYCLE EFFECT

This variable measures the behavioural impact arising from the time-cycle of the RAE. The components of this measure are similar to the smoothing measure and the academic freedom measure. Questions 17, 18, 19, 20, 21 and 22 measure it.

v. MOBILITY

There is anecdotal evidence that staff mobility has increased from the time the introduction of the RAE. There is also the issue of the premium the “star” researchers would command. This variable measures academics’ perception about the effect of the RAE on staff mobility and salaries. Questions 25, 29, 30 and 31 measure this variable.

vi. GAMING

This is an overall measure for gaming activities, including smoothing and short-termism, and it is measured by Questions 13, 14, 16, 17, 18, 19, 20, 21 and 22.

8.5.2 MEASURES OF ASSOCIATION FOR THE MEASURE VARIABLES

The results displayed in Tables 8.8 through 8.13 (in this chapter’s Appendix) show strong positive monotone correlation between the responses of the combined variables. A respondent is more likely to have a strong (weak) agreement response for all the combined variables. This strong correlation

supports the reliability and internal consistency of the questionnaire. The discussion and analysis of the results are provided below.

8.5.2.1 RESEARCH FIXATION

Research fixation is dependent on the level of self-assessed research activity, but there is no monotone relationship. Examining the means of the responses, it appears that this is due to the moderately active researchers being more likely to engage in research fixation than the non-active or the very active. This supports the “four paper effect” argument presented in Chapter Seven.

There is a negative monotone correlation with “Post”. The less senior the staff the more likely they would agree to the survey statement on research fixation. They spend more time on research at the expense of other pursuits. There is also a negative relationship with the UoA variable.

The pressure to publish is felt by more than three-quarters of staff. This is consistent with the higher stress level being experienced by the majority (over 70%). Respondents who are more likely to agree to research fixation behaviour would agree that the RAE four-year time-cycle is not appropriate for their respective disciplines. The use of research fixation responses to predict responses regarding the stress level reduces the error in prediction by 16%.

8.5.2.2 ACADEMIC FREEDOM

The perceived preferences of the RAE panel members influence the choice of research topic (Martin and Skea, 1992). Although policy makers can influence

scholarly work through signals from RAE panel members, the proportion of academics who admit that their research topics have been influenced by the RAE panels is only 20.4%. The percentage seems low, but taken together with the 13.2% found in the McNay study, the trend is a source of concern to some in the academic community. This concern is compounded by the profile of the academics most influenced in their research topics by the RAE panels. They are the younger academics in the 30-40 age group (26.7%) who are from lower-rated departments, are in lecturer positions and are moderately active researchers.

Another concern is the influence of the RAE time-scale on the choice of research topics. Overall, nearly half (46.9%) of the respondents concur that their research themes are influenced by the time-scale imposed by the RAE. One third of them have avoided doing research in areas that would have taken a long time to complete or are more tentative in nature. Among the younger staff, 60% refer to the time scale as an influence on the range of issues for research.

The association measure results show a negative correlation with the Post variable is significant only at the 5.3% significance level. The association with the department rating was also negatively correlated. Academics in the lower rated departments were more likely to alter their behaviour, as a result of the RAE, to an extent that their academic freedom is infringed upon. The older staff and those longer in their current posts are more likely to disagree that they have altered their behaviour to the extent that academic freedom has been questioned. These two characteristics were positively correlated with the response on academic freedom variable.

8.5.2.3 RESEARCH SMOOTHING

The journal editors who are surveyed for this thesis observe that some undesirable publication practices are emerging. Some authors have resorted to recycling papers and undertake what is known as “salami slicing” (see Chapter Seven). In the McNay (1997) study, only 24.5% of the sample admit that because of the RAE they have published their research at earlier stages of development than would have been the case. For this thesis, the proportion is higher at 40.4%.

As the RAE 1996 required four publications to be submitted for each cycle, the marginal utility of the fifth paper within each cycle is extremely low, almost nil if its quality cannot match that of the previous four papers. Not unexpectedly, 19.5% of the survey respondents have deferred publication due to the RAE time-scale. This consequence is highest among the “quite active” category (25%). The very active researchers probably have little need or reason to defer their publication, while the non-active academics do not have the prodigality to defer publication.

Research smoothing is not independent of the level of self-assessed research activity. There is also no monotone relationship. This is because the moderately active researchers are more likely to smooth their publishing effort compared to the non-active or the very active. Smoothing practises are highest in departments rated 3b (61%). Two thirds of those from departments rated 1 have published at earlier stages than they would have desired. Research smoothing had a

significant and negative monotone relation with the post and department rating variables. The less senior the staff, the more likely they are to smooth out their output. This is even more aggressively pursued by staff in lower rated departments. The hypothesis of independence is rejected for the UoA variable as there is a strong association.

8.5.2.4 TIME-CYCLE

Age and years in the teaching position display a significant positive monotone association. Older academics are less likely to agree that the RAE time-cycle has influenced their behaviour. The post and department rating variables exhibit a negative monotone association. Academics in lower-rated departments are more likely to accept that the RAE time cycle influences their work styles. Those whose behaviour is influenced by the time cycle are likely to agree that their pay has increased in line with recognition of their work accorded by the RAE.

8.5.2.5 MOBILITY

This mobility variable is the only variable that is independent of the self-assessed research activity. There is a positive monotone relation with age and experience. The older and more experienced academics either disagreed or agreed less that mobility is an issue. The younger and newer academics would readily agree that that the RAE has increased mobility and pay. This is seen in the negative monotone association with the Post variable. The less senior staff are more in agreement with the mobility measure.

Almost two thirds (64%) of the respondents are of the opinion that the RAE has increased staff movements across institutions. This perception is higher among

younger staff (about 75%). Ninety percent are convinced that the RAE is an instrument capable of steering university appointments, and that universities are paying a premium to attract star researchers. However, only one-quarter believe that academics' pay have increased due to the RAE. Three quarters of staff in departments rated 4 agree that mobility has increased. Among non-active researchers, 25% are of the assessment that there is greater staff mobility that will intensify with the increase in research activity. A larger proportion - 70%, of the very active researchers - also anticipate this trend. However, no monotone relationship could be established from the survey data. The pay premium for star researchers is noticed by 85% of the very active group. They are evidently highly informed regarding this issue, and are the ones who know the level of premiums used as inducements to transfer jobs. The survey results and the interviews conducted with university administrators support anecdotal evidence that the RAE now drives university appointments and that salary premiums are used to attract star researchers.

8.5.2.6 GAMING

The hypothesis of independence could not be rejected for institution type, experience, UoA, and whether respondents are included in the RAE submissions. Independence is rejected for the self-assessed level of research activity, although no monotone relationship is evident (see Table 8.8). The means of the responses (Table 8.3H) show that the inactive and very active game less than the average researchers. From a policy perspective, the impact of the RAE on the average researchers is the most substantial. As the very active researchers are and have been productive for intrinsic satisfaction, policy makers have to stimulate the

performance of average scholars in the effort to attain centres of excellence. Thus the gaming behaviour exhibited by average researchers is now a source of concern for decision makers.

The measures of association between research activity and a question on whether the RAE has positive effects on research output show an association that leads to rejection of the independence H_0 , although there is no monotone relationship. For this query, the inactive group responds with a high mean of disagreement of 4.86. The very active academics disagree with a mean of 4.11. The moderately active ones and the quite active group disagree with a mean of 4.25 and 3.71 respectively. This provides some evidence that the quite active group is trying to increase their research and in the process, game to enhance their performance.

There is a negative monotone correlation with the department rating, with more academics in lower-rated departments agreeing that they practise gaming. There is also a negative monotone correlation with the Post variable. It has been observed that the less senior the staff, the greater the admission that gaming strategies are being executed. This is corroborated by the positive monotonic correlation between age and years in post. The younger academics with fewer years in post are those who have the highest tendency to game.

8.6 COMPARISON WITH McNAY STUDY²

This section elaborates on the cumulative impact of the RAE on academics'

² This section has been published in the paper: A. Talib "The continuing behavioural modification of academics since the 1992 research Assessment Exercise", Higher Education Review, Vol. 33 (3), 2001 pp 30-46.

behaviour by comparing the findings with McNay's (1997) analysis of the impact of the 1992 RAE. It is expected that new behaviours or a behavioural pattern would have ensued during the intervening period. While this may be especially the case with the ex-PCFC sector, it is noted that the 1992 exercise was a milestone for the changes it brought on and for the inclusion of the ex-PCFC Institutions (see Chapter Four for a discussion).

The analytical approach is to compare the mean responses since similar surveys are conducted by the McNay study and for this research. Significant differences in the mean responses would suggest changes in behaviours. To decide whether μ_1 is significantly different from μ_2 , the null hypothesis, H_0 , is that that $\mu_1 = \mu_2$. This H_0 is equivalent to $\mu_1 - \mu_2 = \mu_v = 0$. If this value deviates from 0 then the hypothesis is rejected. The standard error, assuming independence of the samples, is given by:

$$\sigma_v = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

And as the sample size is reasonably large, the sample standard deviation can be used to estimate the population standard deviation, σ_v .

The ex-PCFC sector was brought into the purview of the RAE in 1992. Consequently, academics in the ex-PCFC sector have modified their work ethics in order to conform with key requirements of the RAE in general. The set of hypotheses testing for behavioural changes in the ex-PCFC sector is analysed by

comparing responses to the McNay study and to the survey conducted for this thesis. In this case, the null hypothesis H_0 of $\mu_1 = \mu_2$ is equivalent to $\mu_1 - \mu_2 = 0$. The differences in mean responses and their associated statistical significances to the two surveys are reported in Table 8.5. The differences in percentages agreeing by institution type are in Table 8-6.

As there is no difference in time spent on research and teaching preparation, the responses to both surveys are somewhat similar. Thus, there is no evidence to support the belief that the RAE has induced biases. The differences in means are significant at the 5% level for these statements:

- I now give less time to activities given no or low recognition by the RAE.
- The RAE has had a positive effect on my research output.
- I am feeling more pressure to publish.
- I now collaborate less (in research) with academics from other English universities.
- Perceived research preferences of RAE panels have affected my choice of research topic.

- Because of RAE time scales, I have published some outputs at an earlier stage than I would prefer.
- Because of the RAE time -scales I have avoided some research projects as they were speculative in nature (more risky in relation to security of output).

The means of all other statements are not significantly different. All the responses (where the difference in means was significant) showed respondents in our survey agreeing more strongly to the statements than the McNay study. The only statement that the respondents in our survey disagreed with more strongly compared to the previous study, was the statement that the RAE had a positive effect on research output. The results indicate that academics are getting more disillusioned with the RAE over time. They are feeling more strongly that the RAE has not had a positive effect on their research output.

Forty-four percent of the respondents in the current survey are collaborating with colleagues from their departments because the synergy in joint research may be more productive. The choice of research topics is increasingly being shaped by the panel as documented that panel members tend to favour research they are familiar with (see Martin and Skea, 1992). It is not unusual for universities to recruit those who share similar research interests as their existing staff. Consequently, the funding value of a mentor researcher outweighs the value of the lone researcher (Talib and Steele, 2000).

It has been further argued that empowerment of lower-level staff is necessary if the government is to adopt a performance orientation (Dixon et al, 1998), but over 58% of the sample in the McNay study feel that their research agenda is being defined by sources other than their own. If the trend of selecting research topics is based on cues from the RAE's time scale and panel preferences, there may be a consequent reduction of intrinsic commitment with the concomitant issue whether research quality can be sustained. It should be noted that 81% of department heads in the McNay study claim that the quality of research by their staff has improved. In the McNay study, 64% of the academics surveyed consider their research quality has improved because of the RAE; the proportion is a lower 39% in the present survey. Only 34% of respondents in the McNay study agreed that the RAE improved the quality of research conducted in universities. (28% only in our survey agreed to same statement).

8.6.1 THE DIFFERENCE BETWEEN EX-UGC AND EX-PCFC

The differences in the proportions agreeing between the McNay study and this thesis is significant for both types of institutions for these statements:

- I now give less time to activities given no or low recognition by the RAE.
- The RAE has had a positive effect on my research output.
- I am feeling more pressure to publish.

- Because of RAE time scales, I have published some outputs at an earlier stage than I would prefer.
- Because of RAE time scales, I have avoided some research projects because they were speculative in nature (more risky in relation to security of output).

The difference in proportion is significant for the ex-UGC sector but not for the ex-PCFC sector for just two statements. The RAE has raised the stress levels and lowered the incidence of voluntary academic activities. The proportion of ex-UGC staff devoting less time to voluntary academic activities such as reviewing and refereeing manuscripts has significantly increased from 32% to 42%, an increase of 10 percentage points.

Apart from the significant differences in proportion in common with the ex-UGC sector, the academics in the ex-PCFC sector also had significant differences in the following statements:

- I now collaborate less (in research) with academics from other English universities.
- Perceived research preferences of RAE panels have affected my choice of research topic.
- I now do less interdisciplinary research than 6 years ago.

- Because of the RAE time scale, I have avoided some research topics or projects because they would have taken a long time to complete.
- The RAE has improved the quality of research conducted in universities.
- I now spend less time on consultancy work (including external lecturing) to concentrate on research.

It is therefore inevitable that the ex-PCFC sector academics have adjusted their work's focus to suit RAE requirements. This includes the reduction of consultancy assignments to concentrate on research, as well as orientating their research towards the RAE requirements rather than to do pure research. The research topics are influenced by the RAE panel members' preferences and time scale.

8.7 CONCLUDING REMARKS

This chapter explained the results and findings based on the survey data. It compared some aspects of the McNay (1997) study to extricate some of the trends that can be a source of concern. For example, there is an orientation towards doing research that may be favoured by the panel. Another is the issue of gaming, viz., to postpone the submission of drafts to subsequent RAE time-cycles once the fourth paper has been submitted. Various other statistics were also discussed.

The initial exploratory step tests if the response variables are independent of the respondent characteristics by using cross-tabulation measures of association. If

the null hypothesis of independence is not rejected, then an academic staff's personal profile has no effect on the behavioural response. The hypotheses are developed from the expectancy theory and goal-setting literature that have been reviewed in Chapter Two. The model developed in Chapter Three shows the expected relationships between the dependent and independent variables.

The null H_0 : independence is not rejected for only Q11 and Q30 (see Table 8.7). There was no association present between the academics characteristics and collaboration with academics from other English universities, or the belief that universities are now paying a "premium". Responses to four questions (Q12, Q15, Q16, and Q26) have only relationships with one explanatory variable. Research collaboration with colleagues in the same department has some relationships with institution type. For example, ex-polytechnic staff are collaborating more with their current department colleagues. Though this strategy of collaboration is sub-optimal, it provides the encouragement and support that are needed especially by the less active researchers.

There is an association, i.e., rejection of the null H_0 : independence, between department RAE rating and the view that the RAE has negative effects on inter-disciplinary research (Q15). However, no monotonic relationship is evident. The self-assessed level of research activity is the only personal characteristic that is not independent of spending less time on consulting activities (Q26) and is positively related with doing less inter-disciplinary research (Q16). All the other response variables have associations with two or more characteristic variables (see Table 8.7).

The main characteristic factors that have a strong association (null H_0 : independence rejected) with the response variables are age, post, department rating, and level of research activity. Post and department rating have negative monotone relationships with the “variable measures”. Age has a positive monotone relationship, while research activity has strong association but no monotone relationship. This is because average researchers are greatly influenced by the RAE.

The younger academics in less senior posts in lower rated departments are more likely to be influenced decisively by the RAE and are adopting more controversial behaviour, such as choosing projects favoured by RAE panels, avoiding projects that may be time-consuming and shunning topics that are less publishable. This is particularly the case with academics of average research calibre. Other questionable strategies include publishing to meet numbers rather than quality. The reactions to the RAE may culminate in a counter-productive effect of compromising quality for quantity since a “publication culture” may overshadow the “research culture”. The need to meet the four-paper requirement is prompting some academics to re-align their tasks with the plausible effect that they reduce or avoid activities such as teaching preparation, public service and voluntary academic work.

One effect of the RAE is its impact on research and publishing strategies. Forty-five percent of the survey respondents smooth their research output, and 51% cannot agree that the RAE time-cycle is appropriate for their disciplines or the

type of research they would conduct. The time scale and the RAE panel member preferences are increasingly steering the choice of research topics. This was also an observation in the McNay report. This development should cause some concerns. The over reliance on performance measures can stifle true innovation (Sinclair, 1995). The other worrying phenomenon is the proliferation of premature publication that arises because researchers are anxious to attain the quota of four papers. Some editors have alerted the fact that some papers are being re-cast with minor modifications for simultaneous submission to different journals. In the same respect, there would be little interest in presenting comprehensive papers when it would be strategic to partition the research into smaller pieces to fulfil the quota. In the long run, there is the risk that a different and disreputable publishing ethic will emerge.

Half of the moderately active and 67.5% of the quite active staff are spending less time in voluntary academic activities because of the RAE. Half of the quite active researchers have reduced their consulting projects such activities are not encouraged by the RAE. It is noted that two thirds of the staff in 5-star departments are allocating less time to areas not recognised by the RAE but only one-third have reduced their consulting commitments. Not unusually, voluntary activities experience the greatest drop.

Average researchers spend more time in research because of the RAE. This increase in time and effort for research means adjustments or cutbacks in other activities such as teaching, consultancy, voluntary public service and personal leisure. While it seems ideal to policy makers for academics to divert time from

personal leisure to research, it may be futile or counter-productive. The increased stress could affect personal life and health, among other problems. Given that preparation time for teaching cannot be realistically reduced below some minimum, the other two categories where time can be and are being re-allocated are voluntary service and consultancy. In general, voluntary work is reduced. The average researchers reduce their consultancy time, though not as much as their voluntary work. This is consistent with the expectancy theory since consultancy has an intrinsic as well as an extrinsic value. To shift time and effort to consultancy, the extrinsic rewards that are relinquished have to be compensated. This can be and has been arranged for the research-active staff by providing an incentive premium in the funding formulae.

CHAPTER EIGHT

APPENDIX 8-A

MEASURES OF ASSOCIATION

APPENDIX 8-A

MEASURES OF ASSOCIATION

The various statistical measures of independence are briefly described in this appendix.

Association Measures Statistics:

1. Nominal Measures

These measures assume that both variables in the two-way contingency table are nominally measured. These nominal measures provide an indication of the strength of association between variables but cannot indicate the direction of the relationship. The measures are of two types; those based on the chi-square statistic and those that follow the logic of proportional reduction in error. (PRE)

Chi-square Based Measures.

The chi-square statistic itself is only a measure of independence. It is not a good measure of the degree of association between variables. Its widespread use in tests of independence has encouraged the use of measures of association based upon it. These association measures

attempt to modify the chi-square statistic to minimise the influence of sample size and degrees of freedom as well as to restrict the range of values of the measure to those between 0 and 1.

a) Phi coefficient

The Phi coefficient modifies the chi square by dividing it by the sample size and taking the square root of the result:

$$\phi = \sqrt{\frac{\chi^2}{N}}$$

For tables in which one dimension is greater than two (as in our case) phi, may exceed unity. To obtain a measure, which does not exceed unity, we can use the coefficient of contingency.

b) The coefficient of contingency.

Although the value of this measure is always between 0 and 1, it cannot generally attain the upper limit of 1. The maximum value possible depends upon the number of rows and columns.

$$c = \sqrt{\frac{\chi^2}{\chi^2 + N}}$$

c) Cramer

$$V = \sqrt{\frac{\chi^2}{N(k-1)}}$$

where k is the smaller of the number of rows and columns.

This statistic can attain the maximum of 1 for tables of any dimension. If one of the table dimensions is 2, Cramer and Phi statistics are identical.

The chi-squared based measures are somewhat hard to interpret, as they cannot be expressed in terms of probabilities or odds. However they are useful for comparing strengths of association. Healey et al (1997) suggest measures of association less than 0.1 indicate weak association; values between 0.1 and 0.3 can be regarded as moderate in strength of association and worth noting, while values over 0.3 provide evidence of a strong relationship between the variables.

Proportional Reduction in error measures. (PRE)

With PRE measures, the meaning of association is clearer and easier to interpret. These measures are all, essentially, ratios of a measure of error in predicting the values of one variable based on knowledge of that variable alone and the same measure of error applied to predictions based on knowledge of an additional variable (the explanatory variable).

Lambda and G&K Tau are designed for cross-classification of nominal data while Gamma is appropriate for ordinal variables. These measures are superior to chi-square based measures. (Agresti 1984)

a) Lambda.

Lambda always ranges between 0 and 1. A value of 0 means the independent (explanatory) variable is of no help in predicting the dependent (response) variable. A value of 1 means the independent variable perfectly specifies the categories of the dependent variable. When the two variables are independent, lambda is 0; but a lambda of 0 need not imply statistical independence. As with all measures of association, lambda is constructed to measure association in a very specific way. In particular, lambda reflects the reduction in error when values of one variable are used to predict values of the other. For example, a lambda of 0.30 between variable A and B, with B as the dependent variable, means a 30% reduction in error is obtained when A is used to predict B. If this particular type of association is absent, lambda is 0.

Other measures of association may find association of a different kind even when lambda is 0.

a) G& K Tau. (also called the concentration coefficient)

This measure is the proportional reduction in the probability of an incorrect guess obtained by making predictions on variable Y using the classification on variable X. A large value represents a strong association, in the sense that we can guess Y much better when we know X than when we do not. A difficulty with this measure is in determining how large a value constitutes a 'strong' association. When the response variable has several possible categorisations, the measure tends to take smaller values as the number of categories increase.

b) Uncertainty coefficient

This is an alternative variation measure proposed by Theil (1970). It indicates the proportionate reduction in error when values of one variable are used to predict values of the other variable. Similar to G& K Tau, the values range between 0 and 1. The value of 0 is equivalent to independence. A value of 0.45 indicates that the knowledge of one variable reduces error in predicting values of the other variable by 45%.

2. Measures of Association for Ordinal variables.

Relationships among ordinal variables could be examined using nominal measures. However nominal measures do not reflect the additional information available from ranking of ordinal variables. Nominal

measures do not answer questions such as “ Does Y increase as X increase?” Bivariate analyses of interval scale variables often summarises covariance by the Pearson correlation. Ordinal variables do not have a defined metric, so the notion of linearity is not meaningful. However, the inherent ordering of categories allows consideration of monotonicity; whether Y tends to increase as X increases. Measures for ordinal variables describe the degree to which the relationship is monotone.

The most commonly used measures of association for ordinal variables are those based on the numbers of concordant and discordant pairs of observations in the sample. A pair of cases is concordant if the values of both variables for one case are higher (or both lower) than the corresponding values for the other case. The pair is discordant if the subject ranking higher on variable X ranks lower on variable Y. When the two cases have identical values on one or on both variables they are tied.

Several measures are based on the difference between the number of concordant and discordant pairs. If the majority of pairs are concordant, the association is said to be positive; as ranks of variable X increase (decrease) so do ranks of variable Y. If the preponderance of pairs is discordant, the association is said to be negative; as ranks of one variable increase (decrease), those of the other variable tend to decrease (increase).

Generally dichotomous nominal variables can be used in methods designed for ordinal variables, since reversing the two categories changes the direction but not the magnitude of the association and does not produce different substantive conclusions (Agresti 1984 p167)

a) Gamma

Gamma can be thought of as the probability that a random pair of observations is concordant minus the probability that the pair is discordant, assuming the absence of ties.

$$\text{Gamma} \rightarrow \gamma = \frac{\Pi_c - \Pi_d}{\Pi_c + \Pi_d}$$

where

$\Pi_c / \Pi_c + \Pi_d$ is the probability of concordance

$\Pi_d / \Pi_c + \Pi_d$ is the probability of discordance

The range is from -1 to +1, with gamma being +1 if the discordant pairs are zero and -1 if the concordant pairs are zero. In the case of independence the gamma value is zero. However, a gamma of zero does not necessarily imply independence except in a 2 x 2 table. Values close to zero imply little or no relationship. Positive values imply positive correlation (monotonicity) and negative values negative correlation. In the computation of Gamma no distinction is made between the independent and dependent variable.

b) Somers' d

Somers (1962) proposed an asymmetric extension of Gamma for which pairs untied on the independent variable serve as the base rather than those untied on both variables. The sample version of Somers' d (below) is the difference between the proportions of concordant and discordant pairs, out of the pairs that are untied on X. This measure is intended for use when Y is a response variable.

$$d_{yx} = \frac{(C - D)}{\{n(n-1)/2 - T_x\}}$$

where
 $T_x \rightarrow$ tied pairs.

and

$$n(n-1)/2 - T_x = C + D + (T_y - T_{xy}) \geq C + D$$

the denominator of d_{yx} is at least as large as the denominator of γ
 and hence $d_{yx} \leq \gamma$

In order for Somers' d to equal 1 there must be stricter monotonicity than for Gamma, in the sense that C or D must equal zero and in addition none of the pairs that are untied on X can be tied on Y.

c) Kendall's Tau-b

A measure that attempts to normalise C-D by considering ties on each variable in a pair separately but not ties on both variables.

$$\tau_b = \frac{(C - D)}{\sqrt{[n(n-1)/2 - T_x][n(n-1)/2 - T_y]}}$$

The sign of the coefficient indicates the direction of the relationship and its absolute value indicates the strength, with larger values indicating stronger relationships. Though possible values range from -1 to $+1$, a value of -1 or $+1$ can only be obtained from square tables.

d) Spearman Correlation coefficient

A measure of association between rank orders. The value ranges from -1 to $+1$ where -1 is a perfect negative relationship and $+1$ is a perfect positive relationship. A value of 0 indicates no relationship.

CHAPTER EIGHT

APPENDIX OF

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AND

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Survey Results: means classified by years of experience

Q No.	Means (years of experience)				
	5yrs.	5 to 10	10 to 15	15 to 20	over 20
1	3.00	2.98	4.21	3.95	3.70
2	3.71	3.55	4.60	4.60	4.31
3	4.28	3.32	3.98	3.48	3.75
4	4.29	4.02	4.30	4.43	4.54
5	4.24	3.82	3.72	3.70	3.69
6	3.12	3.21	3.31	3.60	3.45
7	3.16	3.55	4.64	4.19	4.30
8	3.84	3.55	3.84	3.88	3.81
9	2.36	2.44	2.52	2.19	2.52
10	3.28	3.84	3.90	3.83	4.02
11	4.28	4.48	4.54	4.24	4.30
12	3.00	3.58	4.03	3.71	3.00
13	4.36	4.75	4.79	4.68	4.76
14	4.21	4.60	4.54	4.81	4.85
15	3.00	3.30	2.74	3.13	3.02
16	4.16	4.58	4.43	4.40	4.58
17	3.71	3.68	3.86	3.61	4.02
18	4.42	4.60	4.53	4.27	4.50
19	3.36	3.88	3.86	3.76	4.03
20	3.83	4.40	4.21	4.20	4.23
21	4.00	4.30	3.84	3.95	4.29
22	3.50	3.89	3.70	3.80	4.09
23	2.72	2.93	2.78	3.05	2.84
24	3.24	4.25	4.70	4.41	4.59
25	2.60	2.89	3.32	3.02	3.28
26	4.25	4.04	4.00	4.14	3.87
27	3.76	4.09	4.14	3.71	4.25
28	3.13	3.51	3.30	3.33	3.75
29	1.92	1.88	1.95	1.79	2.11
30	2.12	1.81	1.84	2.02	2.22
31	4.70	4.05	4.60	4.37	4.62
32	3.48	3.58	3.29	3.63	3.07

TABLE 8-3 A

Survey Results: means classified by inclusion in RAE submission.

Q No.		Inclusion in RAE submission			def No
		Def. Yes	Prob Yes	Prob No	
1		3.64	4.06	3.13	4.11
2		4.20	4.59	4.00	4.41
3		3.59	4.24	4.00	4.54
4		4.27	4.76	4.19	5.07
5		3.82	3.41	2.88	4.25
6		3.20	3.94	3.31	4.61
7		4.06	4.82	4.06	4.37
8		3.66	3.94	3.63	4.81
9		2.41	2.71	2.13	2.64
10		3.75	4.29	3.88	4.61
11		4.40	4.47	4.06	4.52
12		3.82	3.81	3.31	3.74
13		4.73	4.65	4.19	4.93
14		4.64	4.94	4.31	5.15
15		3.12	2.71	2.69	2.70
16		4.55	4.13	3.47	4.74
17		3.82	3.76	3.69	4.16
18		4.50	4.88	3.94	4.62
19		3.83	4.18	4.00	4.11
20		4.20	4.24	3.63	4.74
21		4.10	4.18	3.88	4.50
22		3.84	3.88	3.56	4.54
23		2.87	2.47	2.31	3.32
24		4.34	5.18	4.69	4.60
25		2.97	4.44	3.56	3.35
26		3.96	4.47	3.13	4.43
27		4.10	4.59	3.53	3.75
28		3.52	3.63	2.93	3.70
29		1.95	2.00	1.88	2.29
30		2.05	2.29	1.56	1.92
31		4.57	4.59	3.63	4.23
32		3.31	2.88	3.06	3.60

TABLE 8-3 B

Survey Results: means classified by Department Rating.

			Dept. Rating in RAE 1996					
Q No.		5*	5	4	3a	3b	2	1
1		3.19	3.90	4.04	3.37	3.24	3.38	5.00
2		4.54	4.48	4.33	3.92	3.43	4.50	5.00
3		2.96	3.80	3.91	3.55	3.57	4.00	4.71
4		4.23	4.45	4.30	4.20	4.00	5.07	5.00
5		4.04	4.00	3.88	3.45	3.43	4.06	4.29
6		3.15	3.43	3.39	3.25	2.95	3.63	4.71
7		4.31	4.24	4.40	4.13	3.41	3.88	4.00
8		3.92	4.04	3.67	3.56	3.51	4.03	4.29
9		2.92	2.76	2.44	2.14	2.27	2.38	1.86
10		3.54	4.14	3.62	4.17	3.73	4.06	3.43
11		4.54	4.74	4.21	4.61	4.00	4.32	4.29
12		3.85	3.98	3.85	3.71	3.31	4.00	2.29
13		5.00	4.88	4.89	4.80	4.19	4.44	3.29
14		4.46	4.80	4.79	4.60	4.28	5.09	4.57
15		3.54	3.52	2.79	2.89	2.89	3.03	2.71
16		4.62	4.77	4.45	4.34	4.31	4.53	4.14
17		4.00	4.26	3.82	3.68	3.49	4.06	2.83
18		4.46	4.86	4.66	4.40	3.92	4.55	4.67
19		4.54	4.04	3.80	3.92	3.24	4.09	3.14
20		4.58	4.72	4.11	4.29	3.19	4.42	4.14
21		4.15	4.66	4.17	4.06	3.22	4.45	4.14
22		4.04	4.30	3.88	3.81	3.08	4.10	3.67
23		3.38	3.06	2.76	2.65	2.53	3.41	1.71
24		4.35	4.41	4.43	4.67	4.11	4.38	4.43
25		3.31	2.98	2.86	3.19	3.11	3.39	3.43
26		4.23	4.24	3.99	3.68	3.58	4.34	4.43
27		4.19	4.12	4.06	4.23	3.57	4.16	4.43
28		3.46	3.58	3.58	3.57	3.14	3.41	3.86
29		2.04	2.22	1.76	1.77	2.11	2.09	2.29
30		2.16	2.42	1.95	1.69	2.22	1.91	2.43
31		5.08	4.74	4.46	4.50	3.75	4.31	5.00
32		3.27	3.50	3.26	3.30	2.97	3.52	3.43

TABLE 8-3 C

Survey Results: means classified by Institution Type

Q No.		Institution Type	
		ex-UFC	ex-PCFC
1		3.80	3.33
2		4.33	4.00
3		3.61	3.95
4		4.23	4.71
5		3.71	3.99
6		3.23	3.68
7		4.30	3.68
8		3.67	4.02
9		2.51	2.26
10		3.82	3.99
11		4.40	4.42
12		3.93	3.39
13		4.82	4.43
14		4.62	4.82
15		3.04	3.02
16		4.48	4.54
17		3.86	3.77
18		4.52	4.47
19		3.88	3.79
20		4.17	4.30
21		4.10	4.18
22		3.88	3.88
23		2.76	3.06
24		4.49	4.20
25		3.10	3.18
26		3.97	3.99
27		4.07	4.13
28		3.54	3.45
29		1.87	2.19
30		2.06	2.00
31		4.60	4.21
32		3.23	3.51

TABLE 8-3 D

Survey Results: Means classified by Respondents' Post.

Q No.		Prof.	Reader	Princp lect	Sen. Lect.	lecturer
1		3.91	4.00	2.76	3.81	3.46
2		4.64	4.85	3.35	4.34	3.74
3		3.80	3.59	3.86	3.77	3.61
4		4.71	4.15	4.45	4.39	4.06
5		4.00	3.56	4.05	3.85	3.54
6		3.51	3.41	3.57	3.45	3.09
7		4.37	4.00	3.33	4.34	3.81
8		3.85	3.56	4.10	3.97	3.34
9		2.72	2.33	2.10	2.50	2.18
10		3.91	3.56	4.05	4.02	3.77
11		4.55	4.70	4.62	4.31	4.23
12		4.05	4.04	2.86	3.84	3.67
13		5.09	4.78	4.33	4.67	4.51
14		4.91	4.81	4.62	4.70	4.45
15		2.94	3.41	2.90	3.13	2.98
16		4.63	4.64	4.67	4.51	4.27
17		4.25	4.04	3.62	3.81	3.47
18		4.77	4.85	4.14	4.49	4.30
19		4.12	3.67	3.76	3.91	3.63
20		4.52	4.19	4.00	4.20	4.01
21		4.34	4.33	4.19	4.16	3.81
22		4.33	4.26	3.38	3.79	3.60
23		3.17	2.96	2.67	2.92	2.41
24		4.25	4.30	4.10	4.67	4.32
25		3.25	2.77	3.10	3.25	2.98
26		4.28	3.63	3.48	4.07	3.89
27		4.71	3.78	3.86	4.02	3.85
28		4.17	3.04	3.38	3.34	3.41
29		2.17	1.78	2.67	1.90	1.70
30		2.23	2.07	2.10	1.98	1.94
31		4.71	4.26	4.43	4.62	4.22
32		3.67	3.58	3.52	3.21	2.91

TABLE 8-3 E

Survey Results: Means classified by respondents' qualification.

Q No.		Ph.D.	Masters	Prof. Qual.	Bsc/BA
1		3.89	3.17	3.22	2.56
2		4.45	3.59	4.22	3.67
3		3.75	3.65	3.89	3.11
4		4.41	4.14	4.56	4.78
5		3.88	3.59	3.12	3.89
6		3.33	3.38	3.61	3.89
7		4.21	3.97	4.11	3.00
8		3.78	3.81	3.76	3.56
9		2.47	2.40	2.67	1.89
10		3.66	4.30	4.53	4.78
11		4.33	4.42	4.88	5.11
12		3.87	3.58	3.44	3.22
13		4.73	4.56	5.00	5.11
14		4.67	4.63	4.83	5.22
15		2.97	3.25	3.00	3.11
16		4.49	4.52	4.63	4.00
17		3.77	3.76	4.61	4.78
18		4.50	4.40	4.89	4.89
19		3.96	3.49	4.06	4.33
20		4.23	3.95	4.67	5.13
21		4.13	3.92	4.72	4.88
22		3.89	3.64	4.39	4.67
23		2.78	2.90	3.61	3.22
24		4.48	4.40	4.18	3.22
25		3.10	3.27	3.33	2.22
26		4.00	3.92	3.89	4.44
27		4.11	3.87	4.35	4.44
28		3.59	3.29	3.47	3.33
29		1.88	2.02	2.94	2.00
30		2.05	1.90	2.38	2.13
31		4.58	4.25	4.61	3.50
32		3.25	3.34	3.71	3.89

TABLE 8-3 F

Survey Results: classified by respondents' age group.

			AGE		
Q No.		under 30	30-39	40-49	over 50
1		4.17	3.53	3.67	3.72
2		3.80	4.03	4.23	4.39
3		4.33	3.65	3.70	3.76
4		4.00	4.16	4.47	4.43
5		3.00	3.89	3.76	3.77
6		3.17	3.08	3.40	3.54
7		3.60	3.79	4.27	4.22
8		4.60	3.50	3.80	3.90
9		2.33	2.24	2.40	2.63
10		5.00	3.54	3.89	4.02
11		5.00	4.22	4.50	4.39
12		3.50	3.80	3.56	3.95
13		4.83	4.59	4.66	4.86
14		5.00	4.44	4.71	4.81
15		2.50	3.01	3.00	3.11
16		4.00	4.44	4.55	4.50
17		3.17	3.47	3.81	4.17
18		5.17	4.38	4.56	4.53
19		3.83	3.39	3.87	4.21
20		4.20	3.91	4.17	4.48
21		4.25	3.71	4.18	4.38
22		3.20	3.63	3.86	4.12
23		2.00	2.83	2.80	3.00
24		4.67	4.22	4.52	4.41
25		4.00	2.78	3.08	3.34
26		3.83	4.10	3.90	4.03
27		5.17	3.99	3.82	4.35
28		4.20	3.17	3.41	3.80
29		1.33	1.97	1.86	2.11
30		2.20	1.96	1.83	2.28
31		4.33	4.37	4.55	4.51
32		3.60	3.32	3.35	3.27

TABLE 8-3 G

Q No.	LEVEL OF RESEARCH ACTIVITY			
	Quite inactive	Moderately active	Quite active	very active
1	4.59	3.96	3.17	3.58
2	5.05	4.12	3.74	4.37
3	4.27	4.03	3.60	3.49
4	4.73	4.36	4.17	4.37
5	3.82	3.30	3.26	4.27
6	4.32	3.63	2.81	3.33
7	4.86	4.25	3.71	4.11
8	4.90	3.73	3.31	3.85
9	3.05	2.09	2.14	2.68
10	5.09	4.09	3.68	3.64
11	4.86	4.16	4.16	4.57
12	4.14	3.34	3.88	3.83
13	5.41	4.13	4.41	5.06
14	4.82	4.48	4.49	4.88
15	2.95	2.83	2.88	3.23
16	4.77	4.00	4.18	4.84
17	4.50	3.59	3.55	3.99
18	4.91	4.46	4.21	4.65
19	4.86	3.58	3.50	4.05
20	4.86	3.98	3.62	4.55
21	4.82	3.80	3.56	4.50
22	4.73	3.64	3.43	4.11
23	3.73	2.28	2.51	3.19
24	4.71	4.66	4.43	4.21
25	3.57	3.36	2.96	2.99
26	4.77	3.51	3.68	4.26
27	3.77	3.82	4.08	4.31
28	3.85	3.14	3.49	3.66
29	2.09	1.79	1.83	2.11
30	1.91	1.94	1.88	2.21
31	4.29	4.24	4.28	4.78
32	3.41	3.03	3.28	3.46

TABLE 8-3 H

Survey Results: Classified by Academic Experience of respondent.

Q No.		PERCENTAGES AGREEING				
		EXPERIENCE				
		5YEARS	5to10	10 to 15	15 to 20	over 20
1		64.0	63.2	37.9	33.3	48.8
2		50.0	51.8	22.4	21.4	34.7
3		32.0	58.9	37.9	47.6	48.8
4		29.2	39.3	29.3	23.8	26.4
5		24.0	41.1	39.7	38.1	46.3
6		60.0	57.9	56.9	45.2	53.3
7		72.0	50.0	25.9	38.1	33.3
8		36.0	56.4	34.5	31.7	40.5
9		76.0	82.5	75.9	85.7	75.6
10		68.0	48.2	39.7	35.7	41.5
11		20.0	21.4	21.1	24.4	27.0
12		68.0	45.6	43.1	48.8	38.5
13		28.0	17.5	20.7	19.5	20.3
14		25.0	24.6	24.6	11.9	16.5
15		56.0	51.8	68.4	59.0	61.5
16		32.0	21.8	23.2	21.4	23.3
17		37.5	43.9	43.1	48.8	35.2
18		16.7	17.5	22.4	24.4	17.9
19		60.0	45.6	46.6	40.5	44.7
20		41.7	28.1	29.3	26.8	34.1
21		41.7	33.9	39.7	29.3	35.0
22		45.8	41.1	47.4	46.3	39.7
23		76.0	71.9	70.7	64.3	70.5
24		68.0	27.3	22.8	23.1	24.0
25		76.0	71.4	55.4	61.0	63.0
26		25.0	40.4	35.1	31.0	40.0
27		36.0	32.1	32.8	38.1	29.5
28		66.7	54.9	62.5	61.5	42.2
29		92.0	91.2	87.9	90.5	89.4
30		92.0	94.3	91.4	88.1	84.4
31		8.0	34.5	19.3	31.7	24.2
32		52.0	41.8	53.6	39.0	59.5

TABLE 8-4 A

Survey Results: classified by RAE inclusion.

Q No.		PERCENTAGES AGREEING				
		Inclusion as research active in RAE submission				
		Def Yes	Prob Yes	Prob NO	Def NO	
1		48.3	41.2	68.8	39.3	
2		35.4	23.5	43.8	29.6	
3		50.2	35.3	43.8	25.0	
4		31.6	23.5	25.0	14.8	
5		40.6	47.1	62.5	28.6	
6		59.2	43.8	50.0	21.4	
7		40.8	11.8	37.5	33.3	
8		43.9	43.8	37.5	14.8	
9		78.8	76.5	87.5	75.0	
10		46.9	35.3	43.8	21.4	
11		24.5	23.5	25.0	22.2	
12		43.3	37.5	62.5	44.4	
13		21.3	23.5	25.0	11.1	
14		21.4	17.6	18.8	7.4	
15		58.3	76.5	68.8	59.3	
16		21.6	31.3	46.7	18.5	
17		40.8	47.1	43.8	32.0	
18		20.4	11.8	31.3	11.5	
19		46.3	41.2	56.3	39.3	
20		31.7	41.2	50.0	14.8	
21		36.7	47.1	31.3	19.2	
22		44.5	47.1	50.0	20.8	
23		70.3	82.4	87.5	57.1	
24		31.1	0.0	12.5	20.0	
25		68.1	18.8	56.3	61.5	
26		38.1	17.6	56.3	25.0	
27		32.1	23.5	46.7	35.7	
28		52.6	56.3	78.6	39.1	
29		89.6	100.0	93.8	82.1	
30		87.8	82.4	100.0	96.0	
31		23.4	29.4	37.5	26.9	
32		51.1	68.8	56.3	48.0	

TABLE 8-4 B

Survey results: classified by Department RAE rating.

Q No.				PERCENTAGES AGREEING				
				DEPT RATING IN RAE 96				
		5*	5	4	3A	3B	2	1
1		53.8	40.0	37.8	61.5	62.2	50.0	28.6
2		26.9	28.0	28.4	42.2	62.2	33.3	14.3
3		73.1	44.9	43.9	49.2	45.9	40.6	28.6
4		30.8	30.6	32.1	32.3	35.1	13.3	14.3
5		30.8	38.0	40.2	50.0	43.2	37.5	28.6
6		61.5	51.0	54.9	56.9	64.9	50.0	14.3
7		38.5	28.0	32.9	40.6	59.5	43.8	42.9
8		42.3	37.5	43.2	46.0	43.2	31.3	42.9
9		61.5	70.0	80.5	87.7	75.7	87.5	85.7
10		42.3	38.0	56.1	31.3	48.6	43.8	42.9
11		11.5	20.0	29.3	20.3	34.3	22.6	28.6
12		38.5	34.7	42.7	52.3	55.6	37.5	71.4
13		11.5	20.0	15.9	18.5	33.3	25.0	57.1
14		23.1	18.0	18.8	20.0	27.8	12.5	14.3
15		46.2	46.0	71.8	65.6	56.8	54.8	71.4
16		19.2	19.1	27.5	23.0	25.0	25.0	28.6
17		38.5	28.0	37.8	47.7	48.6	41.9	66.7
18		15.4	14.0	17.1	21.5	32.4	22.6	16.7
19		15.4	38.0	51.2	43.1	67.6	46.9	71.4
20		15.4	26.0	34.6	27.7	56.8	29.0	28.6
21		30.8	24.0	35.8	32.8	62.2	32.3	42.9
22		40.0	34.0	45.1	46.9	61.1	32.3	33.3
23		53.8	64.0	79.3	70.8	77.8	59.4	100.0
24		30.8	26.5	30.0	21.9	35.1	24.1	14.3
25		61.5	67.3	75.6	61.9	62.2	48.4	57.1
26		30.8	32.0	35.4	46.2	50.0	28.1	14.3
27		30.8	28.0	33.3	32.8	45.9	25.0	28.6
28		53.8	45.8	55.3	50.0	70.3	48.3	57.1
29		88.5	86.0	95.1	90.8	89.2	93.8	71.4
30		84.0	80.0	87.8	96.8	86.5	93.8	100.0
31		7.7	22.0	27.8	22.6	36.1	34.4	0.0
32		46.2	47.9	54.3	53.1	58.3	41.9	71.4

TABLE 8-4 C

Survey Results: classified by Post.

Q No.			PERCENTAGES AGREEING			
			Classification based on Post			
		Prof	Reader	Princ. Lecturer	SL	Lecturer
1		38.5	40.7	76.2	48.1	52.4
2		23.4	23.1	65.0	31.7	45.7
3		41.5	51.9	38.1	48.1	51.2
4		23.1	30.8	25.0	31.7	33.3
5		40.0	48.1	33.3	37.5	44.4
6		50.8	48.1	47.6	53.8	61.7
7		32.3	44.4	66.7	30.8	48.1
8		38.5	48.0	28.6	34.6	54.4
9		73.8	81.5	90.5	76.0	82.9
10		41.5	55.6	38.1	38.5	49.4
11		26.2	14.8	14.3	25.7	25.9
12		32.3	37.0	76.2	40.8	51.9
13		15.4	22.2	23.8	19.4	25.6
14		17.2	14.8	14.3	18.8	26.8
15		66.7	48.1	66.7	52.9	63.8
16		18.8	20.0	19.0	23.0	30.8
17		32.3	37.0	47.6	42.2	46.9
18		12.3	7.4	23.8	23.5	24.4
19		40.0	51.9	52.4	43.3	52.4
20		26.2	33.3	38.1	33.0	34.6
21		33.8	33.3	38.1	35.9	38.8
22		32.8	40.7	61.9	42.2	50.0
23		65.6	70.4	85.7	64.4	81.7
24		36.5	33.3	28.6	21.2	28.4
25		62.5	76.9	57.1	59.0	68.8
26		26.6	51.9	47.6	36.3	38.8
27		16.9	44.4	38.1	36.5	33.8
28		31.7	75.0	61.9	57.1	55.4
29		87.7	92.6	81.0	89.4	95.1
30		84.4	81.5	90.5	90.2	91.3
31		20.6	44.4	23.8	20.0	28.4
32		43.8	38.5	47.6	55.4	62.5

TABLE 8-4 D

Survey Results: classified by Qualification

Q No.		PERCENTAGES AGREEING				
		Classification based on Qualification				
		Ph.D.	Masters	Prof.	BSc/BA	
1		43.3	60.3	61.1	66.7	
2		28.0	54.0	44.4	44.4	
3		44.9	54.0	33.3	77.8	
4		27.5	36.5	27.8	22.2	
5		38.6	44.4	52.9	55.6	
6		56.5	52.4	44.4	33.3	
7		37.7	38.7	44.4	55.6	
8		41.5	37.1	41.2	44.4	
9		77.2	81.0	72.2	100.0	
10		48.8	36.5	11.8	33.3	
11		25.8	24.2	5.9	11.1	
12		41.1	51.6	55.6	55.6	
13		21.9	19.4	11.1	11.1	
14		20.4	19.0	16.7	11.1	
15		62.6	54.1	50.0	66.7	
16		23.2	21.0	25.0	44.4	
17		42.3	41.9	22.2	22.2	
18		20.6	19.4	11.1	11.1	
19		43.7	55.6	44.4	33.3	
20		31.6	38.7	16.7	12.5	
21		36.3	39.3	16.7	25.0	
22		44.1	49.2	22.2	11.1	
23		73.4	63.5	55.6	77.8	
24		26.5	28.3	29.4	55.6	
25		66.2	55.0	61.1	77.8	
26		35.2	41.3	38.9	33.3	
27		32.2	39.7	17.6	11.1	
28		48.8	64.4	60.0	66.7	
29		90.7	93.7	61.1	100.0	
30		88.8	91.9	81.3	75.0	
31		22.7	31.1	11.1	62.5	
32		53.1	49.2	52.9	33.3	

TABLE 8-4 E

Survey Results: classified by age groups.

Q No.			PERCENTAGES AGREEING		
			Classification based on Age		
		under 30	30 to 39	40 to 49	over 50
1		33.3	50.7	48.6	47.8
2		60.0	36.5	34.3	33.3
3		33.3	51.4	44.0	47.8
4		40.0	36.5	25.9	27.2
5		66.7	33.8	40.4	45.2
6		33.3	62.7	52.3	51.8
7		40.0	49.3	35.8	34.8
8		20.0	50.0	37.4	38.6
9		83.3	84.0	78.9	73.9
10		16.7	55.4	42.2	39.1
11		0.0	24.3	22.4	26.3
12		66.7	42.7	51.9	37.7
13		16.7	26.7	18.5	18.3
14		16.7	23.3	18.5	18.4
15		66.7	60.8	61.7	58.0
16		33.3	26.0	20.8	23.9
17		66.7	48.6	41.7	32.5
18		16.7	23.0	16.7	20.0
19		33.3	60.0	44.0	39.1
20		20.0	37.3	32.4	27.8
21		50.0	42.7	35.2	30.4
22		40.0	45.2	44.4	39.8
23		100.0	69.3	73.4	66.7
24		33.3	32.9	28.0	24.3
25		50.0	74.3	62.0	59.6
26		50.0	32.9	38.5	36.6
27		0.0	33.8	38.5	27.2
28		40.0	62.3	53.3	47.6
29		100.0	89.3	90.8	88.7
30		80.0	93.2	92.6	82.3
31		33.3	24.0	24.3	25.5
32		60.0	50.7	51.9	51.8

TABLE 8-4 F

Survey Results: classified by self-assessed level of Research Activity.

Q No.			PERCENTAGES AGREEING				
			Classification based on Research activity				
			Quite inactive	Moderately active	Quite active	Very active	
1			18.2	47.8	57.7	50.4	
2			13.6	36.4	48.1	31.3	
3			40.9	43.3	47.4	50.8	
4			22.7	28.8	31.2	30.5	
5			40.9	50.7	56.4	28.8	
6			36.4	43.3	67.5	57.1	
7			13.6	35.8	47.4	40.9	
8			19.0	41.8	50.6	39.2	
9			68.2	86.6	84.6	72.2	
10			22.7	35.8	47.4	50.8	
11			22.7	23.9	29.9	21.4	
12			36.4	55.2	39.0	44.4	
13			4.5	31.3	28.2	13.5	
14			18.2	21.2	23.7	16.7	
15			63.6	66.2	63.6	55.0	
16			18.2	31.3	32.9	15.4	
17			27.3	45.3	48.7	36.8	
18			18.2	20.0	24.4	17.3	
19			22.7	58.2	51.3	42.1	
20			18.2	37.9	44.2	24.8	
21			18.2	42.4	49.4	28.0	
22			18.2	50.0	57.9	35.6	
23			45.5	86.6	79.2	61.7	
24			14.3	17.9	26.7	36.2	
25			42.9	59.1	66.2	69.8	
26			22.7	49.2	48.7	26.5	
27			31.8	32.8	38.2	27.8	
28			45.0	63.5	56.2	47.2	
29			95.5	92.5	92.3	87.2	
30			95.5	92.5	90.8	84.6	
31			38.1	25.4	30.3	19.4	
32			54.5	59.7	53.3	46.2	

TABLE 8-4 G

MCNAY COMPARISON: SIGNIFICANCE OF DIFFERENCE IN MEAN

Q No.	Questionnaire Statement	Survey			McNay Study			confidence	
		No. of responses	Mean	SD	No. of responses	Mean	SD	interval 5%	Mean difference
1	I now spend more time on research than 6 years ago	305	3.67	1.83	375	3.5	1.78	0.2732008	0.17
3	I now spend less time in teaching preparation than 6 years ago	304	3.72	1.63	372	3.5	1.7	0.2518323	0.22
5	I now give less time than 6 years ago to "voluntary" academic activities-e.g. referring for journals	304	3.78	1.74	363	4.02	1.64	0.2583082	-0.24
6	I now give less time to activities given no or low recognition by RAE	304	3.37	1.66	356	3.82	1.58	0.2485171	-0.45 Significant
7	The RAE has had a positive effect on my research output	304	4.12	1.6	369	3.08	1.62	0.2442796	1.04 Significant
9	I am feeling more pressure to publish	305	2.45	1.61	374	3.85	1.85	0.2603907	-1.4 Significant
10	I now (try to) collaborate more with researchers overseas to demonstrate international excellence	304	3.87	1.53	368	3.86	1.67	0.2422711	0.01
11	I now collaborate less (in research) with academics from other English universities	301	4.4	1.41	366	4.68	1.38	0.212985	-0.28 Significant
13	Perceived research preferences of RAE panels have affected my choice of research topic	304	4.72	1.5	372	4.96	1.32	0.215468	-0.24 Significant
14	The balance of my research has moved away from the applied end of the spectrum towards more basic pure research	301	4.69	1.39	356	4.63	1.24	0.203104	0.06
16	I now do less inter-disciplinary research than 6 years ago	294	4.49	1.33	365	4.63	1.24	0.1982341	-0.14
17	Because of RAE time scales I have published some outputs at an earlier stage than I would prefer	302	3.85	1.65	372	4.44	1.55	0.2438073	-0.59 Significant
20	Because of the RAE time -scales I have avoided some research topics or projects because they would have taken a long time to complete.	303	4.22	1.67	368	4.38	1.58	0.2478295	-0.16
21	Because of RAE time scales I have avoided some research projects because they were speculative in nature (more risky in relation to security of output)	302	4.14	1.73	365	4.61	1.48	0.2472349	-0.47 Significant
23	The RAE has increased my stress level	304	2.87	1.67	375	3.09	1.63	0.2499217	-0.22
24	The RAE has improved the quality of research conducted in universities	297	4.41	1.46	353	4.2	1.45	0.2246163	0.21
26	I now spend less time on consultancy work (including external lecturing) to concentrate on research	300	3.99	1.51	371	3.89	1.71	0.2438763	0.1

Table 8-5

Q No.	Statement	MCNAY					
		Percentage agreeing ex UGC ex PCFC		Percentage agreeing ex UGC ex PCFC		Diff UGC	Diff PCFC
1	I now spend more time on research than 6 years ago	44.9	57.6	44.3	56.7	0.6	0.9
3	I now spend less time in teaching preparation than 6 years ago	49.5	42.4	46.4	38.6	3.1	3.8
5	I now give less time than 6 years ago to "voluntary" academic activities-e.g. referring for journals	41.9	37.6	32.2	40.6	Sig	-3.0
6	I now give less time to activities given no or low recognition by RAE	57.7	47.1	46.2	40.3	Sig	6.8 Sig
7	The RAE has had a positive effect on my research output	33.8	51.2	63.8	64.1	Sig	-12.9 Sig
9	I am feeling more pressure to publish	75.9	84.7	40.7	42.7	Sig	42.0 Sig
10	I now (try to) collaborate more with researchers overseas to demonstrate international excellence	45.1	41.2	43.9	42.2	1.2	-1.0
11	I now collaborate less (in research) with academics from other English universities	24.3	22.9	20.1	13.6	4.2	9.3 Sig
13	Perceived research preferences of RAE panels have affected my choice of research topic	18.1	27.4	13.7	13.1	4.4	14.3 Sig
14	The balance of my research has moved away from the applied end of the spectrum towards more basic pure research	21.6	15.5	21.5	15.9	0.1	-0.4
16	I now do less inter-disciplinary research than 6 years ago	23.7	22.9	21	15.2	2.7	7.7 Sig
17	Because of RAE time scales I have published some outputs at an earlier stage than I would prefer.	38.6	47.0	25.7	22	Sig	25.0 Sig
20	Because of the RAE time -scales I have avoided some research topics or projects because they would have taken a long time to complete	32.6	31.0	26.1	23.4	6.5	7.6 Sig
21	Because of the RAE time -scales I have avoided some research projects because they were speculative in nature (more risky in relation to security of output)	35.3	37.3	21.6	17.6	Sig	19.7 Sig
23	The RAE has increased my stress level	72.6	65.9	65.5	62.8	Sig	3.1
24	The RAE has improved the quality of research conducted in universities	26.4	32.1	30.5	40.3	-4.1	-8.2 Sig
26	I now spend less time on consultancy work (including external lecturing) to concentrate on research	37.3	36.9	41.9	44.9	-4.6	-8.0 Sig

Summary Results for Measures of Association.

Question	UoA^	Exp.	Yrs-In-Post	Inclusion-	Dept Rating	Inst type-	POST	Ph.D.-	Age	Res. Activi
1	A	P	P			A		P		N
2	A	P					N	P		A
3	A			P						N
4	A	P				P	N			
5						A				P
6	A			P		P				N
7	A	P	P		N	N	A	A		A
8				P						A
9			P							A
10				P				N		N
11										
12						N				
13					N	N	N			P
14		P					N			P
15					A					
16										P
17	A		P				N		P	A
18					N		N			
19	A		P		A				P	A
20			P		N				P	A
21		A	P	A	N		N		P	
22				A	N		N		P	A
23					A	P	N	A		A
24	A	P	P							
25	A							A	P	N
26										A
27				N			N			P
28		P					N		P	
29						P	N			
30										
31		A		N	N	N	A	P		P
32	A	N					N			
Research Fixation	N						N			A
Academic Freedom			P		N		N*		P	A
Research Smoothing	A				N		N			A
Time-Cycle			P		N		N		P	A
Mobility		P					N		P	
Gaming			P		N		N		P	A
Significance level is 5%										
A = Asscoiation		^ = nominal								
P = positive monotone		~ = dichotomous								
N = Negative monotone		all else is ordinal								
* = Significant at 5.3%										
BLANK=no significant association										

TABLE 8-7

Measures of Association for Gaming variable

Variable	Pearson	LR	Lambda	G&K Tau	Unc. Coef	Somers	Phi	Cramer	Cont. Coef	Tau-B	Gamma	Spearman Cor.
UoA	17.08	17.738	0.019	0.025	0.027	0.034	0.254	0.147	0.246	0.037	0.049	0.044
Experience	6.798	6.853	0.03	0.012	0.01	0.069	0.155	0.09	0.153	0.07	0.099	0.087
years-in-post	5.855	5.9	0	0.009	0.008	0.107*	0.144	0.102	0.143	0.105*	0.155*	(0.119)*
RAE subm.	1.576	1.961	0	0.001	0.003	0.061	0.075	0.075	0.075	0.035	0.09	0.037
Dept. rating	23.396	23.975	0.061	0.035*	0.034	(0.109)*	0.291	0.168	0.28	(0.119)*	(0.157)*	(0.146)*
Inst. Type	1.742	1.829	0	0.001	0.003	-0.009	0.079	0.079	0.079	-0.007	-0.013	-0.008
Post	11.211	11.512	0.042	0.018	0.017	(0.0132)*	0.201	0.116	0.197	(0.137)*	(0.190)*	(0.162)*
PhD	2.208	2.23	0	0.004	0.003	-0.064	0.088	0.088	0.088	-0.05	-0.093	-0.054
Age	9.627	9.228	0.012	0.011	0.013	0.124*	0.185	0.131	0.182	0.121*	0.179*	(0.138)*
Research Activity	22.254*	23.326*	0.024	0.029*	0.033*	0.054	0.281*	0.0162*	0.270*	0.053	0.077	0.062
Research Fixation	140.288*	121.19*	0.178*	0.149*	0.176*	0.487*	0.713*	0.412*	0.581*	0.502*	0.668*	0.565*
Academic Freedom	585.570*	474.263*	0.789*	0.682*	0.673*	0.899*	1.441*	0.832*	0.822*	0.9*	0.991*	0.926*
Smoothing	273.59*	286.794*	0.458*	0.375*	0.407*	0.743*	0.985*	0.569*	0.702*	0.758*	0.918*	0.825*
Time cycle	433.575*	444.093*	0.590*	0.558*	0.630*	0.850*	1.24*	0.716*	0.778*	0.871*	0.993*	0.915*
Mobility	21.414*	22.911*	0	0.037*	0.034*	0.18*	0.281*	0.162*	0.270*	0.173*	0.263*	0.194*
	*	Significant at 5% level.										

TABLE 8-8

Variable	Pearson	LR	Lambda	G&K Tau	Unc. Coef	Somers	Phi	Cramer	Cont. Coef	Tau-B	Gamma	Spearman Cor.
UoA	16.396	16.913	0.117	0.029	0.028	-0.077	0.246	0.142	0.239	-0.089	-0.121	-0.109
Experience	12.581	14.765	0.018	0.012	0.023	0.107*	0.209	0.12	0.204	0.114*	0.169*	0.129*
years-in-post	11.853	13.013*	0	0.01	0.020*	0.099	0.203	0.143	0.198	0.1	0.155	0.112
RAE subm.	1.67	1.797	0	0.002	0.003	-0.061	0.075	0.075	0.075	-0.037	-0.099	-0.039
Dept. rating	21.145	20.747	0.068	0.021	0.033	-0.047	0.273	0.158	0.263	-0.053	-0.074	-0.065
Inst. Type	1.52	1.554	0	0.003	0.002	0.029	0.073	0.073	0.073	0.023	0.045	0.024
Post	20.032	21.767*	0.019	0.02	0.035*	(0.090)*	0.266	0.154	0.257	(0.097)*	(0.141)*	(0.114)*
PhD	1.364	1.361	0.018	0.002	0.002	0.011	0.069	0.069	0.069	0.009	0.017	0.009
Age	5.139	5.135	0	0.005	0.008	0.1*	0.133	0.094	0.132	0.102*	0.158*	0.115*
Research Activity	13.206	13.648	0.012	0.015	0.021	0.032	0.214	0.123	0.209	0.033	0.05	0.039
Research Fixation	24.668*	25.508*	0.063	0.021*	0.041*	0.190*	0.297*	0.172*	0.285*	0.203*	0.296*	0.231*
Academic Freedom	26.115*	28.556*	0.019	0.023*	0.045*	0.151*	0.305*	0.176*	0.292*	0.158*	0.233*	0.178*
Smoothing	16.314	17.294*	0.068	0.02	0.027*	0.158*	0.24	0.138	0.233	0.168*	0.250*	0.191*
Time cycle	18.783*	19.198*	0.056	0.019	0.030*	0.149*	0.258*	0.149*	0.249*	0.159*	0.235*	0.181*
	*	Significant at 5% level.										

TABLE 8-9

Measures of Association for Time Cycle variable.

Variable	Pearson	LR	Lambda	G&K Tau	Unc. Coef	Somers	Phi	Cramer	Cont. Coef	Tau-B	Gamma	Spearman Cor.
UoA	28.52	30.44	0.017	0.034	0.041	0.022	0.319	0.184	0.304	0.024	0.03	0.026
Experience	7.907	7.961	0.016	0.011	0.01	0.056	0.163	0.094	0.161	0.056	0.077	0.065
years-in-post	9.728	9.96	0	0.013	0.013	0.130*	0.181	0.128	0.178	0.124*	0.179*	0.143*
RAE subm.	2.196	2.201	0	0.002	0.002	0.061	0.086	0.086	0.086	0.035	0.084	0.038
Dept. rating	24.644	24.327	0.039	0.031*	0.031	(0.115)*	0.29	0.167	0.279	(0.121)*	(0.158)*	(0.149)*
Inst. Type	0.104	0.104	0	0	0	0.008	0.019	0.019	0.019	0.006	0.011	0.006
Post	14.605	14.549	0.022	0.18	0.019	(0.103)*	0.223	0.129	0.218	(0.105)*	(0.142)*	(0.126)*
PhD	1.673	1.679	0	0.002	0.002	-0.007	0.075	0.075	0.075	-0.005	-0.1	-0.006
Age	9.972	10.108	0.022	0.014	0.013	0.138*	0.183	0.129	0.18	0.132*	0.189*	0.153*
Research Activity	21.932*	22.601*	0.011	0.026*	0.028*	0.033	0.271*	0.157*	0.262*	0.033	0.046	0.041
Research Fixation	100.415*	95.42*	0.180*	0.113*	0.125*	0.429*	0.594*	0.343*	0.510*	0.431*	0.570*	0.499*
Academic Freedom	427.28*	446.61*	0.593*	0.510*	0.570*	0.888*	1.205*	0.696*	0.770*	0.868*	0.987*	0.917*
Smoothing	360.278*	374.282*	0.538*	0.434*	0.472*	0.814*	1.100*	0.635*	0.740*	0.811*	0.945*	0.873*
	*	Significant at 5% level.										

TABLE 8-10

Variable	Pearson	LR	Lambda	G&K Tau	Unc. Coe	Somers	Phi	Cramer	Cont. Coe	Tau-B	Gamma	Spearman Cor.
UoA	33.919*	31.153*	0.062	0.038	0.042	0.029	0.347*	0.201*	0.328*	0.032	0.04	0.04
Experience	7.138	7.008	0.005	0.008	0.009	0.042	0.155	0.089	0.153	0.042	0.058	0.049
years-in-post	6.06	6.248	0	0.007	0.008	0.099	0.142	0.101	0.141	0.095	0.138	0.109
RAE subm.	2.471	2.607	0.005	0.002	0.003	-0.004	0.092	0.092	0.091	-0.002	-0.005	-0.002
Dept. rating	18.848	19.452	0.044	0.024	0.025	(0.106)*	0.253	0.146	0.245	(0.112)*	(0.147)*	(0.138)*
Inst. Type	1.034	1.028	0	0.001	0.001	-0.031	0.059	0.059	0.059	-0.023	-0.042	-0.025
Post	12.26	12.161	0.005	0.016	0.016	(0.120)*	0.204	0.118	0.2	(0.122)*	(0.166)*	(0.145)*
PhD	1.086	1.135	0	0.001	0.001	-0.039	0.06	0.06	0.06	-0.03	-0.055	-0.032
Age	5.359	5.193	0	0.005	0.007	0.092	0.134	0.095	0.133	0.088	0.128	0.101
Research Activity	21.937*	22.086*	0.022	0.025*	0.028*	0.046	0.271*	0.156*	0.261*	0.045	0.064	0.057
Research Fixation	85.199*	83.288*	0.122*	0.094*	0.110*	0.375*	0.546*	0.315*	0.479*	0.378*	0.504*	0.436*
Academic Freedom	238.882*	254.502*	0.408*	0.294*	0.328*	0.724*	0.901*	0.520*	0.670*	0.709*	0.874*	0.782*
	*	Significant at 5% level.										

TABLE 8-11

Measures of Association for Academic Freedom variable

Variable	Pearson	LR	Lambda	G&K Tau	Unc. Coe	Somers	Phi	Cramer	Cont. Coe	Tau-B	Gamma	Spearman Cor.
UoA	19.725	21.439	0.019	0.026	0.031	0.008	0.267	0.154	0.258	0.009	0.011	0.009
Experience	7.707	7.682	0.012	0.012	0.01	0.063	0.162	0.093	0.16	0.064	0.091	0.075
years-in-post	8.686	8.806	0	0.013	0.012	0.145*	0.172	0.121	0.169	0.141*	0.209*	0.162*
RAE subm.	4.911	8.341	0	0.003	0.011*	0.051	0.129	0.129	0.128	0.029	0.075	0.032
Dept. rating	29.915*	28.8*	0.06	0.039*	0.039*	(0.120)*	0.321*	0.185*	0.305*	(0.130)*	(0.173)*	(0.161)*
Inst. Type	4.275	4.3	0	0.006	0.006	-0.038	0.121	0.121	0.12	-0.029	-0.054	-0.031
Post	9.046	9.046	0	0.013	0.012	(0.093)**	0.177	0.102	0.174	(0.097)**	(0.134)**	(0.114)**
PhD	0.256	0.259	0	0	0	-0.019	0.029	0.029	0.029	-0.015	-0.028	-0.016
Age	9.653	9.45	0	0.013	0.013	0.144*	0.181	0.128	0.178	0.140*	0.207*	0.160*
Research Activity	25.554*	26.897*	0.03	0.033*	0.036*	0.077	0.294*	0.170*	0.282*	0.077	0.11	0.091
Research Fixation	110.177*	97.212*	0.140*	0.115*	0.136*	0.436*	0.624*	0.360*	0.529*	0.449*	0.603*	0.512*
	*	Significant at 5% level.										
	**	Significant at 5.3% level										

TABLE 8-12

Measures of Association for Research Fixation variable.

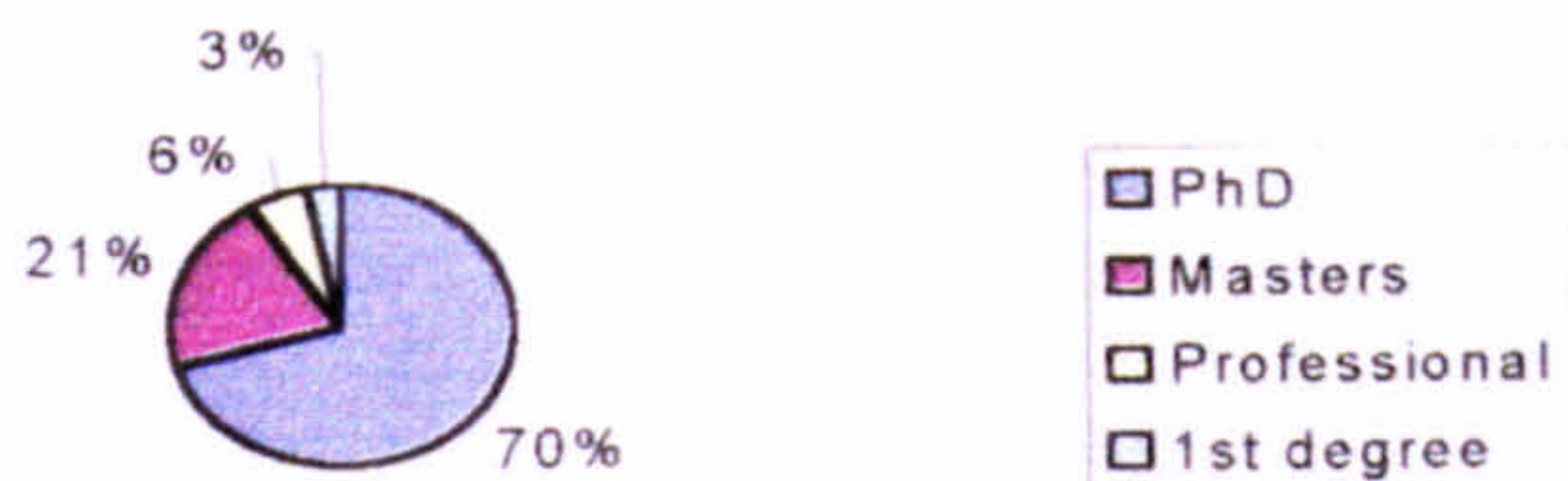
Variable	Pearson	LR	Lambda	G&K Tau	Unc. Coef	Somers	Phi	Cramer	Cont. Coef	Tau-B	Gamma	Spearman Cor.
UoA	19.623	20.272	0.084	0.024	0.028	(0.089)*	0.268	0.155	0.259	(0.096)*	(0.121)*	(0.121)*
Experience	8.281	9.027	0.015	0.007	0.012	0.032	0.169	0.098	0.167	0.032	0.044	0.037
years-in-post	5.199	5.52	0.03	0.005	0.007	0.044	0.134	0.095	0.133	0.042	0.06	0.048
RAE subm.	5.351	5.255	0.04	0.006	0.007	0.173	0.137	0.137	0.135	0.101	0.237	0.11
Dept. rating	24.397	25.469*	0.07	0.027	0.033*	-0.05	0.293	0.169	0.281	-0.053	-0.068	-0.064
Inst. Type	1.667	1.649	0.025	0.002	0.002	0.086	0.076	0.076	0.076	0.064	0.117	0.069
Post	14.189	14.196	0.071	0.017	0.019	(0.112)*	0.223	0.1219	0.218	(0.113)*	(0.152)*	(0.134)*
PhD	2.293	2.243	0.005	0.002	0.003	0.08	0.089	0.089	0.089	0.061	0.109	0.067
Age	2.254	2.233	0.015	0.003	0.003	0.045	0.088	0.062	0.088	0.043	0.061	0.049
Research Activity	29.119*	31.669*	0.9	0.032*	0.041*	-0.002	0.0317*	0.183*	0.302*	-0.002	-0.003	-0.002
	*	Significant at 5% level.										

TABLE 8-13

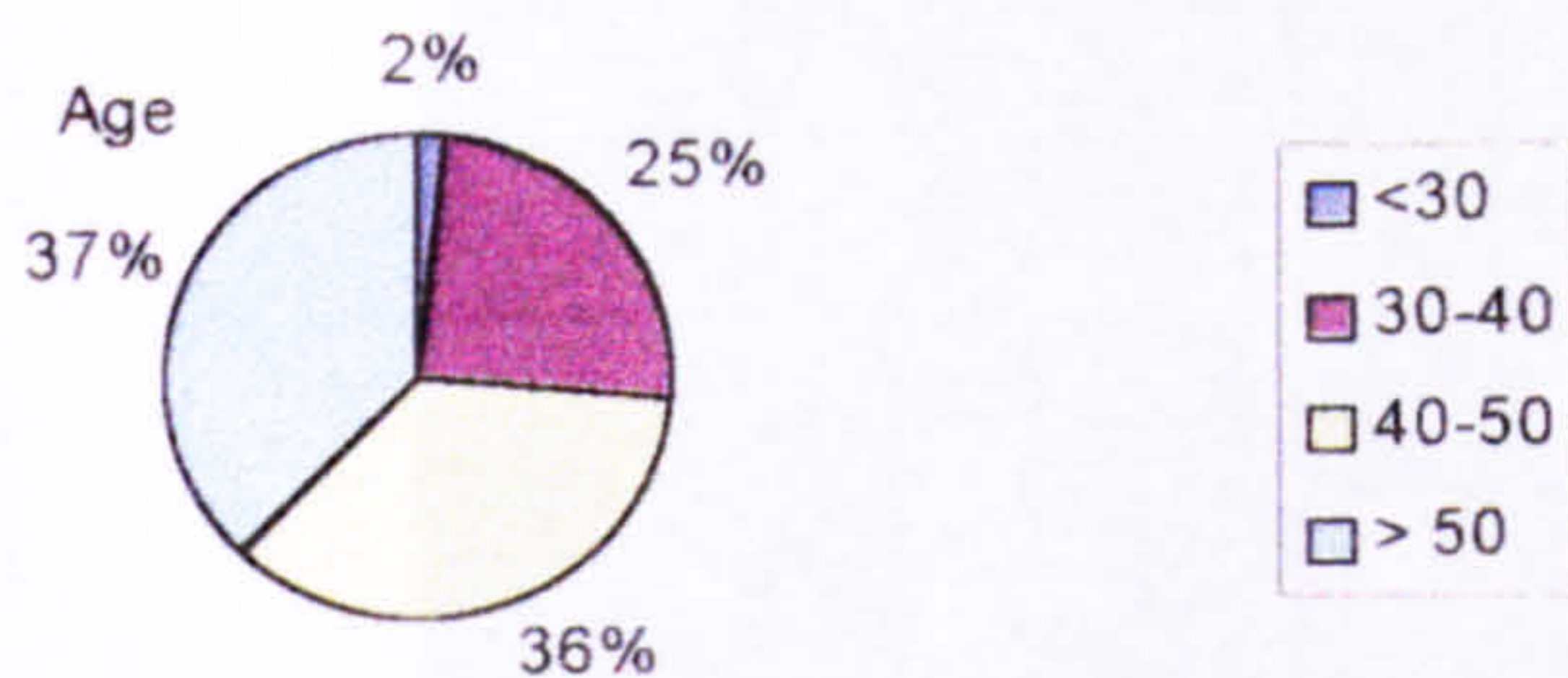
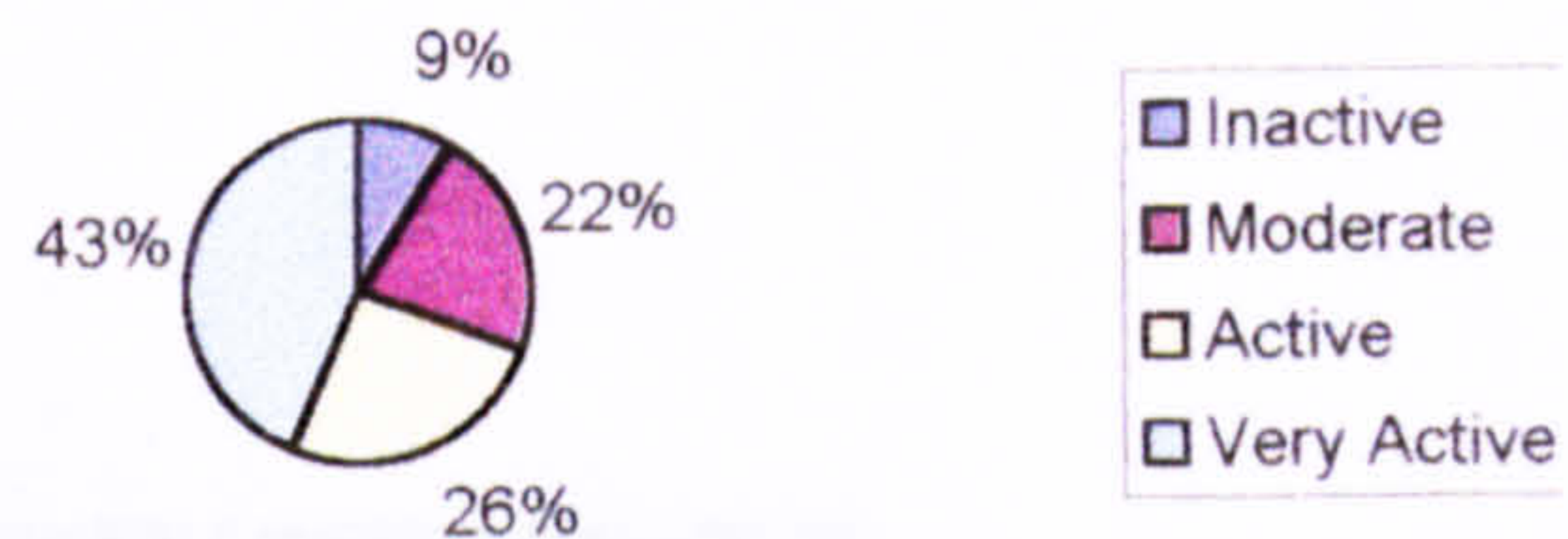
INDEX OF CHARTS:

- Pie Charts of Profile of Respondents.
- FIGURE 8-1: Survey responses means.
- FIGURE 8-2: Comparison of proportion agreeing between institution type.
- FIGURE 8-3: Comparison of proportion agreeing classified by age.
- FIGURE 8-4: Comparison of proportion agreeing classified by research activity.
- FIGURE 8-5: Means classified by Institution type.
- FIGURE 8-6: Means classified by age.
- FIGURE 8-7: Means classified by research activity.
- FIGURE 8-8: Means classified by post.
- FIGURE 8-9: Means classified by department rating.
- FIGURE 8-10: McNay comparison: proportion agreeing in ex-UGC sector.
- FIGURE 8-11: McNay comparison: proportion agreeing in ex-PCFC sector

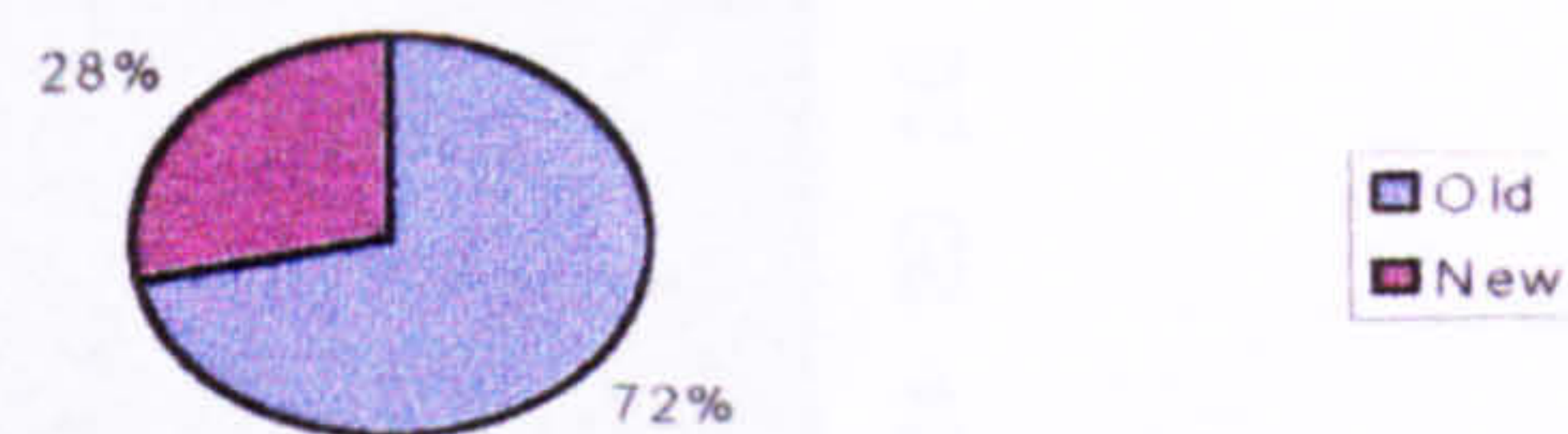
Qualification



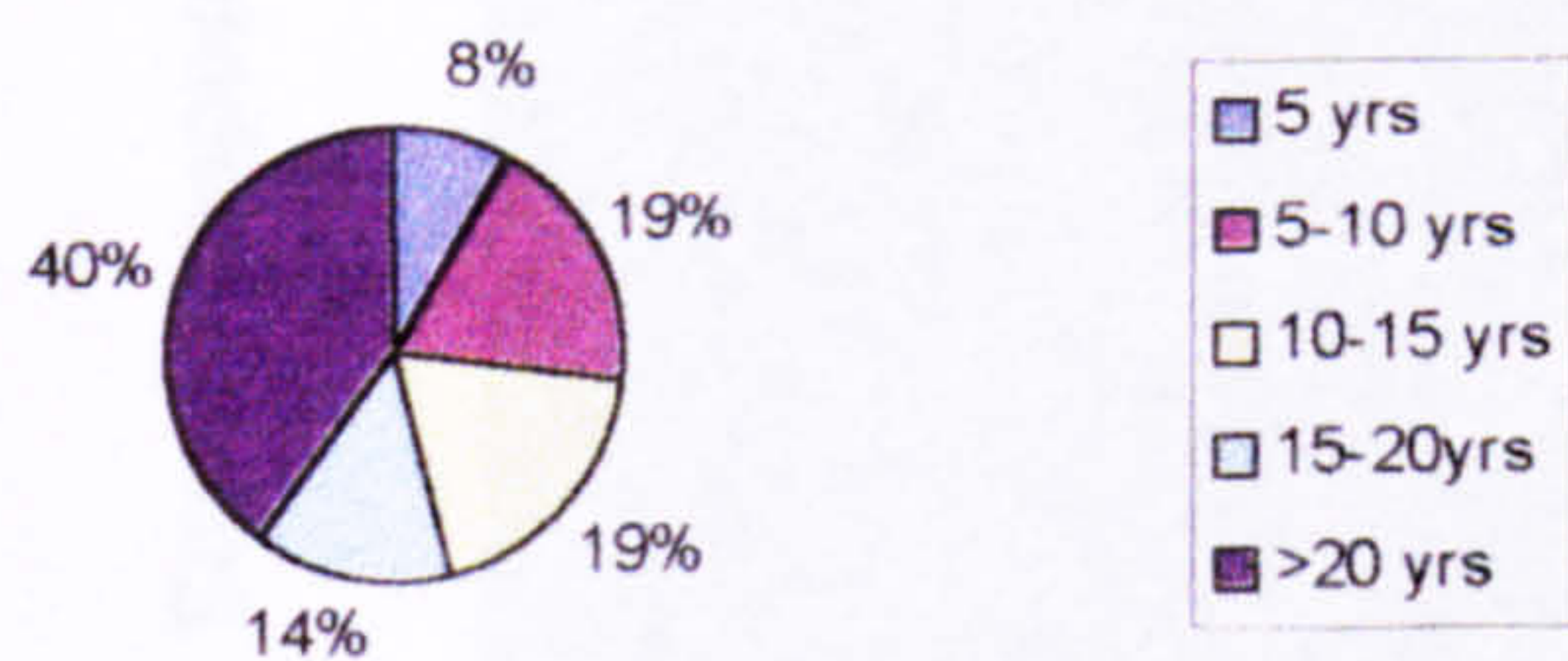
Research Activity



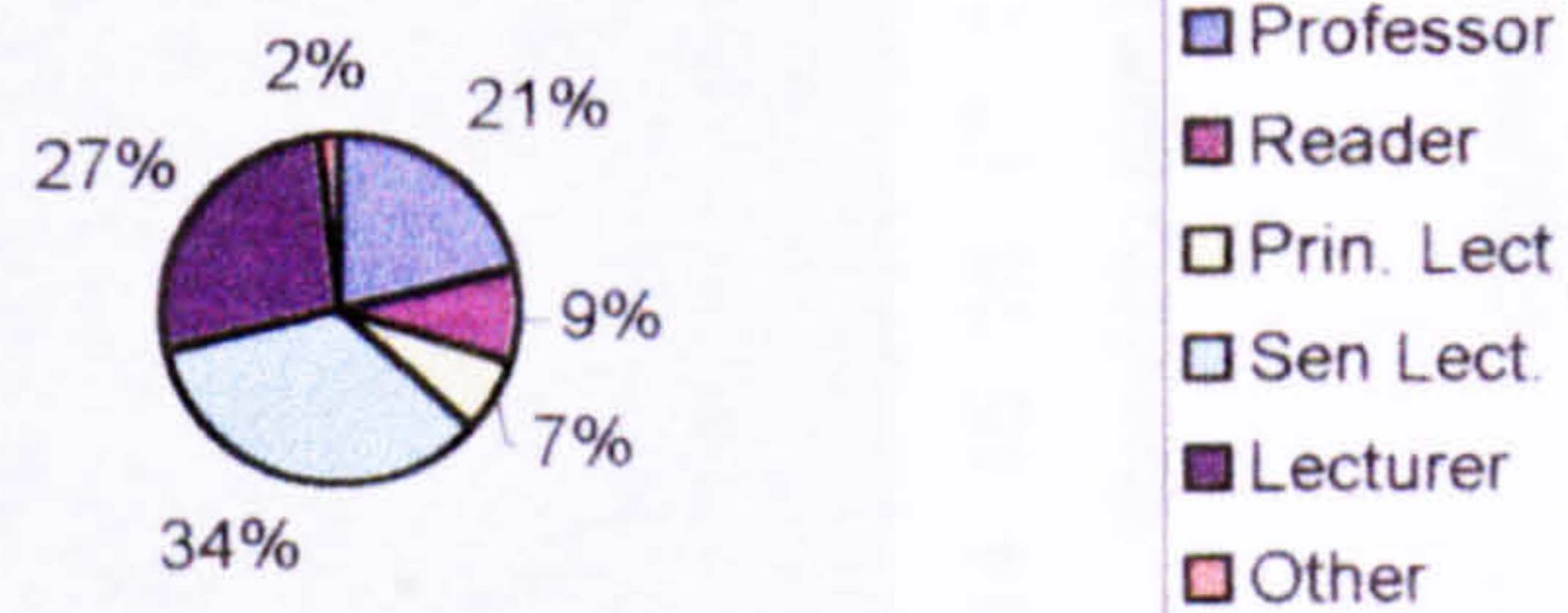
Type of Institution



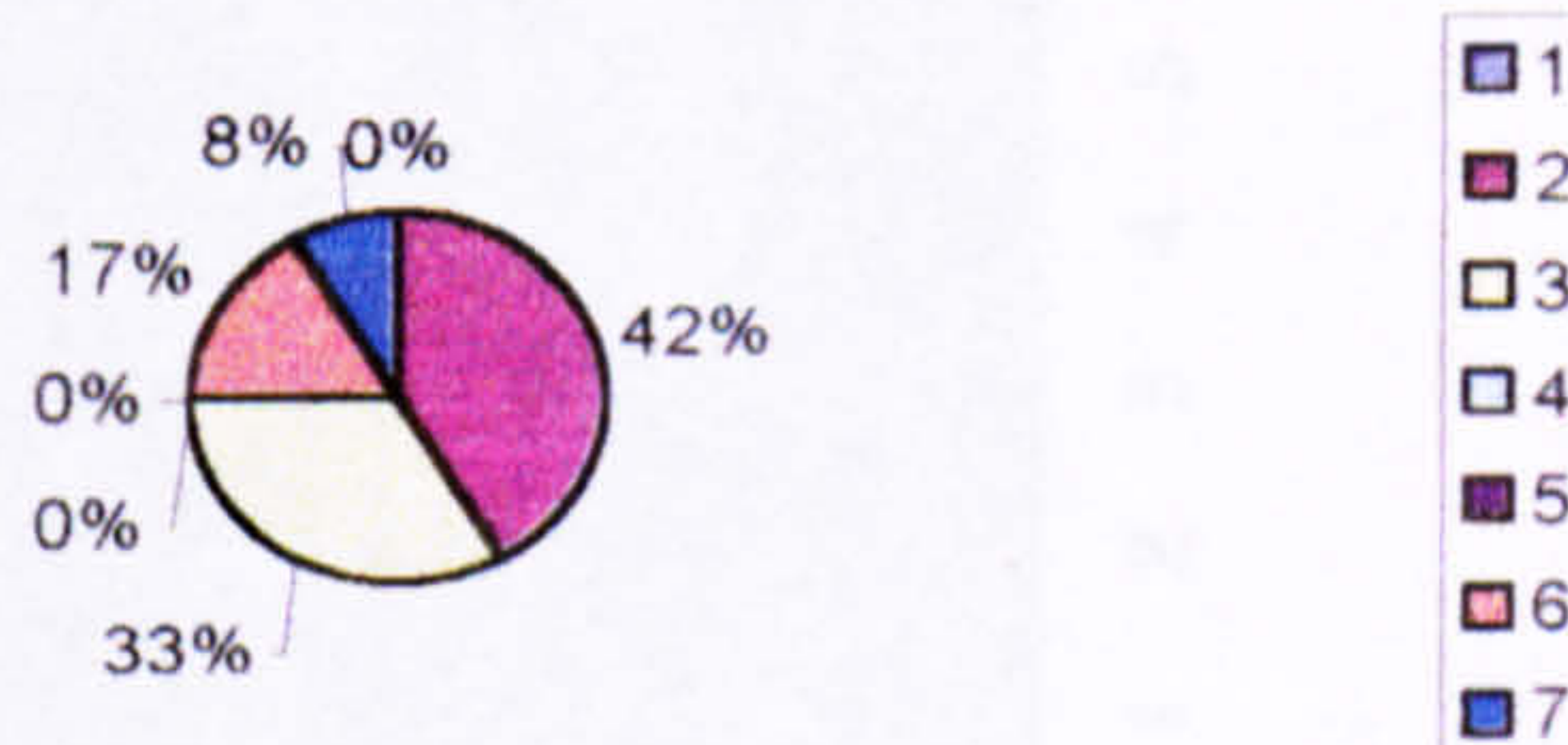
Experience



Post



Dept rating



PROFILE OF RESPONDENTS

Survey responses means

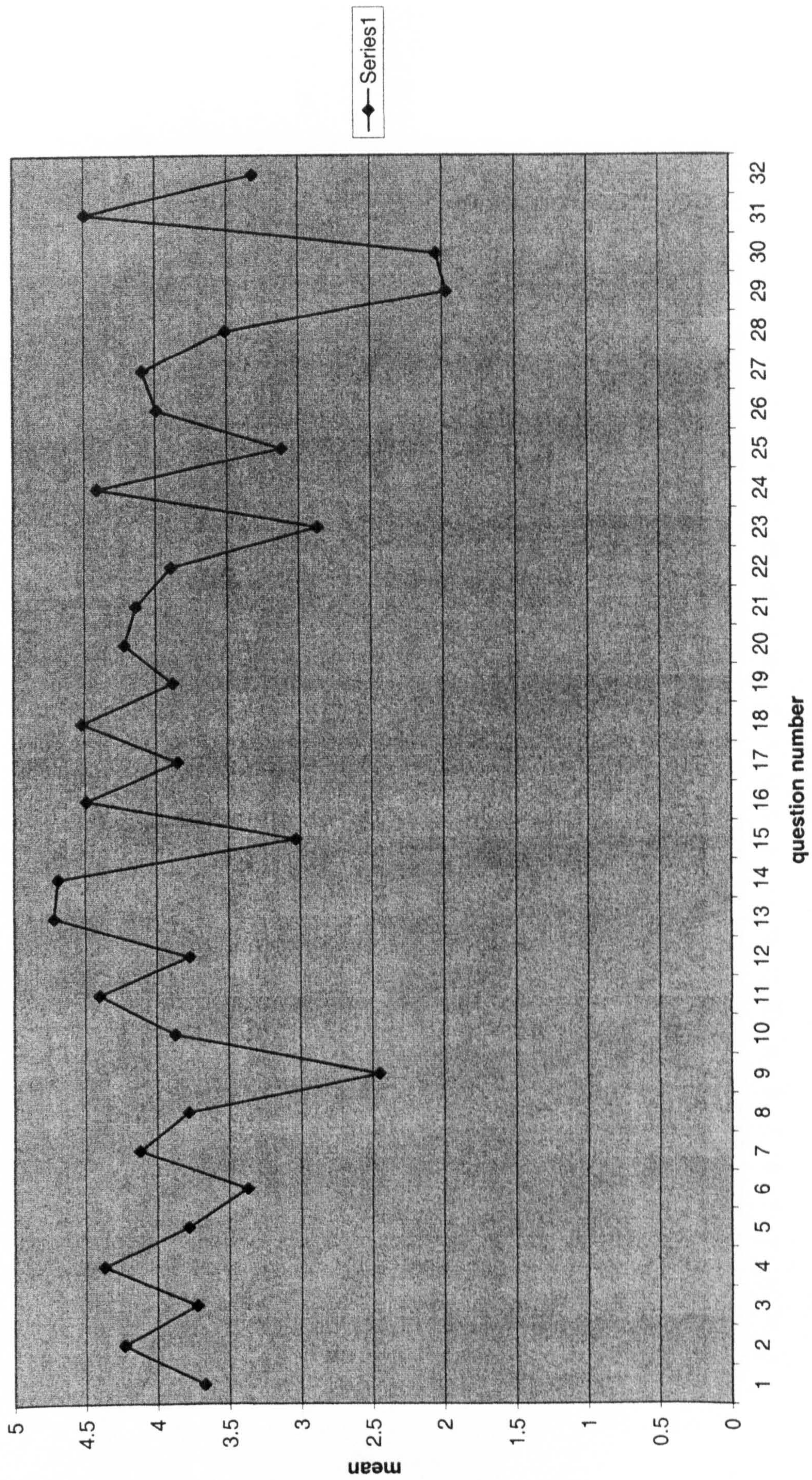


FIGURE 8-1

Comparison between ex UFC and ex-PCFC

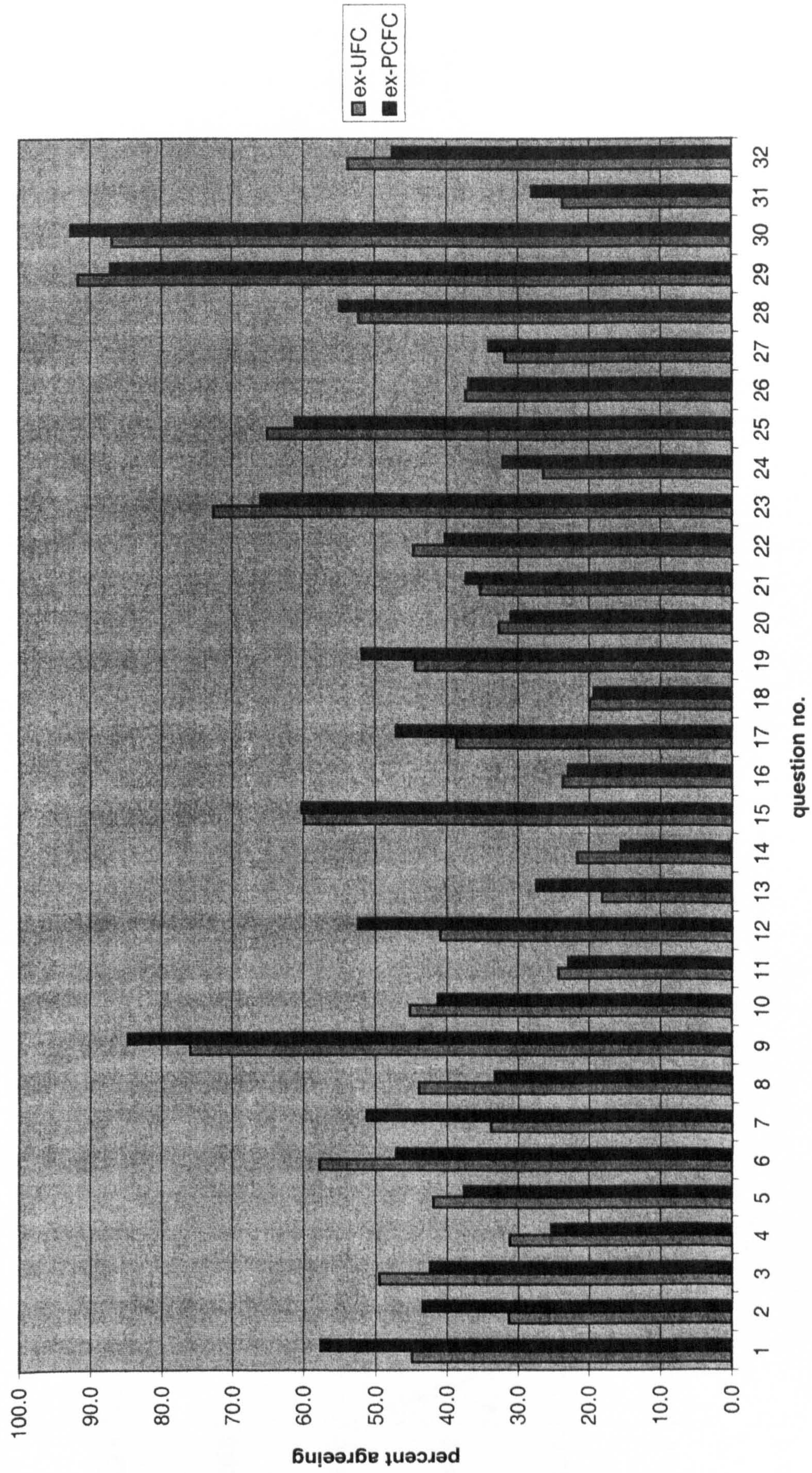


FIGURE 8-2

Age classification

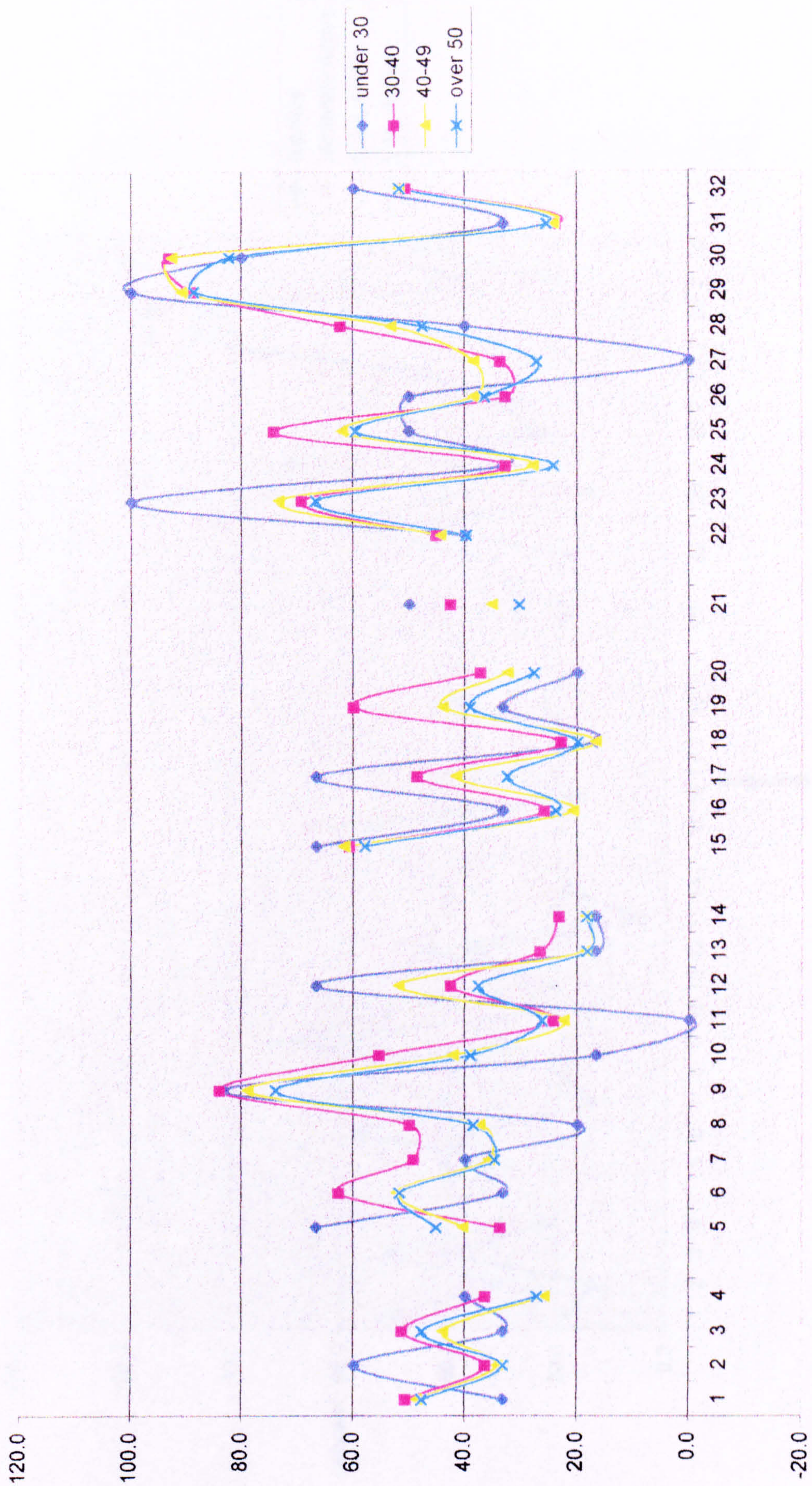


FIGURE 8-3

Percentages agreeing by Research Activity Level

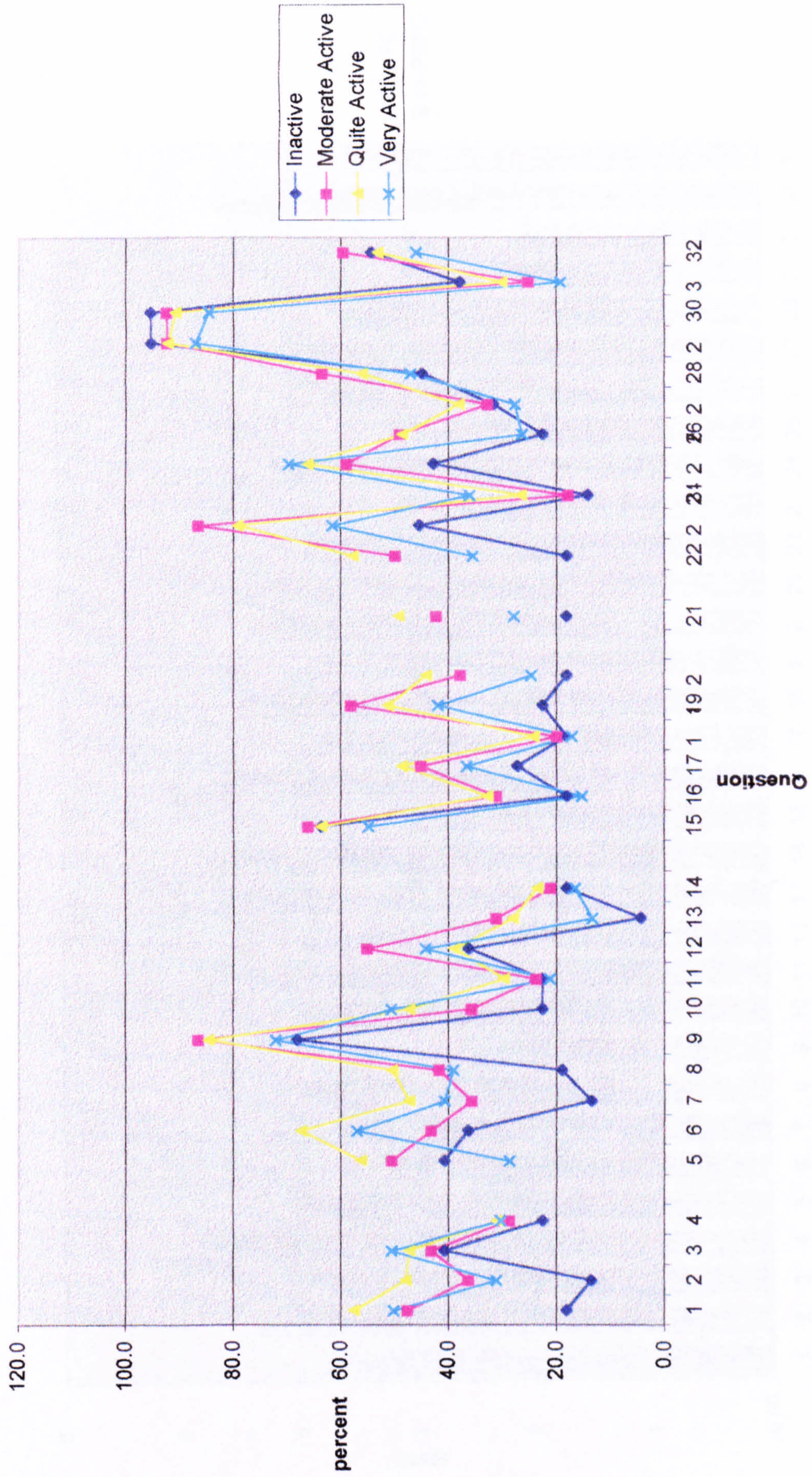


FIGURE 8-4

Means classified by Institution Type

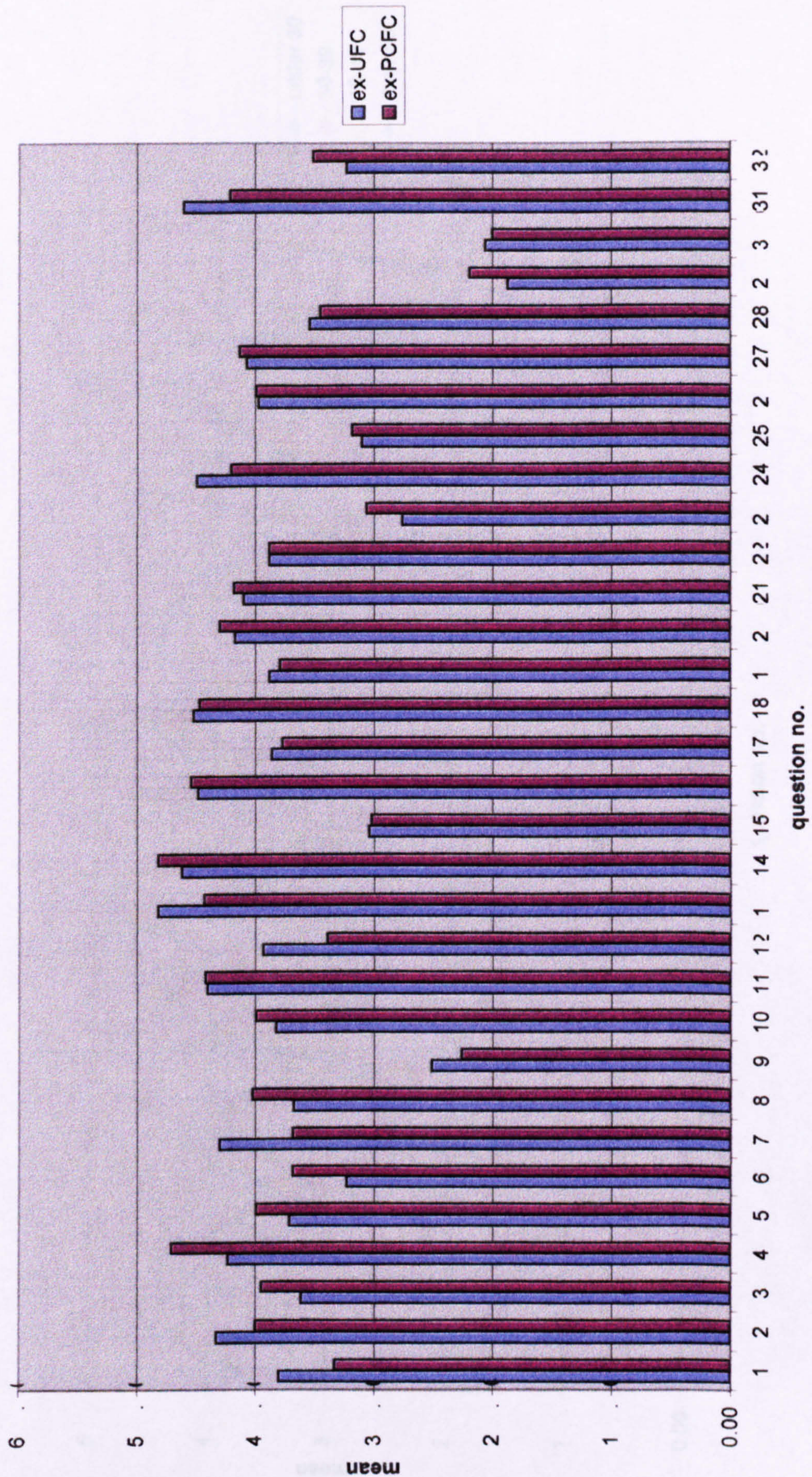


FIGURE 8-5

Means classified by age group

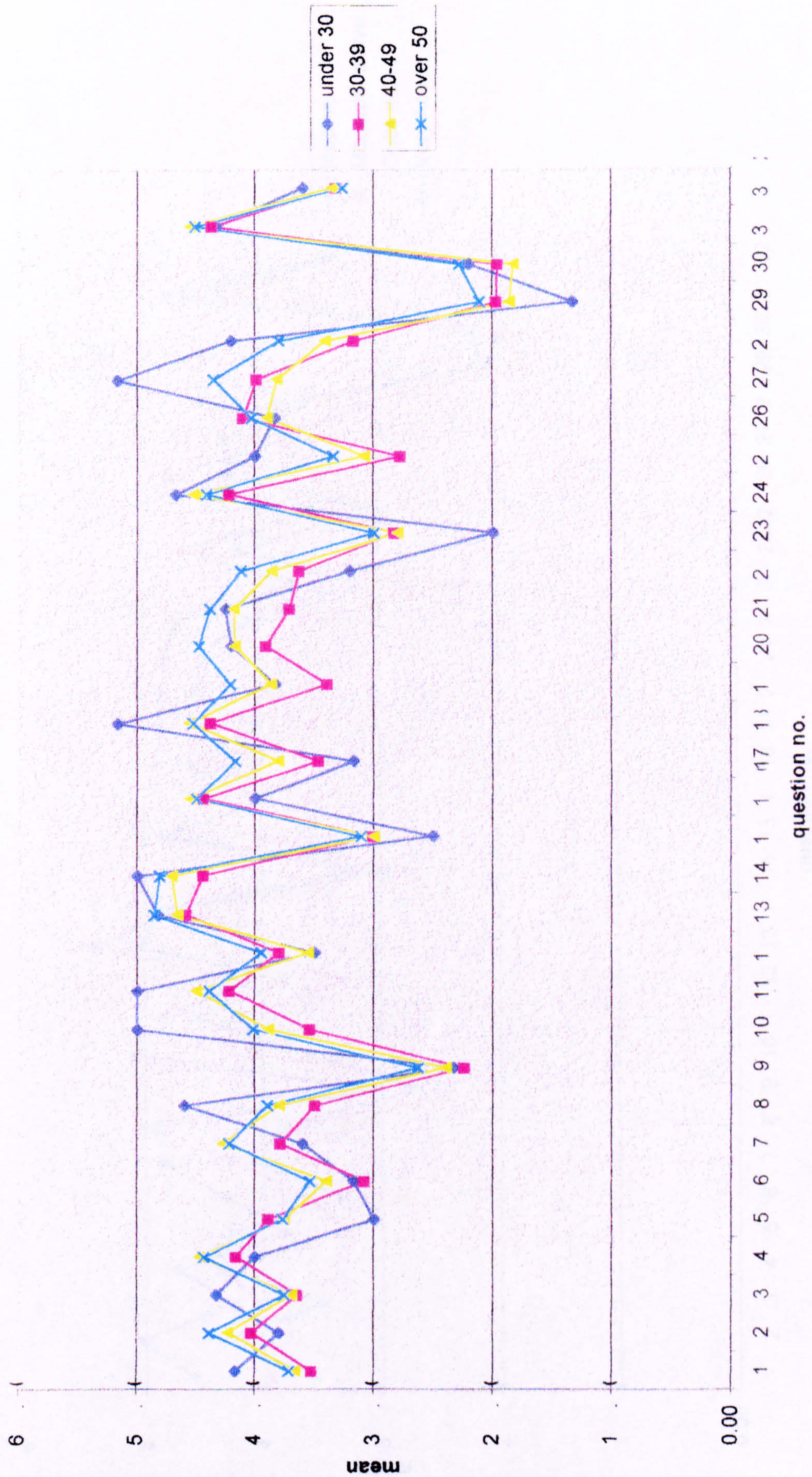


FIGURE 8-6

Means classified by research activity

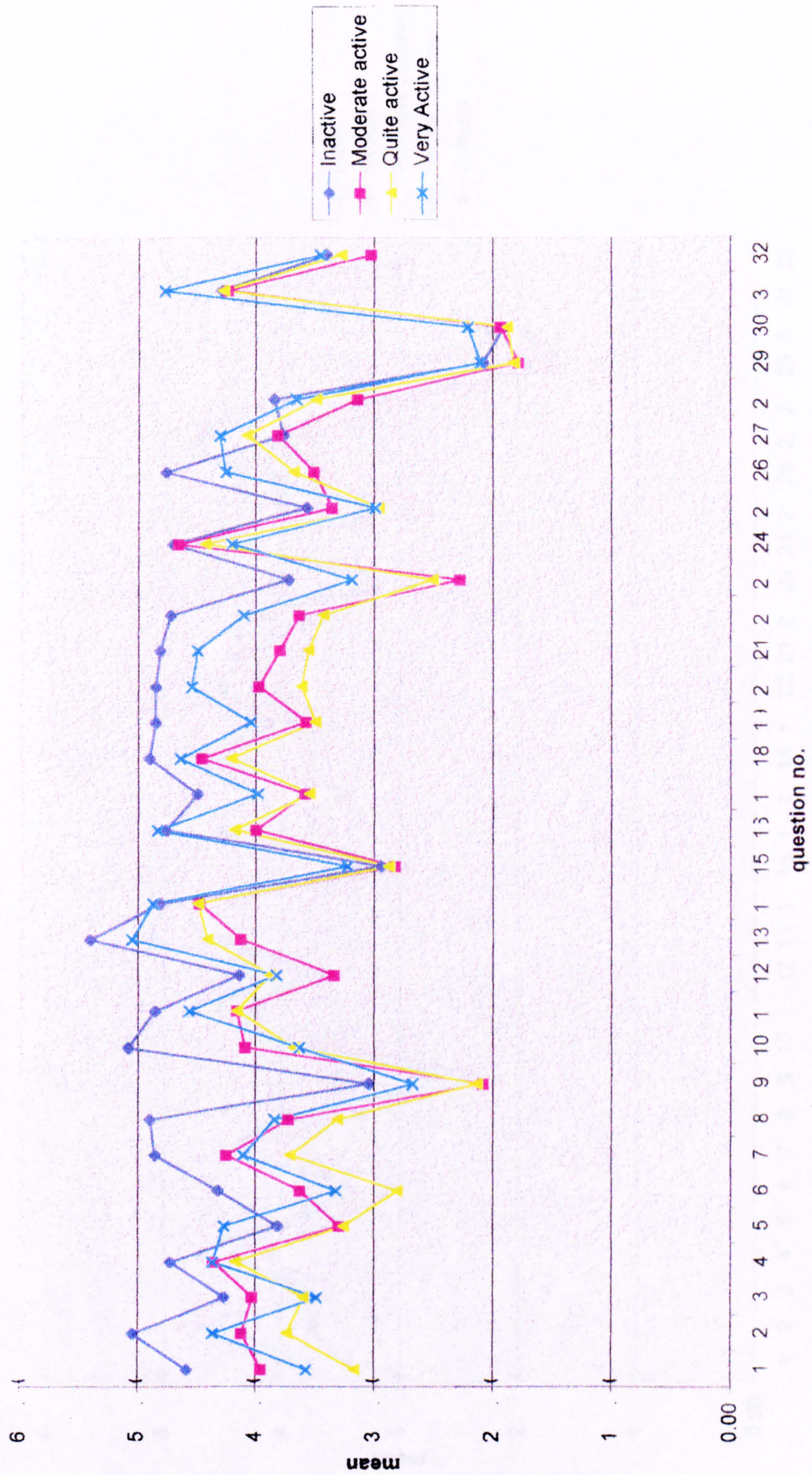


FIGURE 8-7

Means classified by post

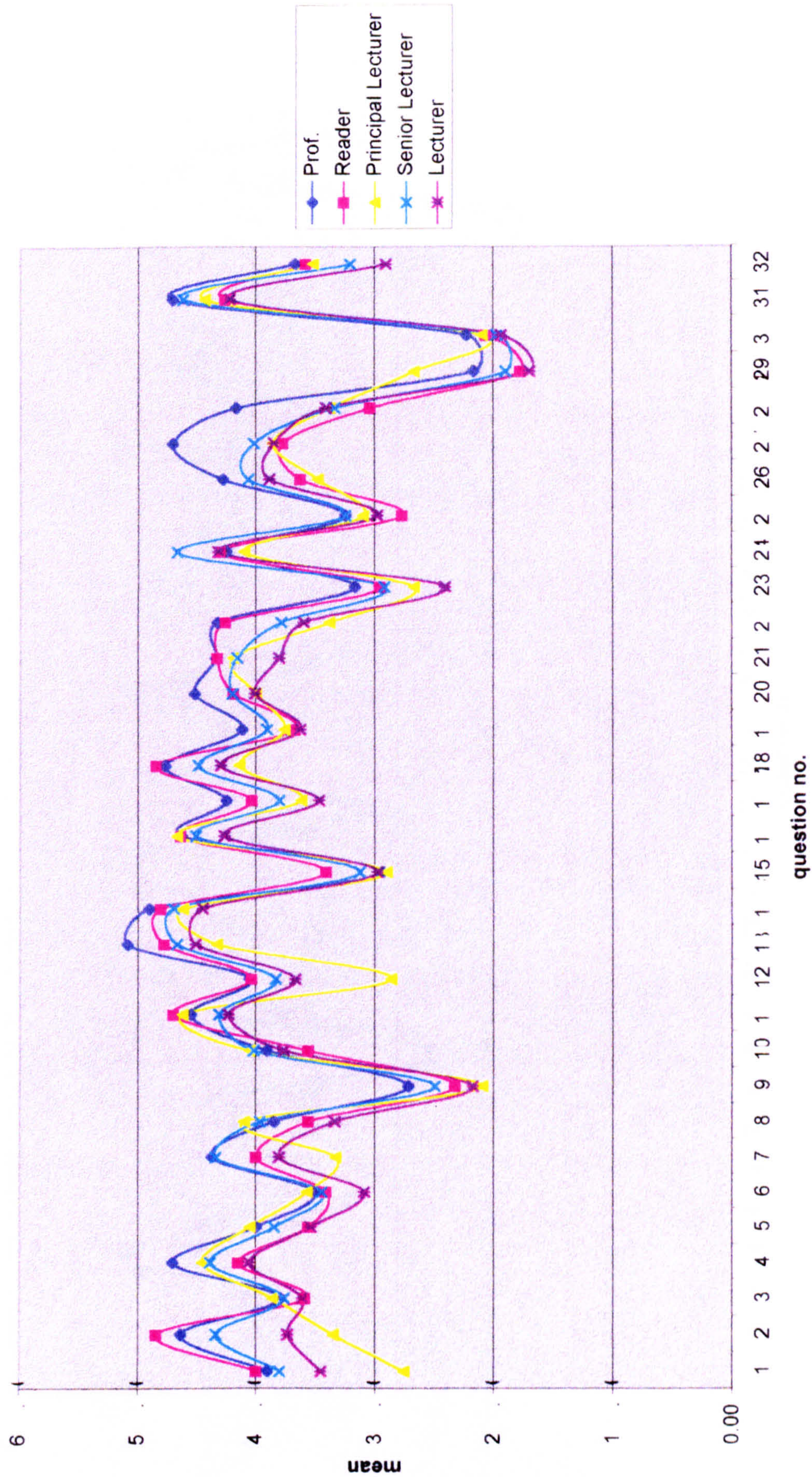


FIGURE 8-8

Means classified by department rating

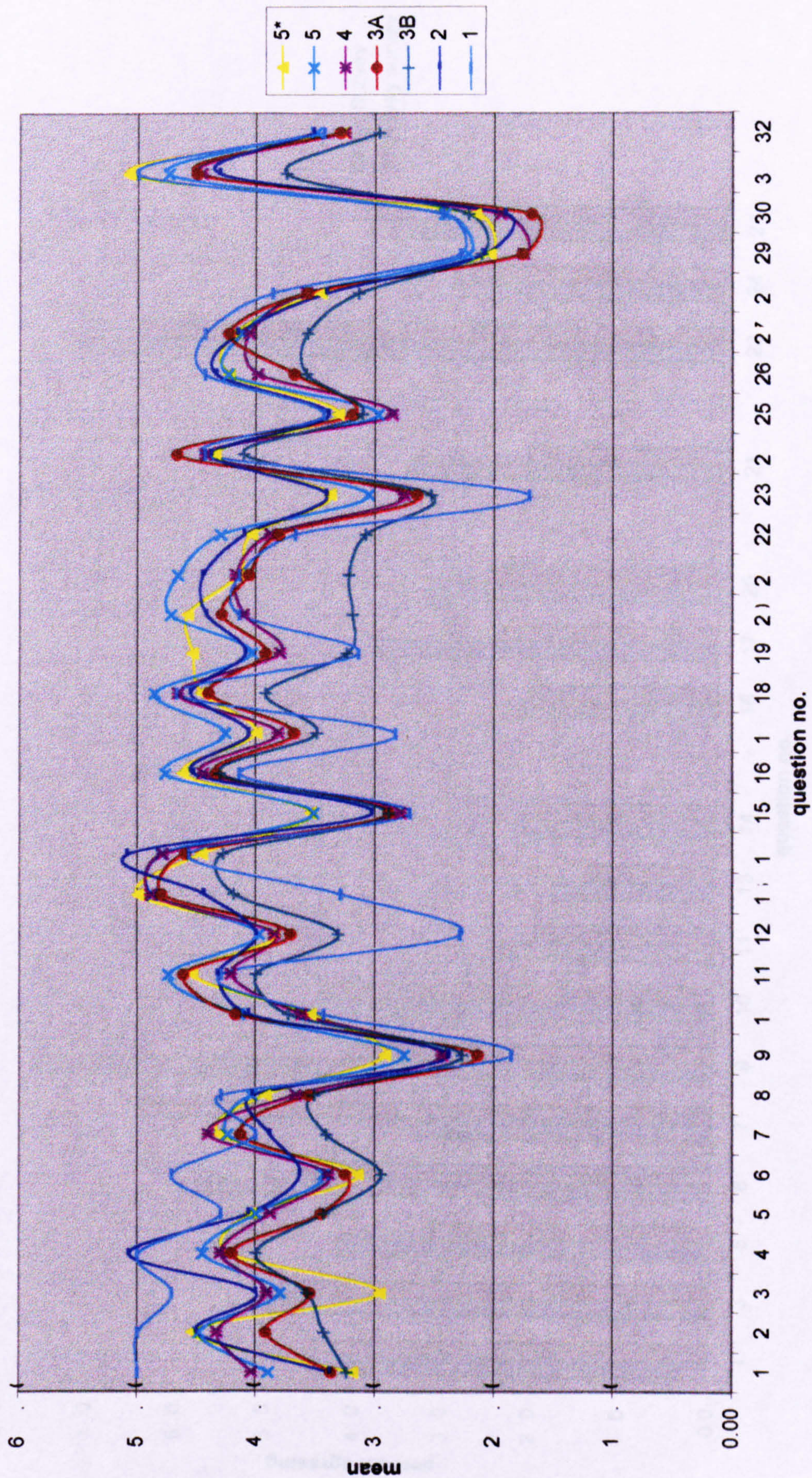


FIGURE 8-9

McNay Comparison: ex-UFC

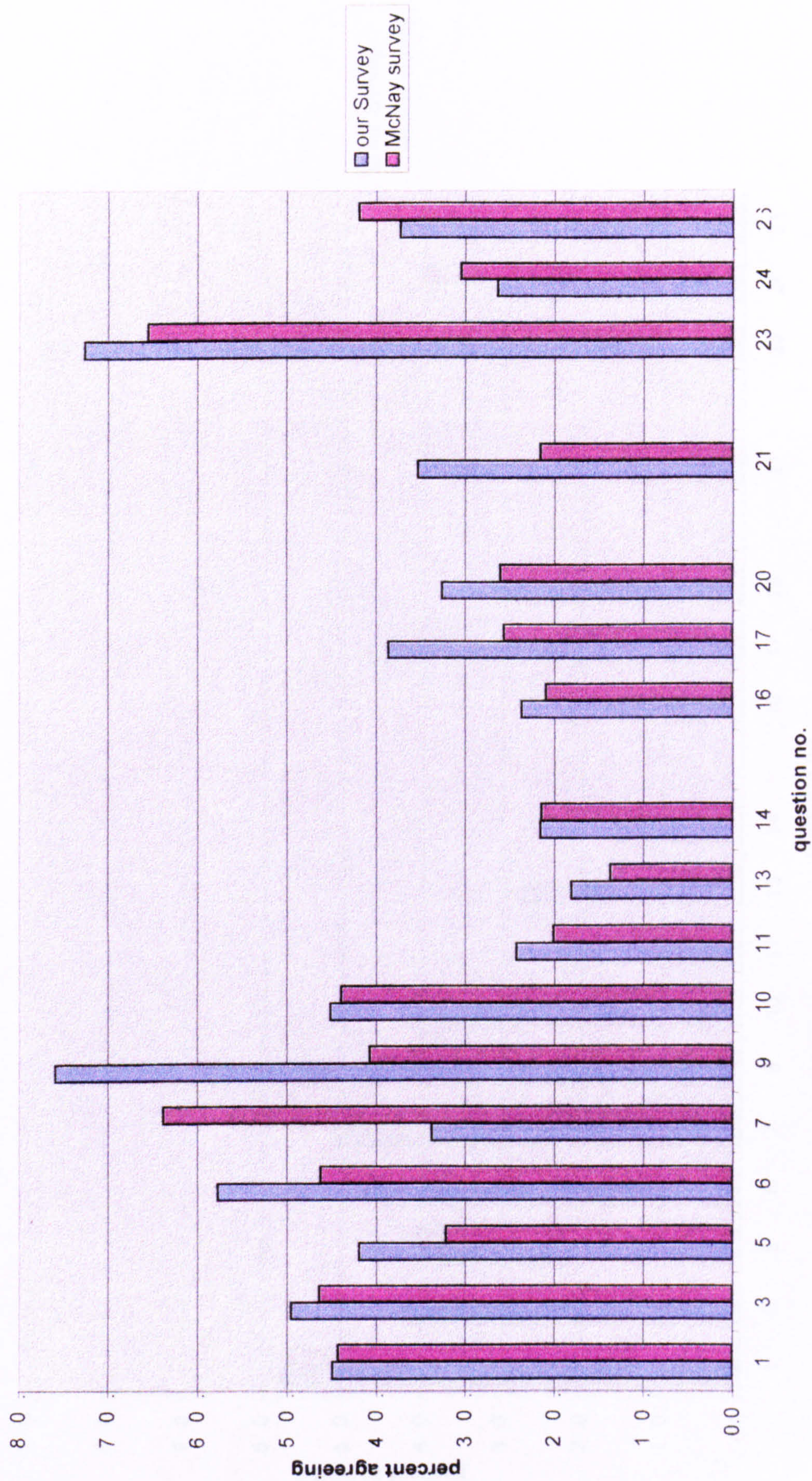


FIGURE 8-10

McNay Comparison: ex-PCFC

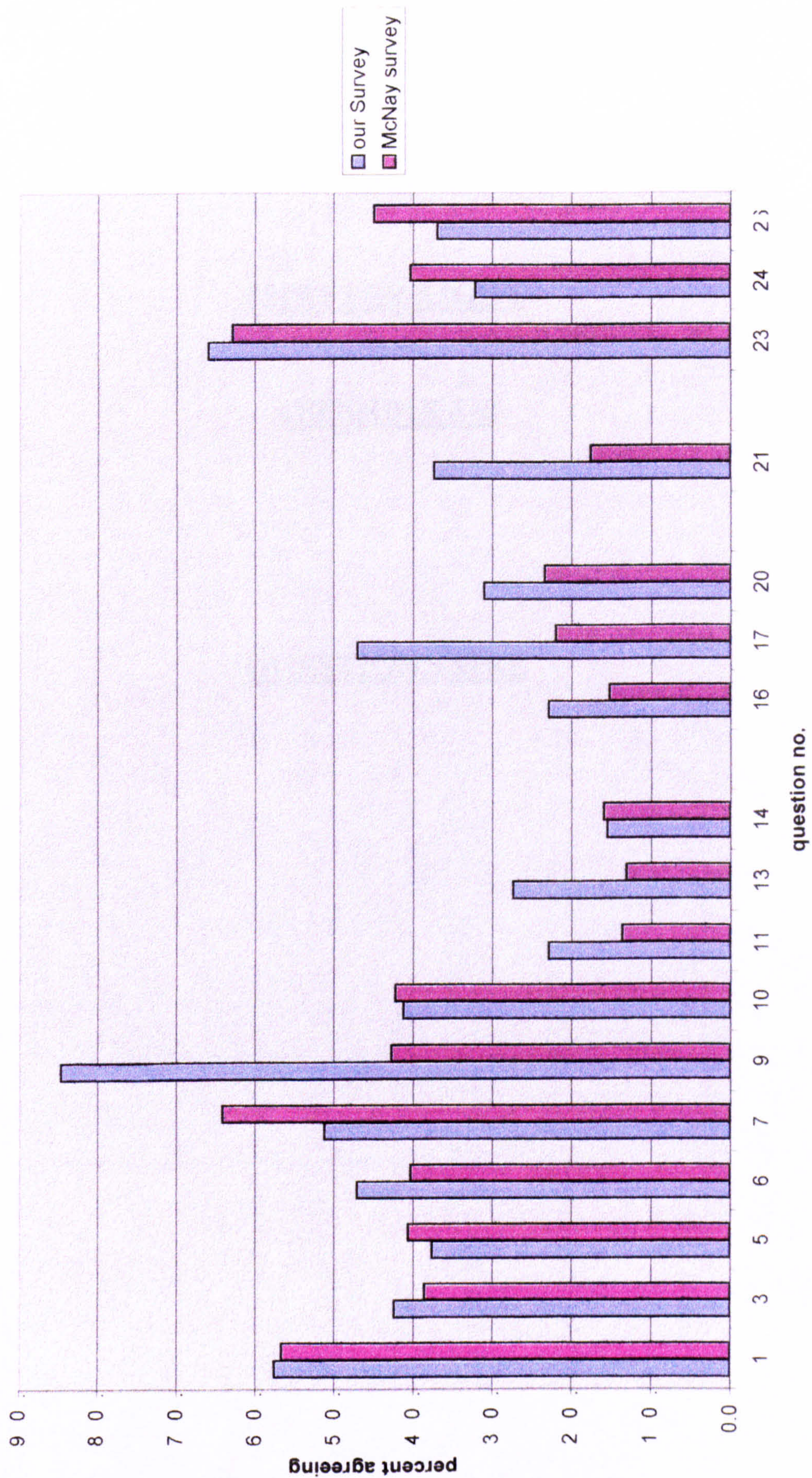


FIGURE 8-11

CHAPTER EIGHT

APPENDIX 8-B

QUESTIONNAIRE

Dear Colleague,

I am undertaking a research project on the impact, and the 'perceptions' of academics of the impact, of the Research Assessment Exercise (RAE).

I am seeking your help in this research project and would be extremely grateful if you could spare the time to complete the questionnaire and then return it in the reply paid envelope provided

The questionnaire does not request the identity of respondents. All information provided in the returned questionnaire will be treated as confidential and will only be used in aggregate form in combination with all other responses.

I do hope that you will be able to participate in the survey and would be grateful if you could complete and return the questionnaire as soon as possible. If you have any queries please do not hesitate to call me at (01926) 313021 or at (0467) 621644 or email me at: ameentalib@msn.com

I thank you for your assistance.

Yours sincerely,

Ameen Talib

RESEARCH ASSESSMENT EXERCISE QUESTIONNAIRE.

ALL RESPONSES WILL BE TREATED AS CONFIDENTIAL. THE SUCCESS OF THIS STUDY IS DEPENDANT ON YOUR RESPONSE; I EXPRESS MY GRATITUDE FOR THE TIME SPENT.

Please answer questions 1 to 32 on basis of how strongly you agree or disagree with the statements describing your individual behaviour/belief. The answers are on a scale of 1 to 6. Boxes 1 to 3 are for agreeing and boxes 4-6 for disagreeing. Please tick box [1] if you very strongly agree, box [2] if you strongly agree, box [3] if you agree but less strongly and box [6] if you very strongly disagree. The scale is in order of strength of agreement; where box [1] represents the strongest agreement and box [6] represents the strongest disagreement.

1. I now spend more time on research than 6 years ago.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

2. I now spend more time on research than 6 years ago as a result of the RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

3. I now spend less time in teaching preparation than 6 years ago.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

4. I now spend less time in teaching preparation than 6 years ago as a result of the RAE pressure on research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

5. I now give less time than 6 years ago to 'voluntary' academic activities- e.g. referring for journals.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

6. I now give less time to activities given no or low recognition by RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

7. The RAE has had a positive effect on my research output.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

8. Because of RAE, I now spend less time in voluntary academic work.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

9. I am feeling more pressure to publish due to the RAE.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

10. I now (try to) collaborate more with researchers overseas to demonstrate international excellence.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

11. I now collaborate less (in research) with academics from other English universities.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

12. I now collaborate more (in research) with colleagues in my department.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

13. Perceived research preferences of RAE panels have affected my choice of research topic.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

14. The balance of my research has moved away from the 'applied' end of the spectrum towards more basic, 'pure' research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

15. In my view, RAE has a negative effect on inter-disciplinary research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

16. I now do less inter-disciplinary research than 6 years ago.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

17. Because of the RAE time-scales I have published some outputs at an earlier stage than I would prefer.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

18. Because of the RAE time-scales I have deferred the publications of some research output.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

19. My research topics or projects are influenced by the RAE time-scale.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

20. Because of the RAE time-scales I have avoided some research topics or projects because they would have taken a long time to complete.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

21. Because of the RAE time-scales I have avoided some research projects because they were speculative in nature (more risky in relation to security of output).

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

22. I now manage my research publications by '*smoothing*' it over the RAE time cycle (i.e. in trying to ensure sufficient publications for the RAE I publish early if I do not have enough publications and/or I defer publication if I have published sufficiently so as to ensure enough publications in the next round of RAE)

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

23. The RAE has increased my stress level.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

24. The RAE has improved the quality of research conducted in Universities.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
25. I believe RAE increases staff mobility between institutions.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
26. I now spend less time on consultancy work (including 'external' lecturing) to concentrate on research.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
27. My department have expanded research student numbers beyond the capacity to supervise as well as we wish.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
28. I believe that the expansion in research student numbers is due to the RAE funding formula.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
29. University appointments are now driven by the RAE.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
30. Universities are now paying a 'premium' to attract 'star' researchers.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
31. Academic researchers pay has increased due to the recognition earned from the RAE.
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

32.(a) The RAE four year time cycle is not appropriate for my subject area research.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

(b) What, in your view, will be an appropriate RAE time cycle for your subject area?

2 years ☐ 4 yrs ☐ 6 yrs ☐ 8 yrs ☐ Other (*specify*) ☐

Personal Details:

33. What is your Primary department? (*i.e. what unit of assessment, per HEFCE classification, would you fall under?*).

34. How many years have you been in academia?

5 years ☐ 5-10 years ☐ 10-15 years ☐ 15-20 ☐ over 20 years ☐

35. How long have you been in current post?

2 years ☐ 2-5 years ☐ 5-10 years ☐ over 10 years ☐

36. Were you included in the submission as research active staff?

Definite Yes ☐ Probably Yes ☐ Probably No ☐

Definite No ☐ Not sure ☐

37. What was your department's rating in RAE 1996?

5* ☐ 5 ☐ 4 ☐ 3a ☐ 3b ☐ 2 ☐ 1 ☐

38. Was your department research rating higher or lower than the average rating for your institution?

Higher ☐ Lower ☐ About average ☐ Not sure ☐

39. What proportion of staff were submitted by your department (subject area) in the RAE 1996?

A (95-100%) ☐ B (80-94%) ☐ C (60-79%) ☐

D (40-59%) ☐ E (20-39%) ☐ F (less than 20%) ☐

Not sure ☐

40. Is your institution ex-UGC ('old') or ex- PCFC ('new')?

Old ☐

New ☐

41. Post Held.

Professor ☐ Reader ☐ Principal Lecturer ☐ Senior Lecturer ☐

Lecturer ☐ Other (please specify)

42. Are you in a 'permanent' position?

Yes ☐

No ☐

43. Please tick the box against the qualification/degree you have. (tick as many boxes as relevant).

PhD ☐ MSc./MBA ☐ Professional Qualification ☐ BSc/BA ☐

44. What is your age group.

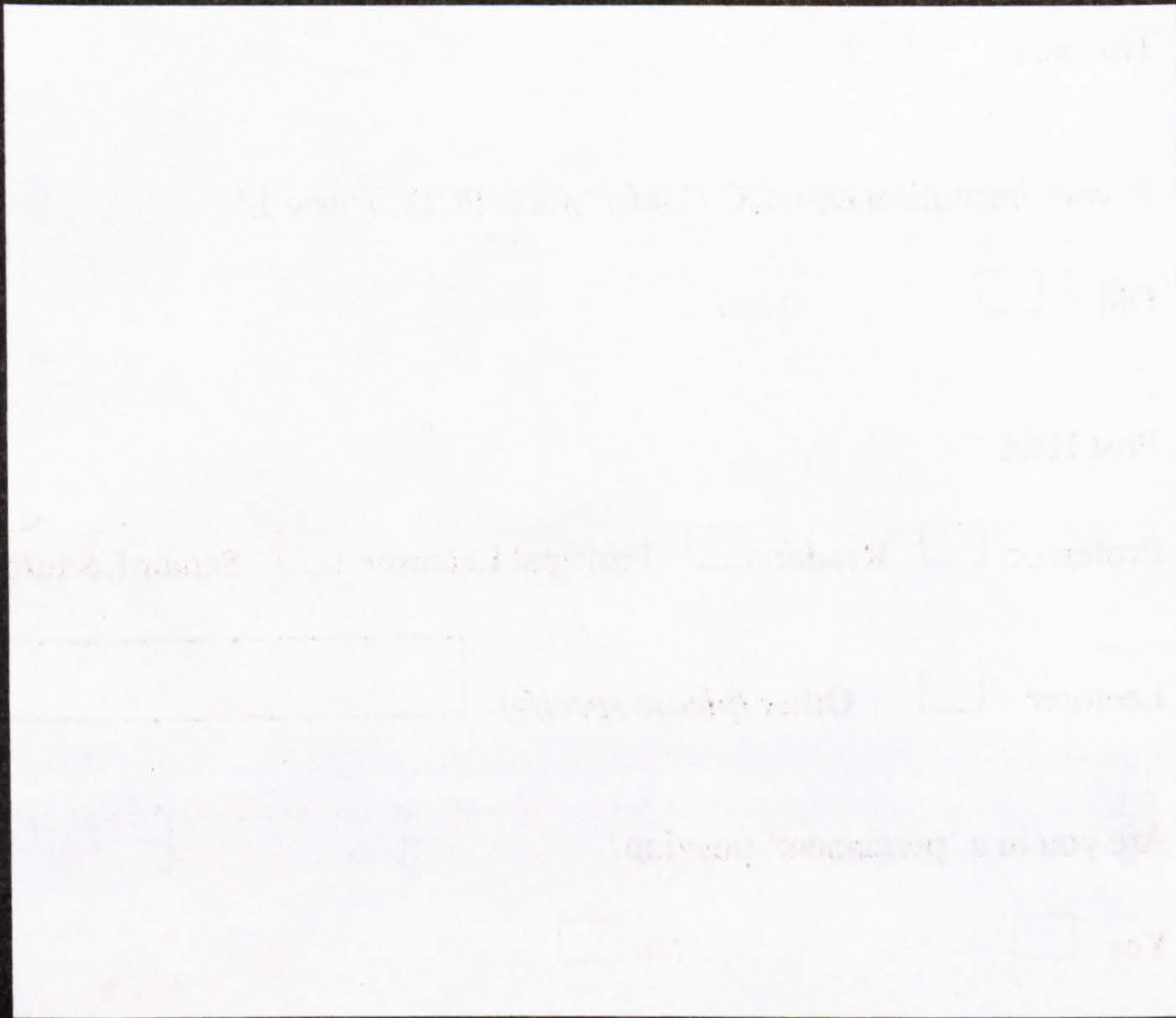
under 30 years ☐ 30-39 ☐ 40-49 ☐ over 50 years ☐

45. How would you rank yourself as a researcher?

Not at all active ☐ Quite inactive ☐ Moderately active ☐

Quite active ☐ Very active ☐

If you have any comments that you would like to make regarding any of the items on this questionnaire and/or the Research Assessment Exercise, please write them in the space below or attach a separate sheet.



THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY.

When complete, please return the questionnaire in the reply paid envelope provided to:

Ameen Talib
Warwick Business School
University of Warwick
Coventry
CV4 7AL

All comments will be treated as anonymous. All information provided in this questionnaire will be treated as confidential and will only be used in aggregate form in combination with all other responses.

RESEARCH ASSESSMENT EXERCISE QUESTIONNAIRE EXPLANATORY NOTES:

1. 'Voluntary academic work' (Q5 & 8) refers to unpaid work undertaken by academics on voluntary basis. An example is refereeing papers for journals.
2. Question (6) refers to activities such as teaching and refereeing; which are not directly rewarded under the RAE mechanism.
3. Question (11): English universities should read British universities.
4. The term 'Department' in the questionnaire also refers to 'division', 'subject area' or 'unit of assessment' as appropriate.
5. 'Current post' in question (35) refers to the number of years in the same post (i.e. lecturer, senior lecturer etc.) . This should be the total number of years in the same current post at present and previous institutions.
6. Question (36) refers to the 1996 RAE submission. The answer is expected to be a definite yes or a definite no. However if you are not informed about your inclusion in the submission you have a choice of three responses. A 'Probably Yes' indicates your belief that you should have been included based on your research output and the department rating.
7. Question (39) refers to the proportion of full-time equivalent (FTE) staff submitted for assessment as described in the published ratings

CHAPTER NINE
SURVEY OF ACADEMICS:
EMPIRICAL RESULTS AND ANALYSIS

CHAPTER NINE

SURVEY OF ACADEMICS: EMPIRICAL RESULTS AND ANALYSIS

9.1 INTRODUCTION

This chapter analyses the empirical results from the survey of academics. The descriptive results, tests for the independence of the variables, and the survey questionnaire of academics were introduced in Chapter Eight. Having established the association (degree of relationship) between the response variables and the characteristic factors, the next step is to test whether there are differences between the groups. The basic methodology is the Analysis of Variances (ANOVA) for testing for significance in the difference of means between groups¹. Then we investigated if the RAE has influenced the behaviour of academics and which of the characteristics have explanatory powers. In this chapter, the model developed in Chapter Three is tested with regression with optimal scaling (CATREG) and logistic regression.

Respondents are requested to indicate their degree of agreement or disagreement to the questions on behaviour in the survey. Their choices are then dichotomised into two groups: (1) agree; or (2) disagree. These qualitative data are then used to estimate the logistic regression model. The model and the methodology were

¹ We also applied the Kruskal-Wallis test and the results from the Kruskal-Wallis test and ANOVA were similar. Hence, we decided to apply ANOVA.

described in Chapter Three and the results are discussed in Section 9.8 of this chapter.

The chapter is organised as follows: the next section discusses the results of the ANOVA tests. The overall level of the behavioural impact of the RAE is analysed in Section 9.3. Categorical regression with optimal scaling and findings from the survey are explained in Section 9.4. The results of CATREG are compared to the ANOVA tests and the Measures of Association results in Section 9.5. The validity and reliability of the survey instrument is tested in Section 9.6. The logistic regression is delineated in Section 9.7, with the empirical results in Section 9.8. A general discussion of the logistic regression results is provided in Section 9.9, followed by closing remarks in the final section.

9.2 ANOVA

The ANOVA is a statistical tool for investigating differences between the means of distinct groups of subjects. It extends the standard two-group t-tests to several groups. These groups can also be categories of a nominal variable (Hand & Taylor, 1987: p. 3). The ANOVA is based on the assumption that the variances of the treatment populations are equal, and is relatively robust to differences in variances between treatments. For this study, the null hypothesis represents that the means for the different groups are equal. The ANOVA results for the survey data are displayed in Table 9.1 at end of this chapter.

As Table 9.1 shows, there is a significant difference in the responses between the groups, in particular for groups based on level of self-assessed research activity.

The RAE and the *four-paper* effect have the highest impact on the middle-tier academics. This was detailed in Chapters Seven and Eight. This effect is consistent with the expectancy and goal-setting motivation theories and REMM, which were discussed in Chapter Two. Applying the expectancy theory, the effort required to perform research work and the expectancy that the effort will lead to a particular outcome, and the intrinsic/extrinsic rewards associated with the effort will significantly influence the motivation and behaviour of the responding academic staff. Therefore, one expects the RAE to have less influence on the non-active academic than on the active researcher. However, the RAE is also expected to have minimal impact on the behaviour of the very active in research. This is because they derive much intrinsic rewards from research, and achieving the goal of four papers per RAE cycle is relatively easy for them. The level of goal difficulty also influences the level of motivation. As explained in Chapter Two, a difficult but attainable goal has the highest motivational influence on the achieving type. In this case, the middle tier academics are expected to exhibit the highest motivation.

There are only three survey questions for which the responses are not significantly different between the groups. These questions are for focus on the following areas: pure research rather than applied research (Q14); interdisciplinary research (Q15); and deferring publication (Q18). The statement on research collaboration with academics from other universities in England (Q11) has an F-ratio significant only at the 5.3% level for Research Activity, but is insignificant for all other groups.

There are four responses with an F-ratio significant at the 5% level for only one factor grouping. The difference in means for spending less time in teaching preparation as a result of the RAE (Q4) is significant only for the Institution type. The level of research activity is the only factor for which the means of groups are significantly different for feeling more pressure to publish (Q9) and voluntary academic activity (Q5). Groups based on academic experiences are the only ones that show significant differences in the means for the belief that research quality in universities has improved (Q24). All the other questions have two or more factors for which the differences in means based on ANOVA are significant at the 5% level (see results in Table 9.1).

The ANOVA results exhibit the following as the (more) important characteristic factors where differences in means were significant:

- Department rating
- Institution type (ex-UGC and ex-PCFC Institutions)
- Post
- Level of research activity

The null hypothesis that the means for the different groups are equal is rejected for most response variables. Thus, the behavioural response to the RAE differs between academics of different characteristics.

9.3 BEHAVIOURAL IMPACT OF THE RAE

This section identifies the existence of the direct and indirect behavioural changes resulting from the RAE. A respondent agreeing to the survey question is an

indication that the RAE has influenced his behaviour. A simple test statistic, the Z-value, is used to evaluate if the proportion agreeing to the survey are higher than one-quarter, one-third, or one-half of the total sample. The behaviour is termed prevalent (strong presence) if the percentage of respondents agreeing to the behaviour statement is greater than 50%; moderate if between 33% and 50%; and weak if the proportion agreeing is more than 25% but less than 33%. These terms and the specific percentages have no special significance, but are arbitrary percentages in order to provide some indication of the level of behavioural changes due to the RAE.

The one-tailed test with the critical region in the upper tail is used to test the null hypotheses that the proportions of respondents agreeing to the survey statement are more than (a) 50%, (b) 33%, or (c) 25%.

The null hypotheses are:

First hypothesis $H_0: \pi = 0.5$

Second hypothesis $H_0: \pi = 0.33$

Third hypothesis $H_0: \pi = 0.25$

And, the corresponding alternative hypotheses are:

First hypothesis $H_1: \pi > 0.5$

Second hypothesis $H_1: \pi > 0.33$

Third hypothesis $H_1: \pi > 0.25$

For the first hypothesis, if the proportion agreeing is too far above 0.5 as to be reasonably due to chance², then the H_0 is rejected. In rejecting H_0 , the alternative hypothesis will be accepted, i.e., accepting the proposition that the proportion agreeing is higher than 50%. The rejection region is defined by the critical value of $Z = 1.64$, which excludes 5% of observations in the right-hand tail area. The null hypothesis is accepted if the calculated Z value is less than 1.64; it would be rejected and strong/moderate/weak presence of the behaviour is existent if the Z value exceeds 1.64.

The test statistic is calculated as follows:

$$Z = \frac{\rho - \pi}{S_p}$$

where the sample standard error (S_p) is :

$$S_p = \sqrt{\frac{\pi(1-\pi)}{n}}$$

The Z values for testing the three null hypotheses are displayed in Table 9-2, with the significant Z values (> 1.64) highlighted. Only the significant critical values at the highest proportion are shown. For example, for Q1, the alternative hypothesis that " $\rho > 50\%$ " is rejected but the alternative hypothesis that " $\rho > 33\%$ " is accepted. This means the proportion of respondents agreeing to the statement is higher than 33%. Accordingly, there is a moderate impact on behaviour, viz.; academics have increased the time they spend on research. However, the direct impact of the RAE on this increase in time spent on research is weak. The alternative hypothesis that is not rejected has a ρ value of greater than 25%.

² For the first hypothesis, and 0.33 and 0.25 for the second and third hypothesis respectively.

The RAE has shaped the perception in the community that there has been an increase of staff mobility among institutions, given that the RAE is driving an increasing number of university appointments and that specific premiums are being paid to attract “star” researchers. This perception is substantiated by the case studies of universities (see discussion in Chapter Five). However, academics do not believe that their salaries have increased as a result of the recognition they had earned from the RAE. They can easily point to the higher mobility and pay premiums enjoyed by the star researchers.

The RAE has a strong impact on increasing the personal stress levels and the pressure to publish. This pressure led to a moderate influence to increase the time spent on research and correspondingly less time on teaching preparation and voluntary academic activities, there is a perceptibly higher influence on the reduction of time allocated to activities given low or no recognition by the RAE. Any measurement system that is linked to performance tends to create pressures for enhanced performance in the areas that are being measured and a matching neglect of the areas that are not being measured (Puxty et al, 1994).

An unintended consequence of the RAE is that academics are publishing less in professional journals and are becoming less proactive in professional and public debates. In the long run, this could be detrimental because the gap between the fields of academia and profession, such as Accountancy, would widen unduly. The funding of research at the university level is directly determined by the evaluations in the RAE, and the teaching performance undergoes quality audits. Public Policy intervention by academics, on the other hand, is not formally

assessed and does not form part of the formal contract of employment. It does, however, constitute an established part of academic life. Invisible to the control processes of the state, public policy intervention is, by default, an unvalued feature of academic endeavour. It has been shifted even further to the margins of academic work by the RAE process. The monitoring of research places undue pressure on an academics' time. Public policy intervention is effectively controlled by not being recognised by any state assessment and remuneration process. The RAE also unintentionally generates peer pressure to restrict the use of valuable time on public policy intervention and other unmeasured activities. This is due to the fact that the resources available to the group, department or cost centre depend on the use of that time as defined by the state's assessment instruments (Puxty et al, 1994: pp. 160-161).

There is a disparity between academics' view of the impact of the RAE on themselves and its general impact. From the survey results, there is a strong view (> 50%) that the RAE has negative effects on inter-disciplinary research, but the survey also shows that less than one-quarter of the sample are now doing less inter-disciplinary research. There is a moderate awareness (> 33%) that the RAE has increased research output, but its significance is not statistically greater than 25%.

Overall, there is a moderate incidence of research fixation behaviour. Many respondents believe that the RAE has increased mobility of good researchers, and that there is now a situation of gaming, infringement of academic freedom,

smoothing of research output, and myopic or short term orientation triggered largely by the RAE time-cycles.

9.4 CATEGORICAL REGRESSION WITH OPTIMAL SCALING

9.4.1 CATREG: AN OPTIMAL LINEAR REGRESSION EQUATION

As the data are categorical, we applied categorical regression with optimal scaling (CATREG) and logistic regression (see Section 9.8). The latter is the more appropriate methodology for the reasons discussed in Chapter Three. The purpose of the CATREG analysis is to provide a basis for comparison. Furthermore, the use of CATREG simplifies the problem of predicting the probability of choice to that of predicting the value of the dependent variable.

Regression with optimal scaling (CATREG) assigns numerical values to the categories, resulting in an optimal linear regression equation for the transformed variables. The standard linear regression analysis involves minimising the sum of squared differences between the response (dependent) variable and a weighted combination of the predictor (independent) variables for the model estimation step. Typically, regression variables are quantitative, with (nominal) categorical data recorded to binary or contrast variables. Categorical variables serve to separate groups of cases and their parameters. The estimated coefficients reflect how changes in the predictors affect the response. An alternative approach is to regress the responses on the categorical predictor values themselves. Each variable is estimated with one coefficient. However, for categorical variables, the

category values are arbitrary. Coding the categories differently would yield different coefficients.

CATREG extends the standard regression approach by simultaneously scaling the variables. The procedure quantifies categorical variables such that the quantification reflects the characteristics of the original categories. The quantified categorical variables are then put through the same procedure as the numerical variables. The quantification is displayed in Table 9.7.

9.4.2 THE CATREG MODEL

The survey design was described in Chapter Three and a model of the factors influencing the behaviour (response) was derived. The behavioural responses are regarded as a function of behavioural fixation and motivation, where:

$$\text{behavioural fixation} = f(\text{socialisation factors, age})$$
$$\text{socialisation} = f(\text{qualification, experience, post})$$
$$\text{motivation} = f(\text{age, post, job security, research activity level,} \\ \text{perceived emphasis placed on research})$$

An academic's job security is affected by whether the job position is permanent and whether they are included in the RAE submission. Those that are in non-permanent posts and are not included in the RAE submissions have less job security. The perceived emphasis on research is measured by Institution type (where it is assumed that ex-UGC institutions have more perceived emphasis) and

department rating (where it is assumed that departments with higher ratings have higher emphasis).

The resultant model tested is linear because of the quantification by CATREG of the categorical variables. The model is written as:

$$Y = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + e \quad [\text{Equation 9.1}]$$

where:

Y = The behavioural response measure.

There are 6 models, one independent variable for each model. The independent variables are: Gaming, Academic Freedom, Time cycle, Research Fixation, Smoothing, and Mobility. These measures have been described in Chapter Three.

and where the following are the predictor variables:

- x_1 Experience (EXP)
- x_2 Department rating (DR)
- x_3 Research activity (RA)
- x_4 Age
- x_5 Submission in RAE (SUB)
- x_6 Qualification (PHD)
- x_7 Permanent position (PERM)
- x_8 Post
- x_9 Institution type (INST)

The independent variables are the individual's views on mobility, research fixation and gaming, where gaming is separated into academic freedom, smoothing and the time-cycle effect. These constructs have been explained in Chapter Three. The choice of the explanatory variables was explained in Chapter Three, but they are briefly mentioned here for convenience. The same explanatory variables are used for all the models to facilitate the direct comparison of the characteristics' effects on the independent variables. For example, if post is a significant explanatory variable for gaming, it would be useful to explore if it is also significant for perceptions of research fixation or mobility. Although the inclusion of irrelevant variables could result in specification errors, it is a less serious error compared to omitting variables. Furthermore, as this is also an exploratory study, it would be useful to relate the characteristics of academics (explanatory variable) to the different behavioural outcomes.

Understandably, experience and age are related variables. Both the older and more experienced academics are expected to have higher behaviour fixations. The older academics are also less inclined to change their behaviour. Moreover, those in permanent positions are expected to have less behavioural effects. The post variable is expected to be negatively related with the independent variable, as post is arranged in descending order in the questionnaire. Academics in less senior posts are expected to alter their behaviour more.

The higher the levels of research activity, the lower are the expected behavioural effects. The non-active researchers, however, are expected to be less affected by

the goal such as the *four-paper* target set by the RAE as they might perceive it as unattainable.

9.4.3 ANALYSIS OF FINDINGS

The F test is used to test the hypothesis that the coefficients in the model are jointly equal to zero. This is a test of the null hypothesis that none of the explanatory variables is significant ($\beta_i=0$, for all β s).

The F ratios summarised in Table 9.3 are all significant at the 5% level. Therefore, the null hypotheses are rejected. The independent variables and the regressors in equation 9.1 are correlated. It is crucial, however, to note that although the CATREG model (Equation 9.1) appears to be linear, it is not linear in the strictest sense because the scaling and quantification of the categorical variables would assign numerical values to the categorical variables. As evident from Table 9.7, these assigned numerical values can be positive or negative, and can change the sign of the relationship. For example, the gaming model (Equation 9.2) has a negative sign for the experience variable, implying a negative linear relationship between gaming and experience, which is contrary to prior expectations. It suggests that the more experience an academic has, the more likely he would practise gaming. However, the results imply otherwise. The quantification of the experience categorical variable in Table 9.7 assigns negative values to both the categories of those with less than 10 years experience and those with 10-15 years experience, while the category for those with over 15 years of experience is positively signed. Therefore, those with less experience are more likely to disagree that they have been gaming. The direction of the

relationship depends on the quantification and could be different for each category of the same variable. In that fashion, CATREG models are not restricted in assuming a strict linear relationship between the independent variable and the explanatory variable.

9.4.3.1 DISCUSSION AND EVALUATION

The summary statistics for the models are in Table 9.3. The coefficients and the standard errors shown in Table 9.4, where the partial coefficients are displayed alongside other statistics. The resultant models with the partial coefficients are presented below.

$$\begin{aligned} \text{GAMING} = & -0.107 (\text{EXP}) - 0.2132 (\text{DR}) + 0.083 (\text{RA}) + 0.171 (\text{AGE}) \\ & + 0.119 (\text{SUB}) + 0.0802 (\text{PHD}) - 0.0373 (\text{PERM}) - 0.179 (\text{POST}) \\ & - 0.05117 (\text{INST}) + 0.96 \end{aligned} \quad [\text{Equation 9.2}]$$

$$R^2 = 0.108 \quad F = 3.512$$

$$\begin{aligned} \text{Academic Freedom} = & -0.0895 (\text{EXP}) - 0.203 (\text{DR}) + 0.186 (\text{RA}) + 0.229 (\text{AGE}) \\ & + 0.11 (\text{SUB}) + 0.0166 (\text{PHD}) + 0.0106 (\text{PERM}) \\ & - 0.0552 (\text{POST}) + 0.0849 (\text{INST}) + 0.95 \end{aligned} \quad [\text{Equation 9.3}]$$

$$R^2 = 0.108 \quad F = 3.642$$

$$\begin{aligned} \text{Time Cycle} = & -0.121 (\text{EXP}) - 0.255 (\text{DR}) - 0.167 (\text{RA}) + 0.198 (\text{AGE}) \\ & + 0.0069 (\text{SUB}) + 0.0229 (\text{PHD}) + 0.02066 (\text{PERM}) \\ & - 0.168 (\text{POST}) - 0.115 (\text{INST}) + 0.95 \end{aligned} \quad [\text{Equation 9.4}]$$

$$R^2 = 0.123 \quad F = 4.258$$

$$\begin{aligned}
 \text{Research fixation} = & -0.103(\text{EXP}) - 0.207(\text{DR}) - 0.207(\text{RA}) + 0.0424(\text{AGE}) \\
 & + 0.0549(\text{SUB}) - 0.164(\text{PHD}) + 0.0586(\text{PERM}) \\
 & - 0.202(\text{POST}) - 0.142(\text{INST}) + 0.95 \quad [\text{Equation 9.5}] \\
 R^2 = & 0.124 \quad F = 4.172
 \end{aligned}$$

$$\begin{aligned}
 \text{Smoothing} = & -0.118(\text{EXP}) - 0.181(\text{DR}) - 0.142(\text{RA}) + 0.126(\text{AGE}) \\
 & + 0.0239(\text{SUB}) + 0.0343(\text{PHD}) - 0.0199(\text{PERM}) \\
 & - 0.202(\text{POST}) - 0.0379(\text{INST}) + 0.97 \quad [\text{Equation 9.6}] \\
 R^2 = & 0.087 \quad F = 2.903
 \end{aligned}$$

$$\begin{aligned}
 \text{Mobility} = & 0.0939(\text{EXP}) - 0.173(\text{DR}) + 0.222(\text{RA}) + 0.16(\text{AGE}) \\
 & + 0.0275(\text{SUB}) \quad + 0.0379(\text{PHD}) \quad + 0.00062(\text{PERM}) \\
 & + 0.068(\text{POST}) - 0.0612(\text{INST}) + 0.96 \quad [\text{Equation 9.7}] \\
 R^2 = & 0.118 \quad F = 3.906
 \end{aligned}$$

As mentioned, the signs of the model need to be reviewed with the signs of the quantification of the categorical variables in Table 9.7. For example, those with PhDs and those in permanent positions have a negative quantification. Therefore, those with PhDs are more likely to practise gaming. Those with permanent positions would be less likely to alter their behaviour.

The results show that department rating, research activity, age group and post are the more important explanatory variables in predicting behavioural effects. The other explanatory variables do not seem to have a major influence in the

prediction except for qualification for research fixation. This result is similar to the measures of association results. The relatively more important explanatory variables in predicting each dependent behaviour variable are displayed in Table 9.8.

The Multiple R measures the degree of association between the dependent variable and all the explanatory variables jointly. The more meaningful measure would be R^2 . The coefficient of determination, R^2 , acts as a summary measure that explains how well the sample regression fits the data. It measures the proportion or percentage of total variation of Y explained by the regression model. The results show our model regressions explain about 10-12% of the response variable, except for smoothing where the explanation is only 8%.

An important property of R^2 is that it is a non-decreasing function of the number of explanatory variables or regressors present in the model. As the number of regressors increases, R^2 almost invariably increases and never decreases. An alternative measure is the adjusted R^2 ; it adjusts for the degrees of freedom associated with the sums of squares. Theil (1978) noted that it is a good practise to use adjusted R^2 s instead of R^2 s, because R^2 s tend to give an overly optimistic picture of the fit of regression equation. However, Theil offered no general theoretical justification for the superiority of adjusted R^2 , and his proposition is not universally accepted (Goldberger, 1991).

The relative importance assigned to each explanatory variable in the regression is shown in Table 9.5. The zero-order correlation in Table 9.5 is the correlation

between the explanatory variable and the dependent variable. It shows how important the explanatory variable is when it is used alone to predict the dependent variable. The larger the absolute values the stronger the relation.

But how important is each explanatory variable in predicting the response (independent) variable when used with the other explanatory variables? A method to assess the relative importance of independent variables is to consider the increase in R^2 when a variable is entered into an equation that already contains the other explanatory variables. The increase is given by:

$$R^2_{\text{change}} = R^2 - R^2_{(i)}$$

where $R^2_{(i)}$ is the square of the multiple correlation coefficient when all independent variables except the i th are in the equation.

A large change in R^2 indicates that the additional variable provides more information about the dependent variable that is not available from the other independent variables in the equation. The signed square root of the increase is the part correlation coefficient. It is the correlation between Y and X_i when the linear effects of the other independent variables have been removed from X_i .

The results in Table 9.5 show that the inclusion of the Post independent variable in predicting the gaming variable results in an increase of R^2 of 0.19, i.e., an increase of about 2% in the prediction ability of the regression equation. The increases in the R^2 for smoothing and research fixation are 3%, and 2% for time-cycle. The increases in R^2 are minimal for academic freedom and mobility.

The categories of professors and readers have negative quantifications. Therefore, they had less behavioural impact as the sign in the model for post is also negative except for mobility. The more senior staff are more definite in their view that the RAE has influenced mobility and pay. Academics in lecturer posts are the most likely to practise gaming and research fixation.

Another significant explanatory variable is department rating. The part and partial correlation coefficients are significant. The inclusion of the department rating as a predictor variable for the time-cycle effect increases the R^2 by 4.5% and by 3% for predicting research fixation behaviour. The R^2 s for the other independent variables increase by around 2.5% when department rating is included as a predictor variable. Academics in departments rated 5 and 5* have negative quantifications (see Table 9.7), implying that they have less research fixation and are less likely to practise gaming.

The level of research activity as a predictor variable increases the R^2 for predicting mobility by 4%, and by 3% for research fixation and academic freedom. The increase in R^2 for the time-cycle effect as a result of the inclusion of research activity as a predictor variable is 2%, 1.4% for smoothing and minimal (0.05%) for gaming. Those who are very active in research practise less gaming. As anticipated, research fixation, smoothing and the time-cycle effect are virtually non-existent for the non-active researchers.

The age group is an important predictor for academic freedom and the time-cycle effect; it increases the amount of prediction in the independent variable by 3%

and 2%, respectively. There is an increase of 1.5% for gaming and mobility but research fixation and smoothing remain largely unchanged. As expected, the actions of the over 50-year-olds are the least affected by the RAE. The younger academics have a higher research fixation and practise gaming in all its forms.

The inclusion of experience, permanent position, submission in RAE, qualification and institution type have only had minimal increases in the R^2 for all independent variables. However, the inclusion of qualification as an explanatory variable in predicting research fixation increases the R^2 by 2.3%.

The square of the part coefficient tells only how much the R^2 would increase when a variable is added to the regression equation. It does not indicate what proportion of the unexplained variation this increase would constitute. A coefficient that measures the proportional reduction in variation is:

$$Pr_i^2 = (R^2 - R_{(i)}^2) / (1 - R_{(i)}^2)$$

The signed square root of Pr_i^2 is the partial correlation coefficient. It is the correlation between the i th independent variable and the dependent variable when the linear effects of the other independent variables have been removed from both X_i and Y . The results of the partial correlation coefficients are not significantly different from the part correlations.

The variability of the estimated regression coefficients must also be considered in evaluating the relative importance of the independent variables. Coefficients with large standard errors would be unreliable.

When the independent variables are correlated among themselves, the parameter estimates would also be correlated. High inter-correlation among the variables can affect the regression estimates in several ways. The estimated variance of the regression coefficient for the i th independent variable is:

$$S^2_{B_i} = S^2 / (1-R^2_i)(N-1) S^2_i$$

Here, R^2_i is the squared multiple correlation when the i th independent variable is considered the dependent variable and the regression equation between it and the other independent variables is calculated. A large value of R^2_i indicates that the i th independent variable is almost a linear function or a combination of the other independent variables. The proportion of variability not explained by the other variables is $1 - R^2_i$. This quantity is called the tolerance of the variable.

The measure of Tolerance is used to detect multicollinearity. These results are shown in Table 9.6. If the tolerance is 1, then X is not correlated with the other regressors, whereas if it is zero, then it is perfectly correlated. It is also observed that the smaller the tolerance, the larger the standard error of the coefficient. Small tolerance values can cause computational problems for regression solutions. The results indicate high tolerance levels. Hence, multi-collinearity is not a problem and no computational problems arise from it.

9.5 ASSOCIATION MEASURES, ANOVA AND CATREG RESULTS COMPARED

The results from the 'Measures of Association' (see Chapter 8), ANOVA and CATREG are consistent in identifying the main characteristic factors influencing the responses.

As can be seen from Table 9.8, the main factors influencing behaviour:

- Department rating
- Post
- Age
- Research Activity

TABLE 9.8: COMPARISON OF RESULTS

	IMPORTANT VARIABLES	EXPLANATORY	CHARACTERISTIC
Independent variable	Association Measures (see chapter 8)	ANOVA	CATREG
Gaming	<ul style="list-style-type: none"> • Department rating • Post • Age • Research Activity 	<ul style="list-style-type: none"> • Department rating • Post • Research Activity 	<ul style="list-style-type: none"> • Department rating • Post • Age
Academic Freedom	<ul style="list-style-type: none"> • Department rating • Age • Research Activity 	<ul style="list-style-type: none"> • Department rating • Age • Research Activity 	<ul style="list-style-type: none"> • Department rating • Age • Research Activity
Time Cycle	<ul style="list-style-type: none"> • Department rating • Post • Age • Research Activity 	<ul style="list-style-type: none"> • Department rating • Post • Age • Research Activity 	<ul style="list-style-type: none"> • Department rating • Post • Age • Research Activity
Research Fixation	<ul style="list-style-type: none"> • Post • Research Activity 	<ul style="list-style-type: none"> • Submission • Post • Institute type • Research Activity 	<ul style="list-style-type: none"> • Department rating • Post • Qualification • Research Activity
Smoothing	<ul style="list-style-type: none"> • Department rating • Post • Research Activity 	<ul style="list-style-type: none"> • Department rating • Research Activity 	<ul style="list-style-type: none"> • Department rating • Age • Research Activity
Mobility	<ul style="list-style-type: none"> • Post • Age • Experience 	<ul style="list-style-type: none"> • Department rating • Institute type • Submission 	<ul style="list-style-type: none"> • Department rating • Experience • Age • Research Activity

9.6 VALIDITY, RELIABILITY AND MULTICOLLINEARITY

The Cronbach Alpha (α) is a statistic that tests for the internal consistency of a set of items based on their average inter-item correlations (Cronbach, 1951). This test is used to ascertain the reliability of the survey instrument. The Cronbach α coefficient is 0.8932, which suggests that the scale in the survey has a very high internal reliability (Nunnally, 1967). For purposes of construct validity tests, the principal components factor analysis is carried out (Kerlinger, 1964), and for the construct reliability tests, the Cronbach alpha statistics are calculated.

The dimensionality of the scale items in the questionnaire is tested with explanatory factor analysis. The principal components method with varimax rotation is applied with Kaiser normalisation. There are eight factors with eigenvalues exceeding 1. These factors explain 63% of the total variances and are shown in Table 9.9. Factors 2, 5, 7 and 8 are bloated specifics. Factor 6 is the view of the RAE. Factor 1 is the time-cycle effect, Factor 3 is the belief in the RAE rewards and mobility effect, and Factor 4 pertains to research fixation.

The measurement constructs load onto the appropriate factors and the factor analysis results support our measure validity. It is noted that the time-cycle construct loads perfectly onto Factor 1. The nine questions making up the gaming construct and their component measures load onto Factor 1 except for Q16 (interdisciplinary research) that loads onto Factor 5. Q13 has a loading of 0.494 on Factor 1 and represents the highest loading for Q13. The highest loading for Q14 is on Factor 5 but its loading on Factor 1 is only 0.317. Table 9.10 summarises the measure constructs loading onto the various factors with

their associated Cronbach α statistics. The Cronbach α results show a high reliability for the six constructs in the survey. The only construct with a low reliability is mobility as the value of its Cronbach α is only 0.4921. Therefore, the results for mobility need to be interpreted carefully. The Cronbach α for the other constructs are all higher than 0.78.

Prior to estimating the logistic regression model, it has to be ensured that the variables are free from multi-collinearity. This would be present if their tolerance values are small. The information in Table 9.6 shows that the tolerances range from 0.46 to 0.97, indicating that multi-collinearity is not an issue. Therefore, with the exception of mobility that might be unreliable, the remaining five constructs are valid and reliable.

9.7 LOGISTIC REGRESSION

The explanatory variables for the logistic regression model have been explained in Chapter Three. The model is repeated here:

$$P_i = E(Y = 1/X_i) = \frac{1}{1 + e^{-Z_i}}$$

where P_i is the probability of agreement with a behaviour (i.e., the conditional probability),

$$\text{and, } Z_i = \beta_1 + \beta_2(\text{Discp}) + \beta_3(\text{EXP}) + \beta_4(\text{Dept Rating}) + \beta_5(\text{AVR}) + \beta_6(\text{INST}) + \beta_7(\text{PhD}) + \beta_8(\text{POST}) + \beta_9(\text{AGE}) + \beta_{10}(\text{RESACT})$$

A number of the predictor variables are represented by dummy variables. For modelling purposes, the value of a dummy variable is “1” if the attribute is present, and “0” if it is absent. As each dummy variable is assigned its own

coefficient, there are a total of 29 coefficients including the constant in the logistic regression. The results are tabulated as follows: Table 9.11 (Gaming), Table 9.12 (Research Fixation), Table 9.15 (Academic freedom), Table 9.17 (Smoothing), Table 9.19 (Time cycle), and Table 9.21 (Mobility).

As the model estimation requires observations with complete responses, those with missing values are discarded. For the Gaming model, there are a total 305 observations, but only 241 are usable as the other 64 are incomplete. The final sample sizes for the other models are: Research Fixation (246), Academic Freedom (250), Smoothing (254), Time Cycle (253), and Mobility (246).

9.7.1 MODEL EVALUATION

Although the dependent variable in logistic regression does not have 'variances' in the same way continuous variables do in (classical) regression, maximum likelihood procedures provide model fit measures analogous to those from least squares regressions. To test the model significance, we compare a model knowing the independent variables to a model not knowing the independent variables, as in the F test for least squares regression. In standard regression, the total sum of squares follow from a model not knowing the independent variables, the error sum of squares from a model knowing the independent variables, and the difference indicates the improvement due to the independent variables. In logistic regression the same principle is applied.

The first step in evaluating the model is to test for goodness of fit. The goodness of fit test is performed with the likelihood ratio (LR) statistic, derived as:

$$\text{LR statistic, } \lambda = -2[\log L_{\Omega} - \log L_{\omega}]$$

The baseline log likelihood (L_{Ω}) multiplied by (-2) represents the likelihood of producing the observed data with parameters for the independent variables equal to zero, and is analogous to the total sum of squares in classical regression. The model log likelihood (L_{ω}) multiplied by (-2) represents the likelihood of producing the observed data with the estimated parameters for the independent variables in the model. This is analogous to the error sum of squares used in classical regression. The difference between the two log likelihoods represents the improvement in the model due to the variables. The test statistic, λ , has a chi-square distribution (χ^2) with $k-1$ degrees of freedom (d.f.). There are 28 d.f. for the models being tested here. The critical value is obtained from the chi square distribution and is used to test the hypothesis that all betas (excluding the constant) are equal to zero. The null hypothesis is rejected if the χ^2 value meets the 5% level of significance at $k-1$ degrees of freedom. The null hypothesis is a restricted model as it only has a constant as an independent variable.

These two log likelihoods define an analogy to a proportional reduction-in-error measure in regression:

$$R^2 = [(-2 \ln L_{\Omega}) - (-2 \ln L_{\omega})] / (-2 \ln L_{\Omega})$$

However, the measure does not represent explained variance since log likelihood does not deal with variance in the form of sum of squared deviations. This measure is referred to as pseudo R^2 . Cox and Snell (1989) raised the ratio of the

likelihood values to the power $2/n$ and Nagelkerke (1991) suggested a further adjustment to the Cox and Snell measure to ensure a maximum of 1. These measures are also reported here, but they should be interpreted with caution as R^2 is of questionable value in dichotomous dependent variable models (Aldrich and Nelson, 1984).

In addition to evaluating the LR statistic, the model is tested for its accuracy in predicting how the variables should be grouped. In theory, an independent holdout sample would be required for validating this predictive ability. But, as this would reduce the original sample size thereby compromising the significance test if the sample size is less than 100 (see Loong, 1997: p. 54), the entire dataset is used to estimate the logistic regression. Furthermore, it is acceptable to use the classification ability as its prediction ability (Valcarcel and Quintana, 1998: Pampel, 2000). Henceforth, the term prediction shall be used in place of classification.³

A more accurate model would require that the percentage of correctly predicted cases exceed the percentage predicted by choosing the percentage in the largest category of the dependent variable (Long, 1997: pp. 107-108). Therefore, for example, the prediction ability of the gaming dependent variable should exceed 70%, the percentage of the surveyed academics who do not practice gaming. The prediction accuracy for each model is obtained by assigning the same weight to each individual variable and taking 50% as the cut-off point. This cut-off point is

³ In this case, it is the classification ability of the model that is being developed. In theory, the test or the prediction ability requires it to be done on a holdout sample.

set as the *a priori* probability, which is the optimal prediction rule if the cost of both types of error is equal (Valcarcel and Quintana, 1998). The Type 1 Error, or false negative, refers to the prediction that an academic disagrees to adopting certain behaviour when he actually adopts it. The Type 2 Error, or false positive would be the case when the existence of a certain behaviour is predicted but does not actually exist.

9.7.2 SIGNIFICANCE OF VARIABLES AND INTERPRETATION

Similar to classical regression, the size of the coefficient relative to its standard error is the basis for testing the significance in logistic regression. The Wald statistic is used to test for significance of the coefficient. This statistic is equal to the square of the ratio of the coefficient divided by its standard error and has a chi-square distribution. A significant Wald statistic rejects the null hypothesis ($H_0: \beta = 0$) and accepts the alternative hypothesis ($H_1: \beta \neq 0$).

To interpret the results of the models, the odds ratios and their 95% asymptotic level of confidence are calculated. The odds ratio of the independent variable X_j is defined as the quotient of the ratio of probability of behaviour existence and non-existence of two individuals identical except with respect to X_j , which is given an additional value of 1 for the first individual (Valcarcel and Quintana, 1998: p. 96). In general, the antilog of the j th slope coefficient is the odds ratio. Subtracting one from the odds ratio and multiplying it by 100 yields the percentage change in the odds for a unit increase in the j th regressor, which for the dummy variables is the difference between the two groups.

9.7.3 MARGINAL EFFECT AND PROBABILITIES

After evaluating the model and testing the significance of the betas jointly and separately, more information is extracted by investigating the odds ratios, marginal effect of the variables, and the probabilities for various combinations of attributes.

9.7.3.1 MARGINAL EFFECT

The marginal effect of the model is the partial derivative of the non-linear equation relating the independent variable to the probabilities. It represents a straight line that meets the logistic curve at a single point without crossing to the other side of the curve (Figure 9.1). The tangent identifies the slope only at that point and its slope shows the linear change in the probability for a one-unit change in the independent variable defined at a single point on the logistic curve.

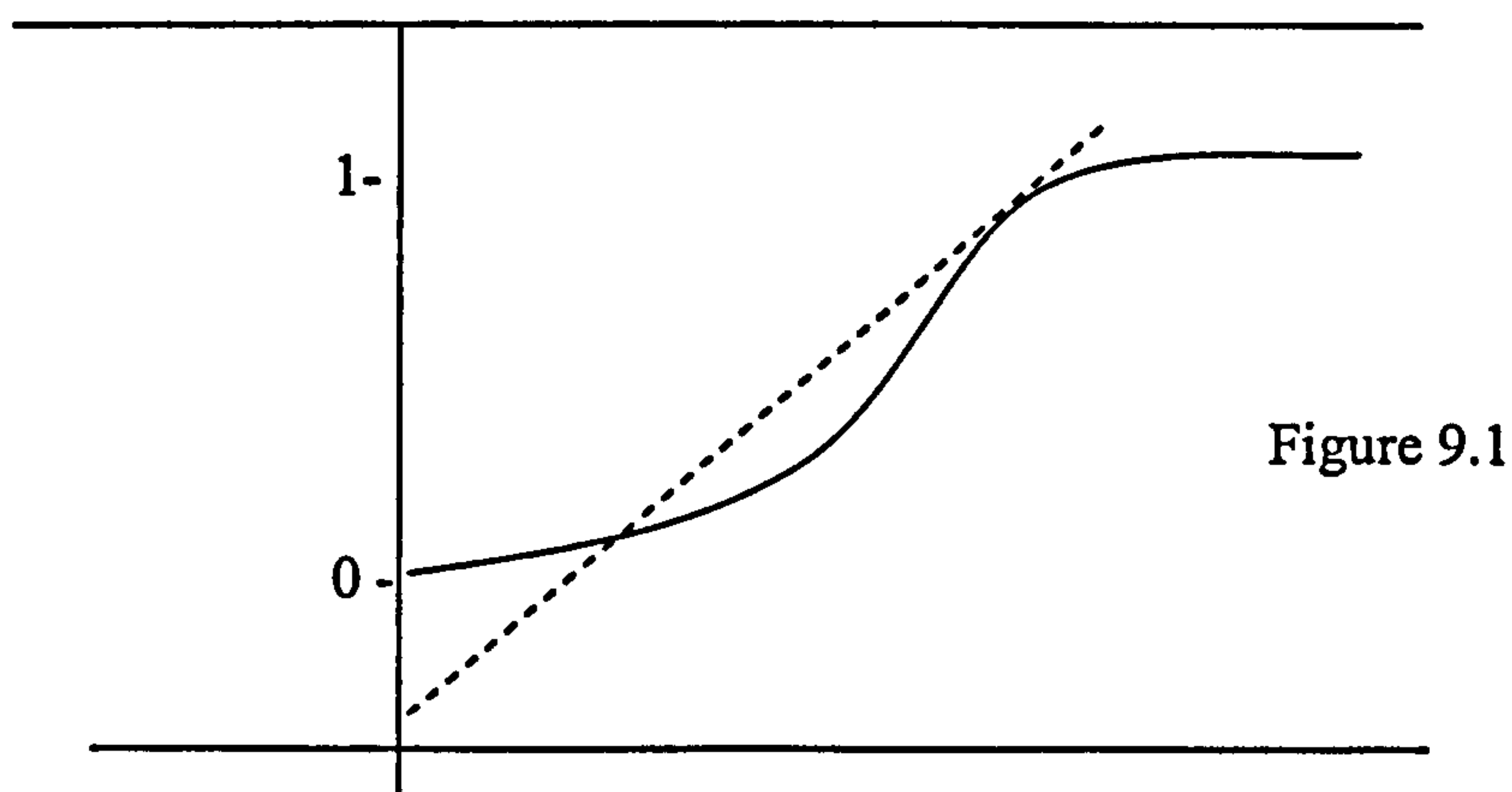


Figure 9.1

The linear slope of the tangent line comes from an equation for the partial derivative. The marginal effect or partial derivative is written as:

$$\partial P / \partial X_k = \beta_k \times P \times (1 - P)$$

The above formula demonstrates the non-additive and non-linear nature of the relationship with probabilities. The effect varies with P , and P varies with the values for the other independent variables. Given the difficulties of describing a non-linear and non-additive relationship with a single coefficient, statisticians disagree over whether it is worthwhile even to calculate a single partial derivative (DeMaris, 1990, 1993; Roneck, 1993). However, given the tendency of researchers and published research to report in terms of proportions or probabilities, the marginal effect is used here to supplement other statistics. However, it is noted that it would be misleading to generalise on the basis of a singular marginal effect as it relates to a single point. The marginal effect is thus calculated at three separate levels.

A “common” method for deriving the marginal effect (Gujarati, 1995; Enomoto, 1999) is to calculate it at $P = [\text{odds ratio} / (1 + \text{odds ratio})]$ (see the “Est” columns in the tables).

The partial derivative works best with continuous variables for which small changes in the independent variables that define the tangent are meaningful. For the dummy variables, the relevant change occurs from 0 to 1, and the tangent for small changes in X makes less sense since the explanatory variables are all categorical variables classified in sets of dummy variables. Instead, it is possible to compute the predicted probability for each group and the difference is the marginal effect. The calculated group difference in probabilities, like the partial derivative, varies with the point chosen on the logistic curve, the X values and the P values. Greene (1997), however, has shown that in a binomial logit model, the

marginal effect calculated by the “common” method gives a good approximation of the difference in the two probabilities when the Xs are evaluated at their respective sample means. Enomoto (1999) adopted this methodology in examining the role of race, age, gender, income and education as factors affecting public attitudes towards the O.J. Simpson trial and the American criminal justice system. The only continuous variable in his model is age; all the other variables are binary variables. The same methodology as Enomoto’s is used to calculate the ‘first’ marginal effect for the “Est” columns in the tables.

In addition to the “common” method, the marginal effect is computed at two other separate points. The second approach is the ‘mean’ method for deriving the marginal effect for the “actual” column in the tables. This is done in the following four steps (Pampel, 2000):

- a) Obtain the predicted logit for the omitted group at P_o equal to the sample proportion. For example, as Gaming has an observed frequency of 30% who practise gaming, set the P_o value at 0.3. Therefore, $L_o = \ln (P_o / (1 - P_o)) = \ln (0.3 / 0.7) = 0.4286$.

- b) Obtain the logit for dummy variable group; $L_d = L_o + \beta$

- c) Calculate the probability (P_d) for dummy group;

$$P_d = 1 / 1 + e^{-L_d}$$

- d) Calculate the difference between probability (P_d) for dummy group and P_o for omitted group.

The difference in Step d is the marginal effect computed under the 'mean' method.

A third method for obtaining the marginal effect is to use the reference category as the probability for the omitted group. This is displayed in the tables under the column labelled (REF CAT). The probability is first calculated with only the constant, and is then calculated with the constant plus the dummy variable coefficients.

As it may be misleading to rely on singular measures for the marginal effects especially for dummy variables, the marginal effects depend on the point on which they were calculated, as they are influenced by the other independent variables as well. However, the notion behind marginal effects and the further insight it can offer renders it difficult to neglect. That and the tendency of researchers to report marginal effects induced us to report them. We, nevertheless, did not wish to mislead the reader by reporting a singular measure for marginal effects. Therefore, we calculated the three separate measures for marginal effects and displayed the probability of an 'agree' response for various combinations of the independent (dummy) variables. The probabilities were calculated by altering the characteristics (the independent variables) one at a time, to give further insight into the marginal effect on the probability by a one-unit change in the dummy variable(s). In this approach, we provided the reader with

alternative measures for the marginal effect in order to gain a better insight. We preferred to leave it to the reader to decide for himself the degree of reliability to place on the marginal effects and inferences there. We have, however, made inferences from the marginal effect measures, but primarily to corroborate the odds ratio measures.

9.7.3.2 PROBABILITIES

The probabilities for each behaviour measure under various combinations of attributes with a focus on academics from Business and Management Studies are computed and displayed in Table 9.29. The attributes are changed one at a time so that the marginal effects at that point could also be identified. The combinations are based on a lecturer in BMS with 15-20 years of experience, in a department rated 4 in the 1996 RAE and that is the average for the lecturer's university which is an ex-UGC institution. The lecturer is below 40 years old, has a PhD and is quite active in research. As each variable is changed, while holding others constant, the probability is calculated.

9.7.4 MODEL SIMPLIFICATION (BACKWARD STEPWISE-LR)

The final procedure is to obtain a simplified and parsimonious model. It is based on the premise that a model should be as simple as possible - with only a few key variables - to capture the essence of the phenomenon under study (Friedman, 1953). Since specification errors due to irrelevant variables are less serious than the case where variables are omitted; the 'full' model is first derived and tested. Then the irrelevant variables are removed by the backward stepwise-LR method⁴,

⁴ The forward stepwise and Wald methods yield similar results.

where the variables are removed one at a time such that the chi-square value is improved to arrive at the final parsimonious model. Purists who argue that the model specification ceases to be independent of the data consider the stepwise regression techniques somewhat dubious. However, the use of such techniques here is considered valid as an investigative tool to observe the influences that might be behind the responses.

9.8 LOGISTIC REGRESSION EMPIRICAL RESULTS

The results are presented for each of the dependent variable models in this section. A discussion of the interpretation of logistic regression models has been provided in Chapter Three.

9.8.1 GAMING

The diagnostics for this model are: chi-square statistic of 45.504 with 28 degrees of freedom, and a 0.0196 tail probability. These allow for the rejection of the hypothesis that all betas are equal, at the 5% significance level. The pseudo R^2 is 15% while the Nagelkere R^2 is 24%. The model results are displayed in Table 9.11. At the 50% cut-off point, the model correctly predicts 75% of the cases. This is an improvement from the 70% of the cases in the "no gaming" category. The model has high prediction accuracy for no gaming. If the cut-off point is set at the probability of 30%, the prediction accuracy for gaming improves substantially.

At the 5% level, the Wald statistic is significant for the level of research activity (RESACT). The only other variable where the $H_0: \beta = 0$ is rejected at the 5%

significance level, is the dummy variable for 3 b department rating in the 1996 RAE. The coefficients are significantly different from zero at the 10% significance level for EDUC, BUZ, EXP3 (10-15 years), and AVR-higher. We could not reject the hypothesis that beta is equal to zero for all the other variables.

The odds ratios for department ratings show that academics in the non-funded departments (1 and 2) have a lower propensity to game than those in the funded departments. The most striking case is that of academics in departments rated 3b; their 4.7304 odds ratio implies that they are 4.7 times as deliberate as academics in non-funded departments to game. Relative to non-funded departments, those rated 5 and 5* have odds ratios of 3.5 and 1.7, respectively.

Academics who are quite or moderately active in research are the ones most ready to game. The odds ratio of the quite active shows they are almost 10 times as likely (or almost 900% more) to game than if a researcher is inactive in research, although the confidence interval of 95% is broad, between 1 and 59. The odds ratio for moderate researchers is 500% higher. The 6.08 odds ratio for the moderate researchers implies that 608 moderate researchers practise gaming for every 100 inactive researchers who do so. The very active researchers are only twice more likely than the inactive to practise gaming, however the Wald statistic is not significant for the very active.

The marginal effect of the research activity variable is very high when calculated by the mean method; 50% for the quite active, and 42% for the moderate group. However these marginal effects, calculated at different points are reduced to 20%.

The backward stepwise (LR) method in SPSS is used to arrive at a more parsimonious model. The only variable left in the model is the level of research activity. The resultant model is:

$$P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-Z_i}}$$

where:

$$Z_i = -2.1365 + 1.6256 (\text{if RESACT} = \text{Moderate}) + 1.8851 (\text{if RESACT} = \text{Quite}) + 0.8061 (\text{if RESACT} = \text{Very})$$

The simplified model has a prediction accuracy of 70.54%, with zero accuracy in predicting gaming, and 100% accuracy in predicting no gaming. However, on the basis of the *a priori* estimate of 30% as a cut-off value, the prediction accuracy is 62%. The simplified model statistics and coefficients are in Table 9-12.

9.8.2 RESEARCH FIXATION

The model has a chi-square statistic of 39.835 with 28 degrees of freedom, and a 0.0684 tail probability. Therefore, the hypothesis that all betas are equal to zero cannot be rejected at the 5% significance level, but is rejected at the 10% level. Since the chi-square does not exceed the critical value (at 5% significance), the independent variables do not significantly influence the dependent variables. But, at the 10% level of significance they do influence the dependent variable. The results should be viewed with this in mind. The pseudo R^2 is 12% while the Nagelkere R^2 is 20%. The model results are displayed in Table 9.13. It appears that research fixation, i.e., where academics concentrate on research at the

expense of the other relevant activities, is not significantly influenced by an academic attribute.

The only variable where the $H_0: \beta = 0$ is rejected at the 5% significance level is the dummy variable for an academic in a senior lecturer post. The model correctly predicts 66% of the cases at the 50% cut-off point. This is an improvement from the 59% of the cases in the no agreement category. Setting as a cut-off point, the *a priori* probability of 41%, the prediction accuracy is 63% overall (as well as the specificity and sensitivity). These results need to be viewed with care as the model is significant only at the 10% level.

The model is simplified by using the Backward Stepwise (LR) method where variables are removed one at-a time based on improving the chi-square values. The resultant model has a chi square value of 14.7859 at 5 degrees of freedom. The summary results of the model are in Table 9.14. The hypothesis that the variables in the equation are all equal to zero is rejected at the 5% significance level. The parsimonious model is:

$$P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-Z_i}}$$

where:

$$Z_i = 0.4484 - 1.0251 (\text{if Discp} = \text{Science}) - 1.0255 (\text{if POST} = \text{Prof.}) - 0.85 (\text{if POST} = \text{Reader}) - 0.621 (\text{if POST} = \text{Prin. Lecturer}) - 1.05 (\text{if POST} = \text{Senior Lecturer})$$

The variables in the final equation are only the dummy variables for Post and the Science discipline. The results indicate that the academics in the Science discipline are 65% less likely to have research fixation than academics in other

fields. On average, lecturers have the highest probability of having a research fixation; the odds of having a research fixation for other posts is about 60% lower.

9.8.3 SMOOTHING

The model has a chi-square value of 49.309 with 28 degrees of freedom, and a 0.0077 tail probability. Therefore the hypothesis that all betas are equal to zero is rejected at the 5% significance level. The pseudo R^2 is 15%, while the Nagelkere R^2 was 24%. The model results are displayed in Table 9.17.

The model correctly predicts 68% of the cases at the 50% and 36% cut-off points. The observed frequencies of those who agreed to practise smoothing are 36%. The model has a high prediction accuracy for agreement to smoothing practices behaviour when the *a priori* cut-off point is used (74% prediction accuracy).

The coefficients associated with the level of research activity (RESACT), the dummy variable for EXP3 (10-15 years) and Liberal discipline were significant at the 5% significance level. We could not reject the hypothesis that beta is equal to zero for all the other variables.

The greatest tendency for smoothing is among academics who are moderately active or quite active in research. The odds ratio for the moderate active shows that smoothing is 14 times greater than if he is inactive in research (or 1300% higher), although the 95% confidence interval is very broad, between 2.5 and

81.8. The 12.43 odds ratio for the quite active researchers implies that about 1243 quite active researchers practise smoothing for every 100 inactive researchers who do so. The very active researchers are more than six times more likely than the inactive ones to practise smoothing. Unsurprisingly, this behaviour is not typical of the inactive researcher who barely has enough research capabilities to have such an option. It is the average researcher who aggressively smoothes the research output.

When computed with the mean method, the marginal effect of the research activity variables is high, over 50% for the moderate and quite active and 42% for the moderate group. But, when calculated at the different points, the marginal effects are reduced to around the 20% region.

The EXP variable reveals some interesting results. New academics (those with less than 10 years of experience) are less likely to practise smoothing. However, this finding conflicts with the results from the age group classification where younger academics are 170% more likely to game than academics who are over 50 years of age. The marginal effects, at the mean, for EXP1 (less than 10 years experience) and aged below 40 are -0.072 and 0.243, respectively. It should be noted that these two variables are not significant at the 5% level. The null that $H_0: \beta = 0$ cannot be rejected. For Age Below 40, the Wald statistic is significant only at the 10% level. The difference could be due to respondents who are older but have less academic experience, having joined academia later in life. Another explanation might be that they do not have PhDs. Typically, a person who joins the academic profession without a PhD would start his academic career in his

mid/late twenties. He would then have over ten years experience and be below 40 years old. Our results show that an academic without a PhD has an odds ratio of 1.1756 and marginal effect of 3.8% at the mean point, but have beta coefficients that do not significantly differ from zero. Academics below 50 years of age, especially those below 40, and particularly those with 15 to 20 years of experience, show a greater tendency to smooth their research output. Academics with 15-20 years of experience are five times more likely to practise smoothing than those with over 20 years of experience. This experienced group had the highest propensity to practise smoothing. This is probably because they are in the high-risk category of being asked to retire early.

The Liberal discipline is the only variable that is significant and has an odds ratio much higher than other disciplines. Academics in Liberal disciplines are over 200% more likely to practise smoothing than academics in the other disciplines. The odds ratio is 3.3434 and the marginal effect, at the mean point, is 29%. This is probably due to the nature of published research of the liberal disciplines.

The Backward Stepwise (LR) method in SPSS is used to arrive at a more parsimonious model. The resultant model is in Table 9.18. The improved model has a chi-square value of 36.9611, with 10 degrees of freedom. The hypothesis that the variables in the equation are all equal to zero is rejected at the 5% significance level. The prediction accuracy of 65%, at the *a priori* cut-off of 36%, and 67% at the 50% cut-off is not much different from the observed 64% for those who claim to disagree to smoothing.

9.8.4 TIME-CYCLE

This model has a chi-square value of 56.38, with 28 degrees of freedom, and a 0.0012 tail probability. Therefore the hypothesis that all betas are equal to zero cannot be sustained at the 5% significance level. The pseudo R^2 is 16%, while the Nagelkere R^2 is 27%. The results of the model are displayed in Table 9-19.

The model correctly predicts 73% of the cases at the 50% cut-off point, and 68% at the 41% cut-off. This is an improvement from the 59% of the cases in the no agreement category. The model also has a high level of accuracy in predicting the agreement with behaviour arising from the time-cycle effect.

The level of research activity (RESACT) is statistically significant at the 5% significance level. The quite active category provides "positive evidence" (Raftery, 1995 grading) for inclusion as a variable in the equation. The dummy variable for the very active, however, is not significant. The other variable where the $H_0: \beta = 0$ is rejected at the 5% level is the dummy for department rating 3b, and Age group between 40 – 50 years. The hypothesis that the betas are equal to zero for all other variables, at the 5% level, cannot be rejected.

The highest proclivity for the time-cycle effect is among academics who are moderately active or quite active in research. For the moderate active, the odds ratio suggests they are eight times or 700% more likely to be affected by time cycles than if the academic is inactive in research. The 12.82 odds ratio for the quite active means that about 1282 quite active researchers have a time-cycle effect for every 100 inactive researchers who do so. The very active researchers

are over three times more likely than the inactive to react to the time-cycle of the RAE.

The RAE time-cycle has the greatest effect on academics from departments rated 3b. The results also indicate that the younger the academic, the more likely he would agree that his behaviour is influenced by the time-cycle. Those in the age group below 40 have an odds ratio of 2.8480 and those between 40-50 an odds ratio of 2.1878.

The variables are removed one at a time based on improvements to the chi-square value. The resultant model is shown in Table 9.20. The revised model has a chi-square value of 40.382, with 11 degrees of freedom. The hypothesis that the variables in the equation are all equal to zero is rejected at the 5% significance level. The prediction accuracy of 67% (with 41% cut-off), and 70% (with 50% cut-off) is not much different from the original model. Therefore, a simpler model based on only the Liberal discipline, RAE Ratings, Age, Research Activity, and the constant is possible without compromising the prediction ability.

9.8.5 ACADEMIC FREEDOM

The model has a chi-square value of 49.604, with 28 d.f., and a 0.0072 tail probability. Therefore, the hypothesis that all betas are equal to zero is rejected at the 5% significance level. The pseudo R^2 is 16%, while the Nagelkere R^2 is 25%. The results of the model are displayed in Table 9-15.

The model correctly predicts 74% of the cases at the 50% cut-off point and 70% at the 30% cut-off point. This is a slight improvement from the 70% of the cases in the no agreement category.

The only variable where the $H_0: \beta = 0$ is rejected, at the 5% significance level, is the Age group. The odds ratio is 4.1529 for the below 40 years age group and 2.4975 for the age group category between 40 and 50. The hypothesis that the betas are equal to zero for all the other variables (at the 5% significance level) cannot be rejected.

The variables are removed one at a time one, based on improving the chi-square value. The final model's summary statistics are in Table 9.16. The improved model has a chi-square value of 35.75, with 10 degrees of freedom. The hypothesis that the variables in the equation are all equal to zero is rejected at the 5% significance level. The prediction accuracy of 66% (cut-off at the 30% *a priori* cut-off) and 72% (at 50% cut-off) is not significantly different from the initial model. Therefore, with variables such as the RAE Ratings, Age, and Research Activity as predictors, and a constant, a simplified model is attained without losing prediction ability.

In the final parsimonious model, the department rating 4 and 3b, as well as age are significant at the 5% significance level. Academics in departments rated 3b are six times more likely than academics in non-funded departments to adopt behaviour infringing on academic freedom.

9.8.6 MOBILITY

The model does not fit well. The hypothesis that all betas are equal to zero, at the 5% significance level, cannot be rejected. The only variable for which the coefficient is significantly different from zero, at the 5% significance level, is the dummy variable for the Principal Lecturer post. The results are displayed in Table 9.21. It seems that the belief in the mobility effect of the RAE does not depend on an academic's attributes. The high percentage (83%) of academics that agreed to the mobility belief indicates that academics across all attributes agree that the RAE has influenced mobility.

The Backward Stepwise (LR) method is used to remove variables one at a time, based on improvements to the chi-square value. The summary results of the revised model are in Table 9.22. This model has a chi-square value of 18.632, with 7 degrees of freedom. The hypothesis that the variables in the equation are all equal to zero is rejected at the 5% significance level. The prediction accuracy is 64% (cut-off at the 83% *a priori* cut-off) and 83%(at a 50% cut-off rating). The variables that remain in the simplified model are only Post and Research Activity, and the constant. The hypothesis that the research activity betas are different from zero cannot be rejected. The results indicate that the quite active and inactive lecturers have the greatest belief that the RAE has influenced mobility. The odds of a lecturer agreeing that the RAE has increased mobility is higher by 80% compared to professors or senior lecturers, 87% vis-à-vis principal lecturers, and 55% in relation to readers.

9.9 DISCUSSION OF THE LOGISTIC REGRESSION RESULTS

The models test six behavioural outcomes that are predicted to be influenced by the RAE. The same explanatory variables are used in estimating the models for all the behaviours in order to facilitate the comparisons between the models, and in identifying the profile of the academic who is most likely to be influenced by the RAE. For each behavioural category in Table 9.23 through Table 9.28, the table shows the profile of the academic with the highest probability and lowest probability for each institution type⁵ (ex UGC and ex PCFC) and also for BMS UoA for each institution type.

The matrix in Table 9.30 shows the attributes of academics in the former UGC institutions with the highest probability for each behaviour measure. It is the young Lecturer who is less than 40 years of age, has no PhD, and in a Liberal discipline who would be most affected by the RAE. He would be quite active in research and most likely to be in a department rated 3a or 3b where the university average rating is similar. For ease in viewing the table, the attributes that are different are italicised. There are two caveats to the results. The first caveat is that it is unlikely that a lecturer who is less than 40 years old would have more than 15 years of academic experience. However, we maintained that combination to highlight the highest probability in each variable category. The second caveat is that the betas of some of the variables are not significantly different from zero, though the models themselves are significant. The exceptions are mobility and research fixation that are significant only at the 10% level. The probability analysis must take these caveats into consideration.

TABLE 9-30

Attribute	Gaming	Research Fixation	Time Cycle	Smoothing	Academic Freedom	Mobility
Discipline	Liberal	Liberal	Liberal	Liberal	Liberal	Other
Experience	15-20	> 20	15-20	15-20	15-20	15-20
Dept. rating	3b	3a	3b	3a	3b	4
Average rating	Av.	Av.	Av.	Av.	Av.	Lower
Post	Lecturer	Lecturer	Prof.	Lecturer	Prof.	Lecturer
PhD	No	No	No	No	Yes	Yes
Age	< 40	40 - 50	< 40	< 40	< 40	< 40
Research Active	Quite	Quite	Quite	Moderate	Quite	Inactive

The probabilities of various attribute combinations for academics in BMS are summarised in Table 9.29 to show the differences in predictability between academics with different attributes, and also to aid in the analysis of the effects of different combinations on the odds of certain behaviours. The marginal effects can be calculated from Table 9.29, at that point. For example, the only difference between the first two rows is in the department rating. The first row is a department rated 1 or 2 while the second row a department rated 3b. The differences in the probability between the two rows are the marginal effects of being in a department rated 3b, at that point of reference. The marginal effects for the department rated 3b calculated from Table 9.29 are: Gaming (0.22), Research Fixation (0.156), Smoothing (0.094), Academic Freedom (0.1344), Time Cycle (0.1948), and Mobility (-0.002). The probability can be worked out for any combination and the corresponding marginal effects can be calculated.

⁵ The principal lecturer post is applicable only at the former PCFC institutions, and they are assumed to be research inactive in this study.

9.10 CONCLUDING REMARKS

Table 9.31 contains the summary of the significant variables for each of the models.

TABLE 9.31

Gaming	Research Fixation	Time Cycle	Smoothing	Academic Freedom	Mobility
Rating 3b	Senior Lect.	<u>AGE:</u> 40 – 50 Rating 3b	Liberal EXP (15-20)	<u>AGE:</u> < 40 40 – 50	Prin. Lecturer
<u>Res. Active:</u> Moderate Quite		<u>Res. Active:</u> Moderate Quite	<u>Res. Active:</u> Moderate Quite Very		

Table 9-32 displays the variables in the final simplified model obtained by the Backward Stepwise LR method.

TABLE 9.32

Gaming	Research Fixation	Time Cycle	Smoothing	Academic Freedom	Mobility
Research Activity	Science	Liberal	Liberal BMS		
			EXP		
		RAE Rating		RAE Rating	
			Av. Rating		
	POST				POST
		AGE		AGE	
		Research Activity	Research Activity	Research Activity	Research Activity

As can be seen from Table 9.32, research activity is clearly the most significant influencing factor. This is not surprising as the RAE measures research output.

The final model for gaming shows that research activity is the main predictor variable. The prediction ability was 70% and 62% only when taken at an *a priori* cut-off. The results show that it is the average researchers who are most likely to *game*, and that the very active researchers would engage in such activities about two times more than the inactive ones. The RAE goal-setting has stimulated the search for task strategies (Earley et al, 1989; Locke and Latham, 1990), including

the adoption of dysfunctional strategy plans. The perceived level of goal difficulty influences the behavioural response.

As mentioned earlier, the gaming measure incorporates the time-cycle effect, smoothing and academic freedom. The smoothing construct refers to the timing for the release of publications. The final equation for smoothing has a prediction accuracy of 67%. The average researchers are 12 or 13 times more likely than the inactive ones to smooth their output. The high odds ratio is due to the presumably almost non-existence of smoothing practices among the inactive. Examining the relative odds ratios for the average and very active researchers, the average ones are more likely to practise smoothing twice more than the very active staff, while for the gaming model, the odds ratios are almost three as to one. This provides evidence of the *four-paper* effect on the middle-tier academics.

There seems to be a (qualified) linear relationship between smoothing practices and experience. Smoothing practices increase with experience, but drastically decrease for academics who have over 20 years of experience. These academics are presumably nearing retirement, and hence, generally have less drive to strategically schedule their publications. The more experienced academics are under more pressure to publish. The disciplines that staff belong to affect smoothing and this is the most apparent in the cases of the Liberal and BMS disciplines.

The other factors that influence gaming are the choice of research topic (academic freedom) and the time-cycle effect. Apart from the research activity level, the RAE rating and staff age are significant explanatory variables in the final model for both. The younger the academic, the greater the likelihood that he would be swayed by external factors when choosing research topics. Furthermore, his behaviour is also more liable to be influenced by the time-cycle. This is understandable, as older academics would have established their specialisation of research. A worrying possibility in this development is that policy makers through the RAE could determine the academic's choice of topic thus stifling any form of creativity or initiative. These concerns have been addressed in Chapter Eight. The scholars who are the most reactive would probably be in departments rated 3b since they exhibit an odds ratio of 6.01. This is also true for the time-cycle construct where the odds ratio for departments with a rating of 3b is 4.43. The consequence of the *four-paper* effect is thus extended from the middle-tier academics to the middle-tier departments.

The final model for research fixation shows that academics in higher positions exhibit a lower degree of this feature. Lecturers concentrate on research at expense of other activities, presumably because of the belief that it improves their career prospects. The final model for mobility belief confirms that lecturers would concur that the RAE influences mobility and pay. The younger academics focus on research and develop strategies, not only the functional but also the dysfunctional strategies, in order to enhance their research.

In conclusion, the RAE seems to have the greatest impact on the behaviours of the average or middle-tier academic. The major variables influencing behaviour are the level of self-assessed research activity, age, and RAE ratings. Despite the survey evidence that the RAE has been responsible for influencing many aspects of academic life, it is noted that these behaviours could also be due to other sources besides the RAE. Nevertheless, the purpose of the survey is to pin down the behaviours that the RAE is most likely to induce.

Units of Assessment in each classification.

		<u>Frequency</u>																																										
1.	Science classification:	25																																										
	Academics in the following Units of Assessment were grouped under “Science”:																																											
	<table><tr><td><u>UoA No.</u></td><td>UoA title</td></tr><tr><td>1</td><td>Clinical Laboratory Science</td></tr><tr><td>2</td><td>Community Based Clinical Subjects</td></tr><tr><td>3</td><td>Hospital based clinical subjects</td></tr><tr><td>4</td><td>Clinical Dentistry</td></tr><tr><td>5</td><td>Pre-clinical studies</td></tr><tr><td>6</td><td>Anatomy</td></tr><tr><td>7</td><td>Physiology</td></tr><tr><td>8</td><td>Pharmacology</td></tr><tr><td>9</td><td>Pharmacy</td></tr><tr><td>10</td><td>Nursing</td></tr><tr><td>11</td><td>Other studies and professions Allied to Medicine</td></tr><tr><td>12</td><td>Biochemistry</td></tr><tr><td>13</td><td>Psychology</td></tr><tr><td>14</td><td>Biological Sciences</td></tr><tr><td>15</td><td>Agriculture</td></tr><tr><td>16</td><td>Food Science and technology</td></tr><tr><td>17</td><td>Veterniary Science</td></tr><tr><td>18</td><td>Chemistry</td></tr><tr><td>20</td><td>Earth Sciences</td></tr><tr><td>21</td><td>Environment Sciences</td></tr></table>	<u>UoA No.</u>	UoA title	1	Clinical Laboratory Science	2	Community Based Clinical Subjects	3	Hospital based clinical subjects	4	Clinical Dentistry	5	Pre-clinical studies	6	Anatomy	7	Physiology	8	Pharmacology	9	Pharmacy	10	Nursing	11	Other studies and professions Allied to Medicine	12	Biochemistry	13	Psychology	14	Biological Sciences	15	Agriculture	16	Food Science and technology	17	Veterniary Science	18	Chemistry	20	Earth Sciences	21	Environment Sciences	
<u>UoA No.</u>	UoA title																																											
1	Clinical Laboratory Science																																											
2	Community Based Clinical Subjects																																											
3	Hospital based clinical subjects																																											
4	Clinical Dentistry																																											
5	Pre-clinical studies																																											
6	Anatomy																																											
7	Physiology																																											
8	Pharmacology																																											
9	Pharmacy																																											
10	Nursing																																											
11	Other studies and professions Allied to Medicine																																											
12	Biochemistry																																											
13	Psychology																																											
14	Biological Sciences																																											
15	Agriculture																																											
16	Food Science and technology																																											
17	Veterniary Science																																											
18	Chemistry																																											
20	Earth Sciences																																											
21	Environment Sciences																																											
2.	Physics.	21																																										
	19. Physics																																											
3.	ENGN (Engineering)	40																																										
	25. Computer Science																																											
	26. General Engineering																																											
	27. Chemical Engineering																																											
	28. Civil Engineering																																											
	29. Electrical and Electronic Engineering																																											
	30. Mechanical, Aeronautical and Manufacturing Engineering																																											
	31. Mineral and Mining Engineering																																											
	32. Metallurgy and Materials																																											

4.	BMS (Business and Management Studies)	53
43.	Business and Management Studies.	
5.	Liberal	20
45	American studies	
46	Middle Eastern and African studies	
47	Asian Studies	
48	European Studies	
49	Celtic Studies	
50	English Language and literature	
51	French	
52	German, Dutch and Scandinavian languages	
53	Italian	
54	Russian, Slavonic and East European languages	
55	Iberian and Latin American languages	
56	Linguistics	
57	Classics, Ancient History, Byzantine and Modern Greek studies	
58	Archaeology	
59	History	
60	History of Art, Architecture and Design	
61	Library and Information management	
62	Philosophy	
63	Theology, Divinity and Religious studies	
6.	EDUC (Education)	12
68	Education	
7.	BUZ (Business Related)	26
24	Statistics and Operational Research	
38	Economics and Econometrics	
40	Social policy and Administration	
44	Accountancy	
8.	Other (All other disciplines)	44
22	Pure Mathematics	
23	Applied Mathematics	
33	Built Environment	
34	Town and Country Planning	
35	Geography	
36	Law	
37	Anthropology	

41	Social work
42	Sociology
64	Art and Design
65	Communications, Cultural and Media studies
66	Drama, dance and performing Arts
67	Music
69	Sports related Subjects.

TABLES

ANOVA Results

[illegible]

TABLE 9-1

The Z critical values for proportion agreeing

Q No.	Statement	No. of responses	Percentage agreeing		Z value at 50%	Z value at 33%	Z value at 25%
			Total				
1	I now spend more time on research than 6 years ago	305	48.8		-0.419	5.868	9.599
2	I now spend more time on research than 6 years ago <u>as a result of RAE</u>	301	35.6		-4.997	0.959	4.247
3	I now spend less time in teaching preparation than 6 years ago	304	47.3		-0.942	5.302	8.979
4	I now spend less time in teaching preparation than 6 years ago <u>as a result of RAE</u> pressure on research	301	29.8		-7.009	-1.181	1.923
5	I now give less time than 6 years ago to "voluntary" academic activities-e.g. referring for journals	304	40.9		-3.173	2.929	6.402
6	I now give less time to activities given no or low recognition by RAE	304	55.0		1.744	8.158	12.080
7	The RAE has had a positive effect on my research output	304	38.9		-3.871	2.188	5.597
8	Because of RAE I now spend less time in voluntary academic work	300	41.5		-2.944	3.131	6.600
9	I am feeling more pressure to publish	305	78.9		10.094	17.048	21.739
10	I now (try to) collaborate more with researchers overseas to demonstrate international excellence	304	44.0		-2.092	4.079	7.650
11	I now collaborate less (in research) with academics from other English universities	301	24.1		-8.987	-3.284	-0.361
12	I now collaborate more (in research) with colleagues in my departments	303	44.8		-1.810	4.368	7.960
13	Perceived research preferences of RAE panels have affected my choice of research topic	304	20.8		-10.182	-4.524	-1.691
14	The balance of my research has moved away from the applied end of the spectrum towards more basic pure research	301	19.6		-10.548	-4.944	-2.164
15	In my view RAE has a negative effect on inter-disciplinary research	299	60.1		3.493	9.966	14.017
16	I now do less inter-disciplinary research than 6 years ago	294	23.9		-8.950	-3.318	-0.436
17	Because of RAE time scales I have published some outputs at an earlier stage than I would prefer.	302	40.7		-3.232	2.846	6.301
18	Because of RAE time scales I have deferred the publication of some research output.	303	19.9		-10.479	-4.850	-2.050
19	My research topics or projects are influenced by the RAE time-scale	305	46.2		-1.327	4.903	8.550
20	Because of the RAE time -scales I have avoided some research topics or projects because they would have taken a long time to complete	303	32.0		-6.266	-0.370	2.814
21	Because of the RAE time -scales I have avoided some research projects because they were speculative in nature (more risky in relation to security of output)	302	35.8		-4.935	1.035	4.334
22	I now manage my research publications by <i>smoothing</i> it over the RAE time-scale	299	43.5		-2.248	3.861	7.388
23	The RAE has increased my stress level	304	70.8		7.253	14.016	18.442
24	The RAE has improved the quality of research conducted in universities	297	27.4		-7.790	-2.052	0.955
25	I believe RAE increases staff mobility between institutions	297	64.9		5.136	11.692	15.880
26	I now spend less time on consultancy work (including external lecturing) to concentrate on research	300	37.3		-4.399	1.584	4.920
27	My dept. has expanded research students numbers beyond the capacity to supervise as well as we wish	303	32.7		-6.023	-0.111	3.095
28	I believe that the expansion in research students numbers is due to the RAE funding formula	286	53.7		1.251	7.445	11.209
29	University appointments are now driven by the RAE	305	90.6		14.181	21.393	26.458
30	Universities are paying a 'premium' to attract 'star' researchers	300	88.8		13.441	20.554	25.520
31	Academic researchers pay has increased due to the recognition earned from the RAE	298	25.0		-8.631	-2.937	0.000
32	The RAE four year time cycle is not appropriate for my subject area research.	298	51.9		0.656	6.939	10.724

Table 9-2

Multiple *R* square Adjusted *R* square

Model

ANOVA
F ratio

Sig.

Gaming

0.329

0.108

0.078

3.512

0

Academic Freedom

0.328

0.108

0.078

3.642

0

Time Cycle

0.35

0.123

0.094

4.258

0

Research Fixation

0.352

0.124

0.094

4.172

0

Smoothing

0.295

0.087

0.057

2.903

0.003

Mobility

0.343

0.118

0.088

3.906

0

Table 9-3

CATREG: Model Coefficients

			<u>Gaming</u>	<u>Academic</u>	<u>Time</u>	<u>Research</u>	<u>Smoothing</u>	<u>Mobility</u>
				<u>freedom</u>	<u>cycle</u>	<u>fixation</u>		
Experience	beta		-0.107	-0.0895	-0.121	-0.103	-0.118	0.0939
	SE		0.083	0.08	0.078	0.072	0.082	0.074
	F		1.654	1.256	2.425	2.041	2.082	1.608
	importance		-0.087	-0.061	-0.082	0.019	-0.087	0.128
Dept rating	beta		-0.213	-0.203	-0.255	-0.207	-0.181	-0.173
	SE		0.081	0.071	0.069	0.069	0.072	0.063
	F		6.981	8.268	13.739	8.912	6.412	7.512
	importance		0.303	0.321	0.377	0.197	0.312	0.277
Research Activity	beta		0.083	0.186	-0.167	-0.207	-0.142	0.222
	SE		0.067	0.065	0.068	0.071	0.069	0.065
	F		1.566	8.195	5.975	8.504	4.203	11.526
	importance		0.088	0.298	0.191	0.279	0.167	0.377
Age group	beta		0.171	0.229	0.198	0.0424	0.126	0.16
	SE		0.078	0.075	0.074	0.073	0.079	0.073
	F		4.76	9.423	7.057	0.335	2.58	4.759
	importance		0.282	0.378	0.309	0.021	0.182	0.242
Submission	beta		0.119	0.11	0.0069	0.0549	0.0239	0.0275
	SE		0.066	0.064	0.071	0.073	0.072	0.064
	F		3.263	2.949	0.0095	0.562	0.109	0.183
	importance		0.04	0.023	-0.001	0.043	0.004	0.024
PhD	beta		0.0802	0.0106	0.0229	-0.164	0.0343	0.0379
	SE		0.062	0.06	0.061	0.062	0.062	0.061
	F		1.665	0.076	0.143	6.923	0.305	0.388
	importance		0.057	0.002	-0.005	0.131	0.013	0.009
Perm	beta		-0.0373	0.0106	0.02066	0.0586	-0.0199	0.00062
	SE		0.06	0.058	0.058	0.059	0.059	0.059
	F		0.383	0.033	0.128	0.995	0.115	0.00011
	importance		-0.001	0.004	-0.003	-0.004	-0.002	0
Post	beta		-0.179	-0.0552	-0.168	-0.202	-0.201	0.068
	SE		0.075	0.07	0.064	0.067	0.066	0.067
	F		5.74	0.618	6.656	9.052	9.336	1.046
	importance		0.331	0.062	0.221	0.249	0.43	-0.033
Inst.Type	beta		-0.05117	0.0849	-0.115	-0.142	-0.0379	-0.0612
	SE		0.082	0.072	0.071	0.072	0.072	0.066
	F		0.393	1.376	2.633	3.888	0.277	0.87
	importance		-0.012	-0.023	-0.006	0.065	-0.019	-0.023

Table 9-4

CATREG: Correlation Results

	Correlation	Gaming	Academi	Time	Research	Smoothir	Mobility
			<u>freedom</u>	<u>cycle</u>	<u>fixation</u>		
Experience	zero-order	0.088	0.074	0.083	-0.023	0.064	0.161
	partial	-0.079	-0.068	-0.094	-0.087	-0.087	0.078
	part	-0.075	-0.064	-0.088	-0.082	-0.083	0.073
	importance	-0.087	-0.061	-0.082	0.019	-0.087	0.128
Dept rating	zero-order	-0.154	-0.171	-0.181	-0.118	-0.15	-0.189
	partial	-0.162	-0.172	-0.219	-0.18	-0.151	-0.167
	part	-0.155	-0.165	-0.21	-0.172	-0.146	-0.159
	importance	0.303	0.321	0.377	0.197	0.312	0.277
Research Activity	zero-order	0.115	0.173	-0.14	-0.167	-0.102	0.2
	partial	0.077	0.183	-0.146	-0.176	-0.123	0.205
	part	0.073	0.176	-0.138	-0.168	-0.118	0.197
	importance	0.088	0.298	0.191	0.279	0.167	0.377
Age group	zero-order	0.179	0.178	0.192	0.062	0.125	0.179
	partial	0.134	0.183	0.158	0.036	0.097	0.133
	part	0.128	0.176	0.15	0.033	0.093	0.126
	importance	0.282	0.378	0.309	0.021	0.182	0.242
Submission	zero-order	0.037	0.023	-0.023	0.097	0.015	-0.102
	partial	0.111	0.104	0.006	0.046	0.02	-0.026
	part	0.106	0.099	0.006	0.043	0.019	-0.025
	importance	0.04	0.023	-0.001	0.043	0.004	0.024
PhD	zero-order	0.077	0.016	0.024	-0.099	0.034	0.027
	partial	0.08	0.017	-0.023	-0.16	0.033	0.038
	part	0.076	0.016	-0.021	-0.151	0.032	0.036
	importance	0.057	0.002	-0.005	0.131	0.013	0.009
Perm	zero-order	0.004	0.037	0.017	-0.009	0.009	0.026
	partial	-0.038	0.011	-0.022	0.061	-0.02	0.001
	part	-0.036	0.01	-0.02	0.057	-0.02	0.001
	importance	-0.001	0.004	-0.003	-0.004	-0.002	0
Post	zero-order	-0.201	-0.121	-0.164	-0.153	-0.187	-0.058
	partial	-0.147	-0.048	-0.154	-0.182	-0.182	0.063
	part	-0.14	-0.045	-0.146	-0.173	-0.176	0.059
	importance	0.331	0.062	0.221	0.249	0.43	-0.033
Inst.Type	zero-order	0.025	0.029	0.007	-0.057	0.045	0.044
	partial	-0.039	-0.071	-0.098	-0.12	-0.032	-0.057
	part	-0.037	-0.067	-0.092	-0.113	-0.03	-0.054
	importance	-0.012	-0.023	-0.006	0.065	-0.019	-0.023

Table 9-5

	Gaming		Academic Freedom		Time Cycle		Research Fixation		Smoothing		Mobility	
	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before
	Transformation		Transformation		Transformation		Transformation		Transformation		Transformation	
Experience	0.494	0.465	0.516	0.472	0.532	0.477	0.634	0.479	0.496	0.477	0.612	0.461
Dept rating	0.528	0.55	0.661	0.551	0.675	0.549	0.685	0.548	0.65	0.549	0.844	0.538
Research Activity	0.774	0.623	0.78	0.652	0.684	0.64	0.656	0.615	0.691	0.64	0.786	0.645
Age group	0.558	0.52	0.593	0.526	0.579	0.53	0.616	0.539	0.54	0.53	0.626	0.509
Subm	0.792	0.675	0.808	0.704	0.633	0.696	0.615	0.673	0.638	0.698	0.812	0.707
PhD	0.886	0.871	0.906	0.886	0.868	0.88	0.851	0.865	0.865	0.88	0.905	0.885
Permanent	0.943	0.943	0.968	0.96	0.963	0.96	0.957	0.96	0.961	0.96	0.979	0.958
Post	0.616	0.633	0.668	0.649	0.773	0.647	0.733	0.629	0.774	0.647	0.758	0.649
Inst Type	0.515	0.534	0.628	0.54	0.64	0.535	0.64	0.527	0.641	0.535	0.778	0.531

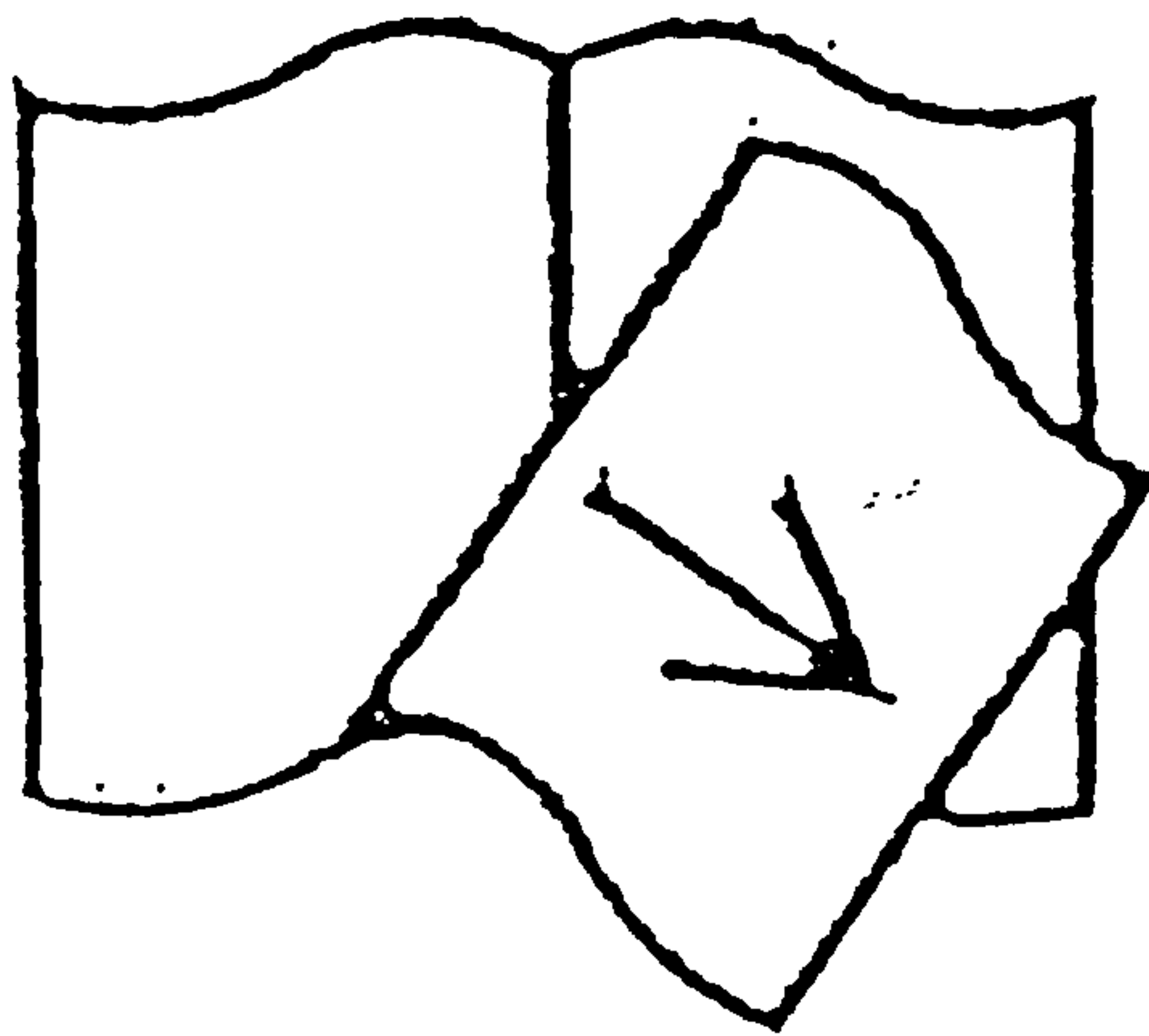
Table 9-6

		<u>Gaming</u>	<u>Academic</u>	<u>Time</u>	<u>Research</u>	<u>Smoothing</u>	<u>Mobility</u>
			<u>Freedom</u>	<u>Cycle</u>	<u>Fixation</u>		
	strong agreement	-1.553	-1.696	-1.289	-2.071	-1.465	-0.556
	moderate agreement	-0.675	-1.134	-0.643	-0.119	-0.855	-0.217
	weak disagreement	-0.675	-0.167	-0.483	-0.104	-0.197	1.322
	strong disagreement	1.191	1.05	1.253	1.21	1.209	4.353
Experience (ordinal)	less than 10 years	-1.487	-1.387	-1.668	-0.848	-1.421	-0.86
	10 -15 years	-0.453	-0.723	-0.043	-0.848	-0.676	-0.86
	15 -20 years	0.847	0.867	0.749	-0.848	0.86	-0.86
	over 20 years	0.847	0.867	0.749	1.18	0.86	1.163
Department rating (ordinal)	5*	-1.269	-1.652	-1.573	-1.921	-1.379	-1.719
	5	-1.014	-1.416	-1.513	-1.174	-1.379	-1.719
	4	-0.679	0.104	0.129	-0.316	-0.45	0.582
	3a	0.412	0.104	0.129	0.932	0.945	0.582
	3b	1.417	1.295	1.261	0.932	1.039	0.582
	2and 1	1.417	1.295	1.261	0.932	1.039	0.582
Research Activity (ordinal)	not active	-0.915	-0.908	-3.287	-3.274	-3.29	-0.908
	moderate active	-0.915	-0.908	0.202	0.021	0.252	-0.882
	quite active	-0.915	-0.908	0.334	0.384	0.319	-0.882
	very active	1.093	1.101	0.334	0.384	0.319	1.129
Age group (ordinal)	below 40	-1.38	-1.297	-1.517	-1.578	-1.628	-1.258
	40-50	-0.287	-0.393	-0.115	-0.04	0.068	-0.375
	over 50	1.139	1.17	1.061	1.021	0.956	1.217
Submission in RAE (nominal)	YES	-0.354	-0.352	0.363	-0.376	0.363	-0.364
	NO	2.828	2.84	-2.758	2.662	-2.758	2.744
PhD (nominal)	YES	-0.62	-0.614	-0.615	-0.629	-0.615	-0.61
	NO	1.612	1.628	1.625	1.589	1.625	1.64
Permanent position (nominal)	YES	-5.099	-4.954	-4.982	5.148	-4.982	-4.88
	NO	0.196	0.202	0.201	-0.194	0.201	0.205
Post (ordinal)	professor	-1.279	-1.428	-1.518	-1.649	-1.515	-1.45
	reader	-0.995	-1.328	-1.245	-0.079	-1.304	-1.45
	principal lecturer	0.037	0.426	0.535	0.19	0.637	0.69
	senior lecturer	0.037	0.426	0.535	0.19	0.637	0.69
	lecturer	1.417	1.044	0.901	1.191	0.76	0.69
Inst. Type (nominal)	Old	-1.627	-1.657	-1.654	-1.618	-1.654	-1.655
	New	0.614	0.603	0.604	0.618	0.604	0.604

Table 9-7

Pages
Missing
not
Available

Table 9.8



FACTOR ANALYSIS RESULTS

Q No	Question	Eigenvalues							
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
		8.415	3.217	2.183	1.609	1.352	1.231	1.177	1.079
	% of variance explained	26.295	10.052	6.822	5.028	4.225	3.846	3.3678	3.371
		Loading	Loading	Loading	Loading	Loading	Loading	Loading	Loading
17	Because of RAE time scales I have published some outputs at an earlier stage than I would prefer.	0.747							
18	Because of RAE time scales I have deferred the publication of some research output.	0.597							
19	My research topics or projects are influenced by the RAE time-scale	0.805							
20	Because of the RAE time -scales I have avoided some research topics or projects because they would have taken a long time to complete	0.811							
21	Because of the RAE time -scales I have avoided some research projects because they were speculative in nature (more risky in relation to security of output)	0.795							
22	I now manage my research publications by <i>smoothing</i> it over the RAE time-scale	0.75							
1	I now spend more time on research than 6 years ago		0.774						
2	I now spend more time on research than 6 years ago as a result of RAE		0.718						
7	The RAE has had a positive effect on my research output		0.67						
12	I now collaborate more (in research) with colleagues in my departments		0.555						
9	I am feeling more pressure to publish			0.559					
23	The RAE has increased my stress level			0.505					
29	University appointments are now driven by the RAE			0.805					
30	Universities are paying a 'premium' to attract 'star' researchers			0.801					
5	I now give less time than 6 years ago to "voluntary" academic activities-e.g. referring for journals				0.701				
6	I now give less time to activities given no or low recognition by RAE				0.719				
8	Because of RAE I now spend less time in voluntary academic work				0.732				
11	I now collaborate less (in research) with academics from other English universities					0.645			
16	I now do less inter-disciplinary research than 6 years ago					0.52			
31	Academic researchers pay has increased due to the recognition earned from the RAE					0.513			
15	In my view RAE has a negative effect on inter-disciplinary research						0.585		
24	The RAE has improved the quality of research conducted in universities						-0.617		
25	I believe RAE increases staff mobility between institutions						-0.675		
27	My dept. has expanded research students numbers beyond the capacity to supervise as well as we wish							0.722	
28	I believe that the expansion in research students numbers is due to the RAE funding formula							0.704	
3	I now spend less time in teaching preparation than 6 years ago								0.843
4	I now spend less time in teaching preparation than 6 years ago as a result of RAE pressure on research								0.557

TABLE 9-9

VALIDITY AND RELIABILITY OF MEASURE CONSTRUCTS

FACTOR loading

Q No			
RESEARCH FIXATION MEASURE		Cronbach Alpha coefficient	0.7808
5	4	0.701	
6	4	0.719	
8	4	0.732	
2	2	0.718	factor 4 loading was 0.285
26			HIGHEST WAS 0.452 IN FACOR 1
4	8	0.557	factor 4 loading was 0.384
MOBILITY		Cronbach Alpha coefficient	0.4921
29	3	0.805	
30	3	0.801	
31	5	0.513	factor 3 loading was insignificant
25	6	-0.675	factor 3 loading was -0.310
GAMING		Cronbach Alpha coefficient	0.8877
17	1	0.747	
18	1	0.597	
19	1	0.805	
20	1	0.811	
21	1	0.795	
22	1	0.75	
13	1	0.494	
14	1	0.317	HOWEVER highest was 0.487 for factor 5
16	5	0.52	
TIME-CYCLE EFFECT		Cronbach Alpha coefficient	0.8958
17	1	0.747	
18	1	0.597	
19	1	0.805	
20	1	0.811	
21	1	0.795	
22	1	0.75	
SMOOTHING		Cronbach Alpha coefficient	0.7964
17	1	0.747	
18	1	0.597	
22	1	0.75	
ACADEMIC FREEDOM		Cronbach Alpha coefficient	0.8586
13	1	0.494	
14	1	0.317	HOWEVER highest was 0.487 for factor 5
17	1	0.747	
19	1	0.805	
20	1	0.811	
21	1	0.795	

TABLE 9-10

Odds ratios and Marginal effect.

GAMING	B	SE	Wald	odds ratio	95% CI for odds ratio		Marginal effect		Marginal effect
					lower	upper	Est	Actual	REF CAT
SCIENCE	-0.478	0.669	0.5138	0.6200	0.1678	2.2912	-0.1129	-0.0901	-0.0160
PHYSICS	-0.3261	0.6785	0.2309	0.7217	0.1909	2.7287	-0.0794	-0.0638	-0.0117
ENGN	-0.3282	0.5741	0.3268	0.7202	0.2338	2.219	-0.0799	-0.0641	-0.0118
BMS	-0.2377	0.5416	0.1927	0.7884	0.2728	2.2789	-0.0586	-0.0474	-0.0089
LIBERAL	0.5123	0.6299	0.6614	1.6691	0.4856	5.7363	0.1200	0.1170	0.0270
EDUC	-1.5597	0.9262	2.8355**	0.2102	0.0342	1.2914	-0.2239	-0.2174	-0.0340
BUZ	-1.2132	0.6978	3.0233**	0.2972	0.0757	1.1669	-0.2143	-0.1870	-0.0301
EXP 1	-0.1208	0.6231	0.0376	0.8862	0.2613	3.0054	-0.0301	-0.0247	-0.0047
EXP2	0.3661	0.5331	0.4767	1.4450	0.5082	4.1084	0.0890	0.0824	0.0181
EXP 3	0.8566	0.5152	2.7644**	2.3551	0.858	6.4643	0.1792	0.2023	0.0532
RATING 5*	0.5773	1.2027	0.2304	1.7812	0.1686	18.8124	0.1329	0.1329	0.0314
RATING 5	1.2332	1.1224	1.2073	3.4322	0.3804	30.9721	0.2155	0.2953	0.0914
RATING 4	0.912	0.9117	1.007	2.4893	0.4169	14.8623	0.1865	0.2162	0.0581
RATING 3A	0.7829	0.7952	0.9695	2.1878	0.4604	10.3966	0.1686	0.1839	0.0469
RATING 3B	1.554	0.7607	4.1728*	4.7304	1.065	21.0089	0.2239	0.3697	0.1333
AVR-HIGHER	-0.9869	0.5056	3.8099**	0.3727	0.1384	1.0041	-0.1952	-0.1623	-0.0268
AVR-LOWER	-0.5044	0.5067	0.991	0.6039	0.2237	1.6302	-0.1184	-0.0944	-0.0167
EX UFC UNIVERSITY	0.3207	0.6924	0.2146	1.3781	0.3547	5.3542	0.0781	0.0713	0.0154
PROFESSOR	-0.1947	0.5962	0.1067	0.8231	0.2558	2.648	-0.0482	-0.0392	-0.0074
READER	-0.7328	0.7032	1.0858	0.4806	0.1211	1.907	-0.1607	-0.1292	-0.0221
PRINCIPAL LECTURER	0.1489	0.8182	0.0331	1.1606	0.2335	5.7694	0.0370	0.0322	0.0066
SENIOR LECTURER	-0.4674	0.4864	0.9236	0.6266	0.2415	1.6255	-0.1107	-0.0883	-0.0158
NO PHD QUALIFICATION	0.3602	0.4519	0.6351	1.4336	0.5912	3.4762	0.0872	0.0806	-0.3273
AGE BELOW 40	0.6968	0.5865	1.4113	2.0073	0.6358	6.3365	0.1547	0.1624	0.0401
AGE BETWEEN 40 AND 50	0.6725	0.421	2.5524	1.9591	0.8585	4.471	0.1505	0.1564	0.0382
<u>RESEARCH ACTIVITY</u>									
MODERATE	1.8048	0.9037	3.9887*	6.0788	1.0342	35.7308	0.2189	0.4226	0.1728
QUITE ACTIVE	2.2701	0.9267	6.0015*	9.6804	1.5745	59.5225	0.1926	0.5058	0.2618
VERY ACTIVE	0.725	0.918	0.6238~	2.0647	0.3416	12.4808	0.1534	0.1695	0.0423
CONSTANT	-3.0926	1.2141	6.4886*						

Prediction Accuracy(50% cut-off)

Initial -2 log likelihood	292.2001
-2 log likelihood with variables	248.696
Model chi square statistic	45.504
df	28
significance	0.0196

Overall	74.69%
No gaming	91.18%
Gaming	35.21%

Pseudo R^2	0.1557
Aldrich And Nelson R^2	0.1888
Cox & Snell R^2	0.1720
Nagelkerke R^2	0.2450

Prediction Accuracy(30% cut-off)

Overall	69.71%
No gaming	68.82%
Gaming	71.83%

Wald (all df=1)

- * significant at 5% level
- ** significant at 10% level

TABLE 9-11

GAMING

Parsimonous Model

	B	SE	Wald*	odds ratio	95% CI for odds ratio	
					lower	Upper
LEVEL OF RESEARCH ACTIVITY:						
MODERATE	1.6256	0.8038	4.0900	5.0816	1.0515	24.5590
QUITE ACTIVE	1.8851	0.7879	5.7252	6.5873	1.4063	30.8556
VERY ACTIVE	0.8061	0.7824	1.0613	2.2391	0.4830	10.3771
Constant	-2.1365	0.7465	8.1913			
Initial -2 log likelihood	276.822			Prediction Accuracy(50% cut-off)		
-2 log likelihood with variables	261.444			Overall	70.54%	
Model chi square statistic	15.378			No Gaming	100.00%	
df	3			Gaming	0.00%	
significance	0.0015					
Cox & Snell R^2	0.062			Prediction Accuracy(30% cut-off)		
Nagelkerke R^2	0.088			Overall	62.24%	
Wald (all df=1)				No Gaming	61.18%	
				Gaming	64.79%	
* All significant at 5% level						

TABLE 9-12

Odds Ratios and marginal effect

RESEARCH FIXATION	B	SE	Wald	Odds Ratio	95% CI for odds ratio		Marginal effect		Marginal ef REF CAT
					lower	upper	Est	Actual	
SCIENCE	-1.1584	0.6284	3.398**	0.3140	0.0916	1.0760	-0.2107	-0.2309	-0.2222
PHYSICS	-0.9558	0.6521	2.1486	0.3845	0.1071	1.3802	-0.1917	-0.1991	-0.1922
ENGN	-0.1527	0.4964	0.0946	0.8584	0.3245	2.2710	-0.0380	-0.0364	-0.0356
BMS	-0.8127	0.4933	2.7144**	0.4437	0.1687	1.1666	-0.1730	-0.1744	-0.1686
LIBERAL	0.1972	0.5770	0.1168	1.2180	0.3931	3.7736	0.0488	0.0484	0.0477
EDUC	-1.2347	0.7822	2.4920	0.2909	0.0628	1.3475	-0.2155	-0.2418	-0.2325
BUZ	-0.8571	0.5737	2.2319	0.4244	0.1379	1.3065	-0.1793	-0.1823	-0.1761
EXP 1	-0.1993	0.5560	0.1285	0.8193	0.2755	2.4364	-0.0493	-0.0472	-0.0462
EXP2	-0.6133	0.4891	1.5720	0.5416	0.2076	1.4126	-0.1398	-0.1366	-0.1325
EXP 3	-0.2373	0.4621	0.2638	0.7888	0.3189	1.9510	-0.0585	-0.0560	-0.0547
RATING 5*	0.2948	1.0339	0.0813	1.3429	0.1770	10.1873	0.0721	0.0727	0.0719
RATING 5	0.7231	0.9545	0.5740	2.0608	0.3174	13.3812	0.1591	0.1788	0.1785
RATING 4	-0.1130	0.8148	0.0192	0.8932	0.1809	4.4106	-0.0282	-0.0270	-0.0265
RATING 3A	1.1180	0.6889	2.6333	3.0587	0.7927	11.8018	0.2076	0.2700	0.2717
RATING 3B	0.7044	0.6880	1.0481	2.0226	0.5251	7.7906	0.1559	0.1743	0.1739
AVR-HIGHER	-0.7228	0.4423	2.6710	0.4854	0.2040	1.1549	-0.1590	-0.1578	-0.1528
AVR-LOWER	-0.5234	0.4883	1.1493	0.5925	0.2275	1.5427	-0.1223	-0.1184	-0.1150
EX UFC UNIVERSITY	0.6197	0.6139	1.0190	1.8584	0.5579	6.1897	0.1410	0.1536	0.1529
PROFESSOR	-0.8306	0.5481	2.2967	0.4358	0.1488	1.2758	-0.1756	-0.1776	-0.1716
READER	-1.1677	0.6251	3.4896**	0.3111	0.0914	1.0591	-0.2113	-0.2323	-0.2234
PRINCIPAL LECTURER	-0.3173	0.7270	0.1905	0.7281	0.1752	3.0270	-0.0774	-0.0740	-0.0722
SENIOR LECTURER	-0.9601	0.4428	4.7006*	0.3829	0.1607	0.9120	-0.1922	-0.1999	-0.1928
NO PHD QUALIFICATION	0.0238	0.4043	0.0035	1.0241	0.4637	2.2617	0.0059	0.0058	0.0057
AGE BELOW 40	0.1195	0.5501	0.0472	1.1269	0.3834	3.3122	0.0298	0.0292	0.0287
AGEBETWEEN 40 AND 50	0.3568	0.3708	0.9259	1.4288	0.6908	2.9550	0.0864	0.0882	0.0873
<u>RESEARCH ACTIVITY:</u>									
MODERATE	0.8491	0.6581	1.6649	2.3375	0.6436	8.4902	0.1782	0.2090	0.2091
QUITE ACTIVE	1.0898	0.6640	2.6935	2.9737	0.8092	10.9279	0.2052	0.2639	0.2654
VERY ACTIVE	0.5662	0.6522	0.7536	1.7616	0.4906	6.3249	0.1308	0.1404	0.1396
CONSTANT	-0.4539	0.9937	0.2086						

Prediction Accuracy(50% cut-off)

Initial -2 log likelihood 332.3759
-2 log likelihood with variable: 292.541
Model chi square statistic 39.835
df 28
significance 0.0684

Overall 65.85%
No agreement 80.14%
Agreement 45.00%

Pseudo R^2 0.1198
Aldrich And Nelson R^2 0.1619
Cox & Snell R^2 0.1490
Nagelkerke R^2 0.2020

Prediction Accuracy(41% cut-off)

Overall 63.41%
No agreement 63.70%
Agreement 63.00%

Wald (all df=1)

* significant at 5% level
** significant at 10% level

	B	SE	Wald	odds ratio	95% CI for odds ratio	
					lower	Upper
Science POST:	-1.0251	0.5006	4.1941*	0.3588	0.1345	0.9569
Prof	-1.0255	0.3846	7.1077*	0.3586	0.1687	0.7622
Reader	-0.8500	0.5035	2.8497**	0.4274	0.1593	1.1467
Prin. Lecturer	-0.6210	0.5487	1.2807	0.5374	0.1833	1.5754
Senior Lecturer	-1.0500	0.3556	8.7195*	0.3499	0.1743	0.7025
Constant	0.4484	0.2755	2.6476			

Initial -2 log likelihood	332.3759	Prediction Accuracy(50% cut-off)	
-2 log likelihood with variables	317.59		
Model chi square statistic	14.7859		
df	5		
significance	0.0113	Overall	63.01%
		No agreement	85.62%
		Agreement	30.00%

Cox & Snell R^2	0.058	Prediction Accuracy(41% cut-off)	
Nagelkerke R^2	0.079		
		Overall	62.60%
		No agreement	79.45%
		Agreement	38.00%

Wald (all df=1)
* significant at 5% level
** significant at 10% level

TABLE 9-14

Odds ratios and marginal effect

ACADEMIC FREEDOM	B	SE	Wald	odds ratio	95% CI for odds ratio		Marginal effect		Marginal effect REF CAT
					lower	upper	Est	Actual	
SCIENCE	-0.8226	0.6358	1.6739	0.4393	0.1263	1.5274	-0.1744	-0.1416	-0.0352
PHYSICS	-0.9971	0.6832	2.1299	0.3689	0.0967	1.4077	-0.1963	-0.1635	-0.0399
ENGN	-0.5413	0.5609	0.9315	0.5820	0.1938	1.7472	-0.1259	-0.1004	-0.0260
BMS	-0.2938	0.5332	0.3035	0.7454	0.2621	2.1199	-0.0719	-0.0579	-0.0157
LIBERAL	0.1596	0.6147	0.0674	1.1730	0.3516	3.9130	0.0396	0.0345	0.0104
EDUC	-1.0057	0.8353	1.4493	0.3658	0.0712	1.8806	-0.1972	-0.1645	-0.0401
BUZ	-1.2188	0.6468	3.5503**	0.2956	0.0832	1.0502	-0.2146	-0.1876	-0.0447
EXP 1	-0.2783	0.6079	0.2096	0.7571	0.2300	2.4922	-0.0682	-0.0550	-0.0150
EXP2	-0.1004	0.5264	0.0364	0.9045	0.3223	2.5380	-0.0250	-0.0207	-0.0058
EXP 3	0.5233	0.5034	1.0806	1.6876	0.6292	4.5266	0.1223	0.1197	0.0399
RATING 5*	-0.8032	1.1429	0.4939	0.4479	0.0477	4.2070	-0.1716	-0.1390	-0.0347
RATING 5	-0.2365	1.0333	0.0524	0.7894	0.1042	5.9823	-0.0583	-0.0472	-0.0129
RATING 4	0.5082	0.8478	0.3594	1.6623	0.3156	8.7567	0.1192	0.1160	0.0385
RATING 3A	0.5564	0.7535	0.5454	1.7444	0.3984	7.6388	0.1289	0.1278	0.0430
RATING 3B	1.4312	0.7450	3.6906**	4.1837	0.9715	18.0193	0.2228	0.3420	0.1599
AVR-HIGHER	-0.3018	0.4680	0.4158	0.7395	0.2955	1.8505	-0.0738	-0.0593	-0.0161
AVR-LOWER	-0.425	0.4804	0.7827	0.6538	0.2550	1.6763	-0.1016	-0.0811	-0.0215
EX UFC UNIVERSITY	1.0168	0.6600	2.3738	2.7643	0.7583	10.0774	0.1984	0.2423	0.0959
PROFESSOR	0.2192	0.5722	0.1467	1.2451	0.4056	3.8216	0.0541	0.0479	0.0146
READER	-0.1985	0.6383	0.0967	0.8200	0.2347	2.8650	-0.0491	-0.0400	-0.0110
PRINCIPAL LECTURER	0.6165	0.8089	0.5808	1.8524	0.3795	9.0433	0.1404	0.1426	0.0489
SENIOR LECTURER	-0.1306	0.4663	0.0784	0.8776	0.3519	2.1889	-0.0325	-0.0267	-0.0075
NO PHD QUALIFICATION	-0.0465	0.4460	0.0109	0.9546	0.3983	2.2878	-0.0116	-0.0097	-0.0037
AGE BELOW 40	1.4238	0.5966	5.6959*	4.1529	1.2899	13.3714	0.2227	0.3403	0.1586
AGEBETWEEN 40 AND 50	0.9153	0.4168	4.8225*	2.4975	1.1034	5.6532	0.1869	0.2170	0.0827
<u>RESEARCH ACTIVITY</u>									
MODERATE	1.0185	0.7677	1.7603	2.7690	0.6150	12.4676	0.1985	0.2427	0.0961
QUITE ACTIVE	1.474	0.7816	3.5584**	4.3667	0.9437	20.2043	0.2235	0.3517	0.1674
VERY ACTIVE	-0.0962	0.7828	0.0151	0.9083	0.1959	4.2130	-0.0240	-0.0198	-0.0056
CONSTANT	-2.6699	1.1315	5.5676*						

Prediction Accuracy(50% cut-off)

Initial -2 log likelihood	307.1078	Overall	74.40%
-2 log likelihood with variables	257.504	No agreement	89.66%
Model chi square statistic	49.604	Agreement	39.47%
df	28		
significance	0.0072		

Pseudo R^2	0.1615
Aldrich And Nelson R^2	0.1984
Cox & Snell R^2	0.1800
Nagelkerke R^2	0.2540

Prediction Accuracy(30% cut-off)

Overall	70.00%
No agreement	69.54%
Agreement	71.05%

Wald (all df=1)

- * significant at 5% level
- ** significant at 10% level

TABLE 9-15

	B	SE	Wald	odds ratio	95% CI for odds ratio	
					lower	upper
<u>RAE RATING:</u>						
RATING 5*	0.1501	0.7722	0.0378	1.1619	0.2558	5.2780
RATING 5	0.4170	0.6717	0.3853	1.5173	0.4068	5.6602
RATING 4	1.2315	0.5962	4.2657*	3.4262	1.0649	11.0240
RATING 3A	0.9540	0.6060	2.4786	2.5962	0.7916	8.5142
RATING 3B	1.7936	0.6435	7.7699*	6.0112	1.7031	21.2169
<u>AGE:</u>						
BELOW 40	1.0360	0.3955	6.8626*	2.8180	1.2981	6.1176
BETWEEN 40 AND 50	0.7443	0.3611	4.2486*	2.1049	1.0372	4.2714
<u>LEVEL OF RESEARCH ACTIVITY:</u>						
MODERATE	0.9273	0.7225	1.6474	2.5277	0.6134	10.4160
QUITE ACTIVE	1.2809	0.7108	3.2473**	3.6000	0.8938	14.4996
VERY ACTIVE	0.0804	0.7067	0.0129	1.0837	0.2712	4.3302
CONSTANT	-2.9188	0.8148	12.8337*			

			Prediction Accuracy(50% cut-off)	
Initial -2 log likelihood	307.1078			
-2 log likelihood with variables	271.357		Overall	72.00%
Model chi square statistic	35.75		No agreement	92.53%
df	10		Agreement	25.00%
significance	0.0001			
			Prediction Accuracy(30% cut-off)	
Cox & Snell R^2	0.133		Overall	66.40%
Nagelkerke R^2	0.188		No agreement	66.67%
			Agreement	65.79%
<u>Wald (all df=1)</u>				
* significant at 5% level				
** significant at 10% level				

TABLE 9-16

Odds ratios and marginal effect

SMOOTHING	B	SE	Wald	odds ratio	95% CI for odds ratio		Marginal effect		Marginal effect REF CAT
					lower	upper	Est	Actual	
SCIENCE	-0.3619	0.6237	0.3367	0.6964	0.2051	2.3644	-0.0876	-0.0786	-0.0073
PHYSICS	-0.4879	0.6638	0.5403	0.6139	0.1671	2.2548	-0.1150	-0.1033	-0.0094
ENGN	0.3944	0.5191	0.5772	1.4835	0.5363	4.1038	0.0949	0.0949	0.0115
BMS	0.3552	0.4987	0.5072	1.4265	0.5367	3.7907	0.0861	0.0852	0.0101
LIBERAL	1.2070	0.5899	4.1873*	3.3434	1.0522	10.6237	0.2139	0.2929	0.0532
EDUC	0.1135	0.7516	0.0228	1.1202	0.2568	4.8869	0.0283	0.0265	0.0029
BUZ	-0.3306	0.6041	0.2995	0.7185	0.2199	2.3477	-0.0804	-0.0722	-0.0068
EXP 1	-0.3300	0.5715	0.3340	0.7189	0.2345	2.2038	-0.0803	-0.0721	-0.0068
EXP2	0.4951	0.4891	1.0246	1.6407	0.6291	4.2785	0.1165	0.1199	0.0151
EXP 3	1.0500	0.4703	4.9848*	2.8577	1.1368	7.1835	0.2016	0.2565	0.0426
RATING 5*	0.6311	1.0614	0.3535	1.8797	0.2347	15.0513	0.1431	0.1539	0.0207
RATING 5	0.7726	0.9890	0.6102	2.1654	0.3117	15.0432	0.1670	0.1891	0.0272
RATING 4	0.7167	0.8081	0.7865	2.0477	0.4201	9.9797	0.1580	0.1753	0.0245
RATING 3A	1.1119	0.7095	2.4558	3.0401	0.7567	12.2123	0.2071	0.2710	0.0466
RATING 3B	0.7196	0.6955	1.0706	2.0536	0.5255	8.0261	0.1585	0.1760	0.0247
AVR-HIGHER	-0.8384	0.4546	3.4012**	0.4324	0.1774	1.0540	-0.1767	-0.1644	-0.0138
AVR-LOWER	-0.1484	0.4612	0.1035	0.8621	0.3491	2.1290	-0.0369	-0.0334	-0.0033
EX UFC UNIVERSITY	0.0999	0.6215	0.0258	1.1051	0.3268	3.7363	0.0249	0.0233	0.0025
PROFESSOR	-0.4642	0.5383	0.7436	0.6286	0.2189	1.8056	-0.1100	-0.0988	-0.0090
READER	-0.8207	0.6280	1.7077	0.4401	0.1285	1.5071	-0.1742	-0.1616	-0.0136
PRINCIPAL LECTURER	0.6912	0.7303	0.8957	1.9961	0.4770	8.3535	0.1537	0.1689	0.0233
SENIOR LECTURER	-0.1742	0.4359	0.1598	0.8401	0.3575	1.9740	-0.0432	-0.0391	-0.0039
NO PHD QUALIFICATION	0.1618	0.4122	0.1541	1.1756	0.5241	2.6374	0.0402	0.0380	0.0042
AGE BELOW 40	0.9948	0.5481	3.2940**	2.7042	0.9236	7.9176	0.1961	0.2433	0.0393
AGEBETWEEN 40 AND 50	0.2533	0.3868	0.4290	1.2883	0.6037	2.7493	0.0623	0.0602	0.0069
<u>RESEARCH ACTIVITY</u>									
MODERATE	2.6719	0.8840	9.1349*	14.4674	2.5580	81.8254	0.1616	0.5306	0.2428
QUITE ACTIVE	2.5203	0.8994	7.8524*	12.4323	2.1330	72.4691	0.1737	0.5149	0.2142
VERY ACTIVE	1.8653	0.8903	4.3899*	6.4579	1.1280	36.9740	0.2166	0.4241	0.1155
CONSTANT	-3.6795	1.1689	9.9086*						

		Prediction Accuracy(50% cut-off)	
Initial -2 log likelihood	333.6901	Overall	68.11%
-2 log likelihood with variables	284.382	No agreement	83.23%
Model chi square statistic	49.309	Agreement	41.94%
df	28		
significance	0.0077		
Pseudo R^2	0.1478		
Aldrich And Nelson R^2	0.1941		
Cox & Snell R^2	0.176	Prediction Accuracy(36% cut-off)	
Nagelkerke R^2	0.241	Overall	68.90%
		No agreement	65.84%
		Agreement	74.19%
<u>Wald (all df=1)</u>			
* significant at 5% level			
** significant at 10% level			

TABLE 9-17

	B	SE	Wald	odds ratio	95% CI for odds ratio	
					lower	Upper
BMS	0.6405	0.3552	3.2518*	1.8974	0.9459	3.8063
LIBERAL	1.3121	0.4866	7.2704*	3.7140	1.4310	9.6393
<u>EXP:</u>						
less than 10 years	0.6299	0.3615	3.0362*	1.8774	0.9244	3.8128
10 - 15 years	1.0005	0.3918	6.5205*	2.7198	1.2618	5.8622
15-20 years	1.1892	0.4339	7.5100*	3.2844	1.4031	7.6884
<u>AVERAGE RATING:</u>						
Higher	-0.7368	0.3317	4.9342*	0.4786	0.2498	0.9170
Lower	-0.0510	0.3607	0.0200	0.9502	0.4686	1.9267
<u>RESEARCH ACTIVITY:</u>						
Moderate	2.5664	0.8318	9.5209*	13.0194	2.5504	66.4630
Quite Active	2.4909	0.8274	9.0626*	12.0723	2.3849	61.1081
Very Active	1.8121	0.8104	4.9998*	6.1232	1.2507	29.9772
Constant	-3.1403	0.8355	14.1255*			

Initial -2 log likelihood	333.6901	Prediction Accuracy(50% cut-off)	
-2 log likelihood with variables	296.729	Overall	67.72%
Model chi square statistic	36.9611	No agreement	85.09%
df	10	Agreement	37.63%
significance	0.0001		
Cox & Snell R^2	0.135	Prediction Accuracy(36% cut-off)	
Nagelkerke R^2	0.185	Overall	65.75%
		No agreement	65.22%
		Agreement	66.67%
<u>Wald (all df=1)</u>			
* significant at 5% level			
** significant at 10% level			

TABLE 9-18

Odds ratios and marginal effect

TIME CYCLE	B	SE	Wald	odds ratio	95% CI for odds ratio		Marginal effect		Marginal effect
					lower	upper	Est	Actual	REF CAT
SCIENCE	-0.1302	0.5817	0.0501	0.8779	0.2807	2.7455	-0.0324	-0.0311	-0.0054
PHYSICS	-0.8106	0.6274	1.6693	0.4446	0.1300	1.5206	-0.1727	-0.1740	-0.0251
ENGN	-0.3975	0.5163	0.5928	0.6720	0.2443	1.8484	-0.0956	-0.0917	-0.0147
BMS	-0.8007	0.5152	2.4153	0.4490	0.1636	1.2326	-0.1712	-0.1722	-0.0249
LIBERAL	0.6614	0.5983	1.2220	1.9375	0.5997	6.2592	0.1485	0.1638	0.0396
EDUC	-1.5228	0.8203	3.4460**	0.2181	0.0437	1.0887	-0.2238	-0.2784	-0.0357
BUZ	-1.1958	0.6107	3.8336**	0.3025	0.0914	1.0012	-0.2132	-0.2363	-0.0317
EXP 1	-0.2835	0.5793	0.2394	0.7531	0.2420	2.3443	-0.0695	-0.0664	-0.0110
EXP2	0.1891	0.4855	0.1517	1.2082	0.4665	3.1288	0.0469	0.0464	0.0091
EXP 3	0.6294	0.4724	1.7754	1.8765	0.7435	4.7363	0.1427	0.1560	0.0371
RATING 5*	0.2230	1.0558	0.0446	1.2498	0.1578	9.8972	0.0551	0.0548	0.0109
RATING 5	0.4636	0.9699	0.2285	1.5898	0.2375	10.6396	0.1099	0.1149	0.0253
RATING 4	0.2956	0.8050	0.1349	1.3439	0.2774	6.5107	0.0723	0.0729	0.0149
RATING 3A	0.6924	0.7041	0.9671	1.9985	0.5028	7.9445	0.1539	0.1714	0.0420
RATING 3B	1.7142	0.7051	5.9112*	5.5522	1.3942	22.1106	0.2217	0.3842	0.1657
AVR-HIGHER	-0.6903	0.4478	2.3761	0.5014	0.2084	1.2061	-0.1535	-0.1516	-0.0225
AVR-LOWER	-0.6336	0.4655	1.8526	0.5307	0.2131	1.3215	-0.1435	-0.1406	-0.0211
EX UFC UNIVERSITY	0.6892	0.6341	1.1810	1.9921	0.5748	6.9037	0.1534	0.1706	0.0418
PROFESSOR	0.0634	0.5338	0.0141	1.0655	0.3742	3.0335	0.0158	0.0154	0.0029
READER	-0.7285	0.6124	1.4150	0.4826	0.1453	1.6029	-0.1599	-0.1589	-0.0233
PRINCIPAL LECTURER	0.5951	0.7429	0.6418	1.8132	0.4228	7.7764	0.1363	0.1475	0.0345
SENIOR LECTURER	-0.0250	0.4394	0.0032	0.9753	0.4122	2.3076	-0.0062	-0.0060	-0.0011
NO PHD QUALIFICATION	0.5393	0.4195	1.6527	1.7148	0.7536	3.9017	0.1255	0.1337	0.0305
AGE BELOW 40	1.0466	0.5550	3.5565**	2.8480	0.9597	8.4519	0.2013	0.2543	0.0750
AGEBETWEEN 40 AND 50	0.7829	0.3907	4.0146*	2.1878	1.0172	4.7052	0.1686	0.1932	0.0496
<u>RESEARCH ACTIVITY</u>									
MODERATE	2.1292	0.7764	7.5206*	8.4081	1.8358	38.5090	0.2023	0.4439	0.2431
QUITE ACTIVE	2.5512	0.7959	10.2740*	12.8225	2.6945	61.0230	0.1712	0.4891	0.3369
VERY ACTIVE	1.1963	0.7807	2.3480	3.3079	0.7161	15.2788	0.2132	0.2868	0.0919
CONSTANT	-3.0279	1.0830	7.8171*						

Prediction Accuracy(50% cut-off)

Initial -2 log likelihood	342.6858
-2 log likelihood with variables	286.306
Model chi square statistic	56.38
df	28
significance	0.0012

Overall	73.12%
No agreement	82.55%
Agreement	59.62%

Pseudo R^2	0.1645
Aldrich And Nelson R^2	0.2228
Cox & Snell R^2	0.2000
Nagelkerke R^2	0.2690

Prediction Accuracy(41% cut-off)

Overall	68.38%
No agreement	69.13%
Agreement	67.31%

Wald (all df=1)

- * significant at 5% level
- ** significant at 10% level

TABLE 9-19

TIME CYCLE	Parsimonous Model (Backward LR)					
	B	SE	Wald	odds ratio	95% CI for odds ratio lower	odds ratio upper
LIBERAL	0.9624	0.4908	3.8452*	2.6181	1.0005	6.8512
<u>RAE RATING:</u>						
RATING 5*	0.2072	0.6354	0.1063	1.2302	0.3541	4.2739
RATING 5	0.1577	0.5801	0.0739	1.1709	0.3756	3.6500
RATING 4	0.3217	0.5227	0.3788	1.3795	0.4952	3.8425
RATING 3A	0.4666	0.5306	0.7733	1.5945	0.5637	4.5106
RATING 3B	1.4886	0.5925	6.3122*	4.4309	1.3873	14.1524
<u>AGE:</u>						
AGE BELOW 40	0.8790	0.3682	5.6989*	2.4084	1.1704	4.9561
AGEBETWEEN 40 AND 50	0.6921	0.3331	4.3175*	1.9980	1.0401	3.8381
<u>RESEARCH ACTIVITY:</u>						
MODERATE	1.7281	0.7125	5.8825*	5.6299	1.3932	22.7499
QUITE ACTIVE	1.9345	0.7093	7.4388*	6.9207	1.7235	27.7901
VERY ACTIVE	0.8943	0.6968	1.6476	2.4457	0.6242	9.5825
Constant	-2.6674	0.7727	11.9158*			
				Prediction Acurracy(50% cut-off)		
Initial -2 log likelihood	342.6858					
-2 log likelihood with variables	302.304					
Model chi square statistic	40.382					
df	11					
significance	0					
Cox & Snell R^2	0.148	Prediction Acurracy(41% cut-off)				
Nagelkerke R^2	0.199					
				Overall		
				67.59%		
				No agreement		
				71.14%		
				Agreement		
				62.50%		
<u>Wald (all df=1)</u>						
* significant at 5% level						
** significant at 10% level						

TABLE 9-20

Odds ratio and Marginal effect.

MOBILITY	B	SE	Wald	odds ratio	95% CI for odds ratio		Marginal effect		Marginal effect
					lower	upper	Est Actual	REF CAT	
SCIENCE	-1.5011	0.8602	3.0452**	0.2229	0.0413	1.2030	-0.2237	-0.3088	-0.0381
PHYSICS	-1.5044	0.7901	3.6255**	0.2222	0.0472	1.0451	-0.2237	-0.3096	-0.0382
ENGN	-0.4714	0.7218	0.4265	0.6241	0.1517	2.5686	-0.1115	-0.0770	-0.0068
BMS	-0.2296	0.6666	0.1186	0.7949	0.2152	2.9358	-0.0567	-0.0348	-0.0029
LIBERAL	-0.7896	0.8874	0.7917	0.4540	0.0797	2.5851	-0.1696	-0.1408	-0.0135
EDUC	-0.1343	1.2653	0.0113	0.8743	0.0732	10.4398	-0.0334	-0.0197	-0.0016
BUZ	-0.713	0.7601	0.8799	0.4902	0.1105	2.1745	-0.1574	-0.1246	-0.0117
EXP 1	0.4833	0.7620	0.4023	1.6214	0.3641	7.2206	0.1140	0.0579	0.0044
EXP2	0.17	0.6175	0.0758	1.1853	0.3534	7.9761	0.0422	0.0227	0.0018
EXP 3	0.8476	0.6557	1.6711	2.3340	0.6456	8.4372	0.1780	0.0894	0.0065
RATING 5*	0.0818	1.2509	0.0043	1.0852	0.0935	12.5982	0.0204	0.0113	0.0009
RATING 5	1.0212	1.1851	0.7424	2.7765	0.2721	28.3318	0.1988	0.1013	0.0073
RATING 4	1.5391	1.0437	2.1749	4.6604	0.6027	36.0409	0.2239	0.1279	0.0090
RATING 3A	1.0938	0.9056	1.4590	2.9856	0.5061	17.6145	0.2056	0.1058	0.0076
RATING 3B	-0.0983	0.8824	0.0124	0.9064	0.1608	5.1101	-0.0245	-0.0143	-0.0012
AVR-HIGHER	-0.2153	0.5814	0.1371	0.8063	0.2580	2.5200	-0.0532	-0.0325	-0.0027
AVR-LOWER	0.6622	0.7102	0.8695	1.9391	0.4820	7.8005	0.1486	0.0745	0.0055
EX UFC UNIVERSITY	-1.4124	0.8259	2.9246**	0.2436	0.0483	1.2292	-0.2224	-0.2867	-0.0340
PROFESSOR	-1.6357	0.8457	3.7408**	0.1948	0.0371	1.0221	-0.2232	-0.3424	-0.0448
READER	-0.8893	0.9812	0.8215	0.4109	0.0601	2.8116	-0.1836	-0.1625	-0.0160
PRINCIPAL LECTURER	-2.4767	1.0203	5.8924*	0.0840	0.0114	0.6207	-0.1771	-0.5390	-0.1100
SENIOR LECTURER	-1.4086	0.7575	3.4581**	0.2445	0.0554	1.0790	-0.2224	-0.2858	-0.0339
NO PHD QUALIFICATION	-0.8037	0.5553	2.0946	0.4477	0.1508	1.3293	-0.1717	-0.1438	-0.0138
AGE BELOW 40	0.3845	0.7421	0.2684	1.4689	0.3430	6.2895	0.0927	0.0477	0.0036
AGEBETWEEN 40 AND 50	0.3803	0.4887	0.6056	1.4627	0.5613	3.8116	0.0917	0.0472	0.0036
<u>RESEARCH ACTIVITY</u>									
MODERATE	-0.6521	0.9301	0.4916	0.5210	0.0842	3.2248	-0.1469	-0.1121	-0.0103
QUITE ACTIVE	-0.132	0.9593	0.0189	0.8763	0.1337	5.7445	-0.0329	-0.0194	-0.0016
VERY ACTIVE	-1.4294	0.9057	2.4908	0.2395	0.0406	1.4130	-0.2228	-0.2909	-0.0348
CONSTANT	4.4553	1.5023	8.7957*						

Prediction Accuracy(50% cut-off)

Initial -2 log likelihood	221.6761
-2 log likelihood with variables	183.84
Model chi square statistic	37.836
df	28
significance	0.1015

Overall	82.93%
No agreement	12.20%
Agreement	97.07%

Pseudo R^2	0.1707
Aldrich And Nelson R^2	0.1538
Cox & Snell R^2	0.1430
Nagelkerke R^2	0.2400

Prediction Accuracy(83% cut-off)

Overall	72.36%
No agreement	73.17%
Agreement	72.20%

Wald (all df=1)

- * significant at 5% level
- ** significant at 10% level

MOBILITY

Parsimonous Model (Backward LR)

B SE Wald odds ratio 95% CI for odds ratio

POST:

PROFESSOR	-1.6042	0.6810	5.5483*	0.2011	0.0529	0.7639
READER	-0.7962	0.8684	0.8406	0.4510	0.0822	2.4741
PRINCIPAL LECTURER	-2.0036	0.8029	6.2275*	0.1348	0.0280	0.6505
SENIOR LECTURER	-1.5192	0.6647	5.2236*	0.2189	0.0595	0.8054

RESEARCH ACTIVITY:

MODERATE	-0.5642	0.8654	0.4250	0.5688	0.1043	3.1019
QUITE ACTIVE	0.0033	0.8746	0.0000	1.0033	0.1807	5.5705
VERY ACTIVE	-1.1375	0.8090	1.9769	0.3206	0.0657	1.5654

CONSTANT

3.5950 0.9699 13.7380*

Prediction Accuracy(50% cut-off)

Initial -2 log likelihood	221.6761	
-2 log likelihood with variables	202.744	Overall 83.33%
Model chi square statistic	18.932	No agreement 0.00%
df	7	Agreement 100.00%
significance	0.0084	

Prediction Accuracy(83% cut-off)

Cox & Snell R^2	0.074	
Nagelkerke R^2	0.125	Overall 63.82%
		No agreement 68.29%
		Agreement 62.93%

Wald (all df=1)

* significant at 5% level

** significant at 10% level

GAMING

Combinations with the Highest and Lowest probabilities.

<u>Discipline</u>	<u>EXP</u>	<u>Rating</u>	<u>Av Rating</u>	<u>Inst type</u>	<u>Post</u>	<u>PhD</u>	<u>Age</u>	<u>Research activity</u>	<u>Probability of gaming</u>
liberal	15-20	3b	Average	ex PCFC	Prin Lect.	no	<40	QUITE	0.9646
liberal	15-20	3b	Average	ex UFC	Lecturer	no	<40	QUITE	0.9701
EDUC	<10	1 OR 2	Higher	ex PCFC	S.L.	yes	> 50	INACTIVE	0.0020
EDUC	<10	1 OR 2	Higher	ex UFC	Reader	yes	> 50	INACTIVE	0.0021
BMS	15-20	3b	Average	ex PCFC	Prin Lect.	no	<40	QUITE	0.9280
BMS	15-20	3b	Average	ex UFC	Lecturer	no	<40	QUITE	0.9387
BMS	<10	1 OR 2	Higher	ex PCFC	S.L.	yes	> 50	INACTIVE	0.0074
BMS	<10	1 OR 2	Higher	ex UFC	Reader	yes	> 50	INACTIVE	0.0078
Acct	15-20	3b	Average	ex PCFC	Prin Lect.	no	<40	QUITE	0.8293
Acct	15-20	3b	Average	ex UFC	Lecturer	no	<40	QUITE	0.8523

RESEARCH FIXATION

Combinations with the highest and lowest probability.

<u>Discipline</u>	<u>EXP</u>	<u>Rating</u>	<u>Av Rating</u>	<u>Inst type</u>	<u>Post</u>	<u>PhD</u>	<u>Age</u>	<u>Research activity</u>	<u>Probability</u>
Liberal	>20	3a	Average	ex-UFC	Lecturer	NO	40 - 50	Quite	0.9502
Liberal	>20	3a	Average	ex-PCFC	Lecturer	NO	40 - 50	Quite	0.9115
Science	10 to 15	4	Higher	ex-PCFC	SL	YES	>50	Inactive	0.0176
Science	10 to 15	4	Higher	ex-UFC	Reader	YES	>50	Inactive	0.0263
BMS	>20	3a	Average	ex-UFC	Lecturer	NO	40 - 50	Quite	0.8742
BMS	>20	3a	Average	ex-PCFC	Lecturer	NO	40 - 50	Quite	0.7895
BMS	10 to 15	4	Higher	ex-PCFC	SL	YES	>50	Inactive	0.0247
BMS	10 to 15	4	Higher	ex-UFC	Reader	YES	>50	Inactive	0.0367

TABLE 9-24

ACADEMIC FREEDOM

Combinations with highest and lowest probability.

<u>Discipline</u>	<u>EXP</u>	<u>Rating</u>	<u>Av Rating</u>	<u>Inst type</u>	<u>Post</u>	<u>PhD</u>	<u>Age</u>	<u>Research activity</u>	<u>Probability</u>
Liberal	15-20	3b	Average	ex UFC	Prof	Yes	<40	Quite	0.9728
Liberal	15-20	3a	Average	ex-PCFC	Prin Lect	Yes	<40	Moderate	0.9507
BUZ	<10	5*	Lower	ex UFC	Reader	No	>50	Very	0.0088
BUZ	<10	5*	Lower	ex-PCFC	S L	No	>50	Inactive	0.0034
BMS	15-20	3b	Average	ex UFC	Prof	Yes	<40	Quite	0.9579
BMS	15-20	3a	Average	ex-PCFC	Prin Lect	Yes	<40	Moderate	0.9245
BMS	<10	5*	Lower	ex UFC	Reader	No	>50	Very	0.0220
BMS	<10	5*	Lower	ex-PCFC	S L	No	>50	Inactive	0.0086

TABLE 9-25

SMOOTHING

Cobinations with highest and lowest probability

<u>Discipline</u>	<u>EXP</u>	<u>Rating</u>	<u>Av Rating</u>	<u>Inst type</u>	<u>Post</u>	<u>PhD</u>	<u>Age</u>	<u>Research activity</u>	<u>Probability</u>
Liberal	15-20	3a	Average	ex UFC	Lecturer	No	<40	Moderate	0.97386
Liberal	15-20	3a	Average	ex-PCFC	Prin Lect	No	<40	Moderate	0.985358
Physics	<10	1 + 2	Higher	ex UFC	Reader	Yes	>50	Inactive	0.002337
Physics	<10	1 + 2	Higher	ex-PCFC	Prof	Yes	>50	Inactive	0.003018
BMS	15-20	3a	Average	ex UFC	Lecturer	No	<40	Moderate	0.940811
BMS	15-20	3a	Average	ex-PCFC	Prin Lect	No	<40	Moderate	0.966343
BMS	<10	1 + 2	Higher	ex UFC	Reader	Yes	>50	Inactive	0.005413
BMS	<10	1 + 2	Higher	ex-PCFC	Prof	Yes	>50	Inactive	0.006986

TABLE 9-26

TIME CYCLE

Combinations with highest and lowest probability

<u>Discipline</u>	<u>EXP</u>	<u>Rating</u>	<u>Av Rating</u>	<u>Inst type</u>	<u>Post</u>	<u>PhD</u>	<u>Age</u>	<u>Research activity</u>	<u>Probability</u>
Liberal	15-20	3b	Average	ex UFC	Prof	No	<40	Quite	0.9924
Liberal	15-20	3b	Average	ex PCFC	Prin. Lect	No	<40	Quite	0.9911
EDUC	<10	1 + 2	Higher	ex UFC	Reader	Yes	> 50	Inactive	0.0038
EDUC	<10	1 + 2	Higher	ex UFC	Reader	Yes	> 50	Very	0.0125
EDUC	<10	1 + 2	Higher	ex PCFC	S L	Yes	> 50	Inactive	0.0039
BMS	15-20	3b	Average	ex UFC	Prof	No	<40	Quite	0.9679
BMS	15-20	3b	Average	ex PCFC	Prin. Lect	No	<40	Quite	0.9626
BMS	<10	1 + 2	Higher	ex UFC	Reader	Yes	> 50	Inactive	0.0078
BMS	<10	1 + 2	Higher	ex UFC	Reader	Yes	> 50	Very	0.0254
BMS	<10	1 + 2	Higher	ex PCFC	S L	Yes	> 50	Inactive	0.0079

MOBILITY

Combinations with the highest and lowest probability

<u>Discipline</u>	<u>EXP</u>	<u>Rating</u>	<u>Av Rating</u>	<u>Inst type</u>	<u>Post</u>	<u>PhD</u>	<u>Age</u>	<u>Research activity</u>	<u>Probability</u>
Other	15-20	-	4 Lower	ex UFC	Lecturer	Yes	<40	Inactive	0.9985
Other	15-20		4 Lower	ex PCFC	Lecturer	Yes	<40	Inactive	0.9996
Physics	> 20	3b	Higher	ex UFC	Prof.	No	> 50	Very	0.0664
Physics	> 20	3b	Higher	ex PCFC	Prin Lect	No	> 50	Very	0.2060
BMS	15-20		4 Lower	ex UFC	Lecturer	Yes	<40	Inactive	0.9981
BMS	15-20		4 Lower	ex PCFC	Lecturer	Yes	<40	Inactive	0.9995
BMS	> 20	3b	Higher	ex UFC	Prof.	No	> 50	Very	0.2028
BMS	> 20	3b	Higher	ex PCFC	Prin Lect	No	> 50	Very	0.4814

TABLE 9-28

Probabilities of Various combinations

<u>Discipline</u>	<u>EXP</u>	<u>Rating</u>	<u>Av Rating</u>	<u>Inst type</u>	<u>Post</u>	<u>PhD</u>	<u>Age</u>	<u>Research</u> <u>Activity</u>	<u>Gaming</u>		<u>Res Flx</u>		<u>Smoothing</u>		<u>Academic</u> <u>Freedom</u>		<u>Time</u> <u>Cycle</u>		<u>Mobility</u>	
									<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>
BMS	15-20	1+2	Average	ex-UFC	Lecturer	yes	<40	Quite	0.6929	0.5806	0.7926	0.8137	0.7480	0.9804						
BMS	15-20	3b	Average	ex-UFC	Lecturer	yes	<40	Quite	0.9143	0.7368	0.8870	0.9481	0.9428	0.9784						
BMS	15-20	3a	Average	ex-UFC	Lecturer	yes	<40	Quite	0.8316	0.8089	0.9208	0.8840	0.8557	0.9934						
BMS	15-20	4	Average	ex-UFC	Lecturer	yes	<40	Quite	0.8489	0.5528	0.8867	0.8789	0.7995	0.9957						
BMS	15-20	5	Average	ex-UFC	Lecturer	yes	<40	Quite	0.8857	0.7404	0.8922	0.7752	0.8251	0.9929						
BMS	15-20	5*	Average	ex-UFC	Lecturer	yes	<40	Quite	0.8008	0.6502	0.8778	0.6617	0.7876	0.9819						
BMS	>20	4	Average	ex-UFC	Lecturer	yes	<40	Quite	0.7046	0.6105	0.7325	0.8114	0.6800	0.9901						
BMS	Oct-15	4	Average	ex-UFC	Lecturer	yes	<40	Quite	0.7751	0.4591	0.8179	0.7955	0.7197	0.9916						
BMS	< 10	4	Average	ex-UFC	Lecturer	yes	<40	Quite	0.6789	0.5622	0.6632	0.7651	0.6155	0.9939						
BMS	15-20	4	Higher	ex-UFC	Lecturer	yes	<40	Quite	0.6768	0.3750	0.7719	0.8430	0.6667	0.9947						
BMS	15-20	4	Lower	ex-UFC	Lecturer	yes	<40	Quite	0.7723	0.4228	0.8709	0.8260	0.6791	0.9978						
BMS	15-20	4	Average	ex-PCFC	Lecturer	yes	<40	Quite	0.8030	0.3995	0.8763	0.7242	0.6669	0.9990						
BMS	15-20	4	Average	ex-UFC	S.L.	yes	<40	Quite	0.7788	0.3213	0.8680	0.8643	0.7955	0.9828						
BMS	15-20	4	Average	ex-PCFC	Prin .lect	yes	<40	Quite	0.8255	0.4737	0.9339	0.8295	0.7840	0.9877						
BMS	15-20	4	Average	ex-UFC	Reader	yes	<40	Quite	0.7297	0.2778	0.7750	0.8562	0.6581	0.9897						
BMS	15-20	4	Average	ex-UFC	Prof.	yes	<40	Quite	0.8222	0.3501	0.8311	0.9004	0.8095	0.9785						
BMS	15-20	4	Average	ex-UFC	Lecturer	no	<40	Quite	0.8895	0.5587	0.9020	0.8739	0.8724	0.9905						
BMS	15-20	4	Average	ex-UFC	Lecturer	yes	40-50	Quite	0.8457	0.6105	0.7885	0.8136	0.7539	0.9957						
BMS	15-20	4	Average	ex-UFC	Lecturer	yes	>50	Quite	0.7367	0.5231	0.7432	0.6361	0.5834	0.9937						
BMS	15-20	4	Average	ex-UFC	Lecturer	yes	<40	Inactive	0.3672	0.2937	0.3863	0.6244	0.2373	0.9963						
BMS	15-20	4	Average	ex-UFC	Lecturer	yes	<40	Moderate	0.7791	0.4929	0.9011	0.8216	0.7234	0.9928						
BMS	15-20	4	Average	ex-UFC	Lecturer	yes	<40	Very	0.5451	0.4227	0.8026	0.6016	0.5071	0.9846						
Science	15-20	4	Average	ex-UFC	Lecturer	yes	<40	Quite	0.8154	0.4666	0.7925	0.8106	0.8863	0.9849						
Physics	15-20	4	Average	ex-UFC	Lecturer	yes	<40	Quite	0.8372	0.5172	0.7711	0.7823	0.7979	0.9849						
ENGN	15-20	4	Average	ex-UFC	Lecturer	yes	<40	Quite	0.8369	0.7052	0.8906	0.8500	0.8565	0.9946						

TABLE 9-29

CHAPTER TEN

CONCLUSION

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CONCLUSION

10.1 INTRODUCTION

This final chapter evaluates the main findings and conclusions of the previous chapters in a broader resource allocation and performance control measure context. The evidence compiled in this thesis substantiates intuition and previous studies that the RAE has resulted in a number of consequences that are unintended and unconstructive. An increasing number of scholars are resorting to tactics such as gaming to enhance their research publications. The periodicity of the RAE and the *four-paper effect* have created a publications culture that is largely short-term in nature. The RAE's requirement that an academic's research performance has to be measured and evaluated has led to the emphasis on just those activities. As a result, output of academic nature is produced at the expense of other relevant academic activities such as voluntary services like refereeing for journals.

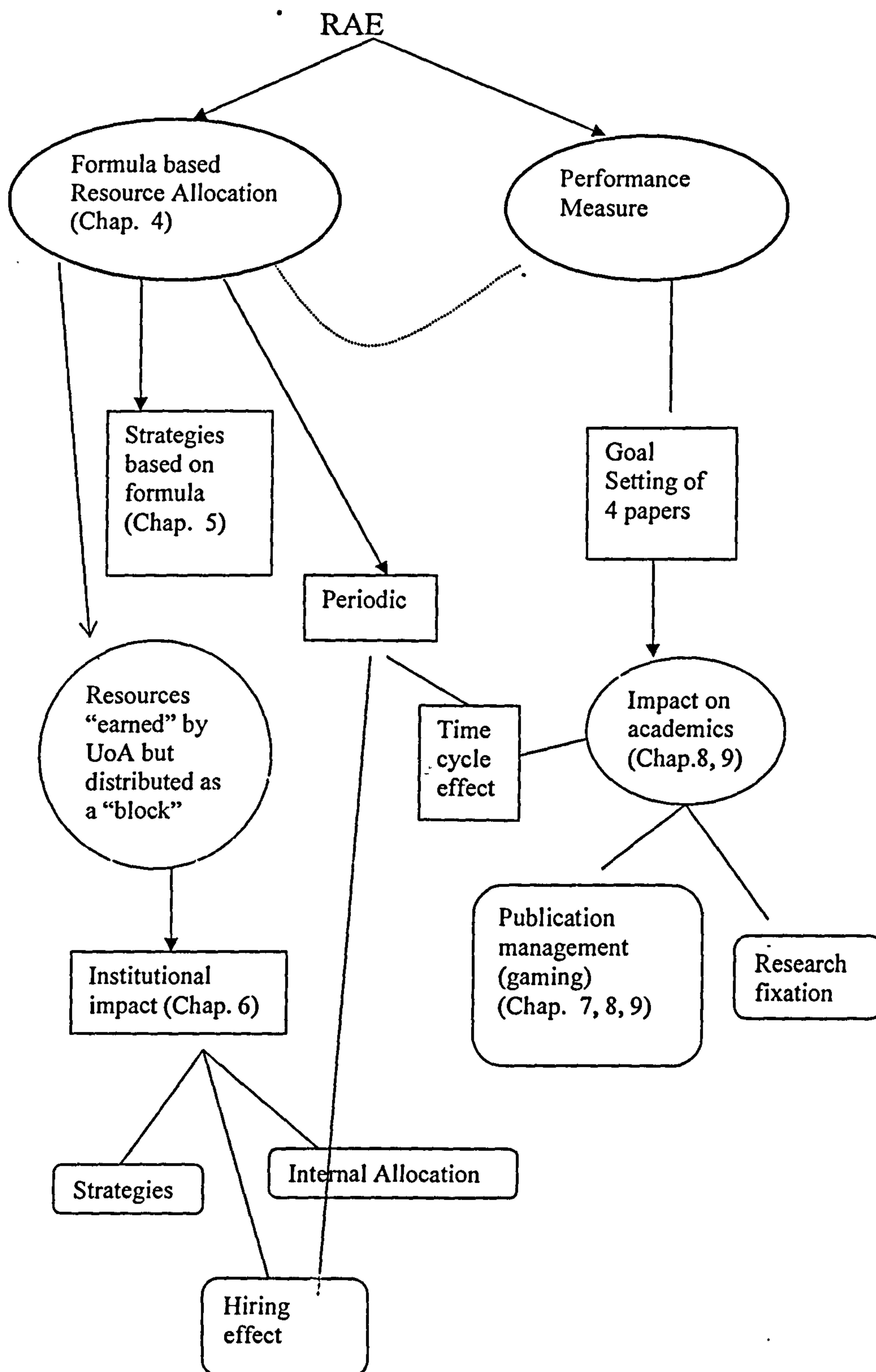
As a resource allocation methodology, the RAE lacks coherence and consistency in its transparent objectives. It confirms the suspicion that the underlying objective of the RAE is nothing more than a formula-based resource allocation of constrained resources in order to reduce the political costs of the budget cuts for higher education. As discussed in Chapter Four, formula-funding models alienate the distribution decision from the aggregate decision. Therefore, the politicians who decide on budget cuts at the aggregate level can distance

themselves from the responsibility of the negative impact of the resulting aggregate constrained distributions. The blame for the distribution impacts, even if arising from budget cut constraints, can then be shifted to the funding bodies and the distribution methodology, exonerating the politicians of all wrong-doing.

10.2 EVALUATION OF THE RAE

The RAE is essentially a formula-based resource allocation mechanism. It measures research performance and the measured performance determines the resource allocation. Therefore, it is also a performance measure. The thesis investigated the consequences from these two angles of the RAE. This is illustrated in Figure 10-1.

FIGURE 10-1:



10.2.1 RESOURCE ALLOCATION

During the last twenty years, much political attention has been given to the organization and effectiveness of public services in the United Kingdom (Kitchener et al, 2000). Across the public sector, concern for the organisation of professional work has risen against a changing political economy that increasingly espouses “New Public Management” doctrines such as consumerism, the attempted reduction of government spending, the introduction of market forms (Hood 1991), accountability and value for money. These doctrines form part of a wider political project that is driven by the neo-liberal economic theory of new right Conservative politicians (see for example Clarke and Newman, 1997). The principal aim has been to “get more for less” from public services (Hood, 1991). The goal of this, from what is referred to as the “Thatcherite” social welfare function, is to improve the welfare of the best members of society. By rewarding and motivating the best, the marginal benefit of the returns will be highest.

One of the difficulties for the RAE is defining what is the aggregate objective welfare function that captures the effect of university research funding - a very complex issue. If the intention of the RAE is to achieve value for money, then the resultant allocation distribution should aim to achieve the highest marginal returns, notwithstanding how it is measured, for each unit of resource. Fundamentally, the RAE allocation should resemble the basic capital rationing decision. If the allocation is Pareto efficient, then the extra unit of resource would have the same marginal returns irrespective of where it is applied. (Pareto efficiency is maximising the output from the unit of resource). The shadow

prices will be equal, where the shadow price is (extra benefit/unit of resource). The capital rationing allocation requires that the initial amounts be re-distributed to highly rated departments. Resources will only be provided to the lower departments if the returns from each additional resource to these lower rated departments are equal to the returns derived from the additional resource unit to the higher rated department.

Figure 10-2 illustrates the above point. The figure assumes that marginal benefit will increase until the 8th unit of resources where marginal benefit starts to decrease. For the first 14 units of resource, the graph shows that the highest returns will be from allocating it to the 5* rated departments. The 15th unit of resource has higher returns if allocated to a 5 rated department. The next 16 units would have highest returns in departments rated 5. For a department rated 3b to receive any funding, there must be at least 64 units available: 14 to 5*, 16 to 5, 16 to 4 and 18 to 3a. Though the graph in Figure 10.2 is hypothetical, the principle is illustrative.

Thus, for lower rated departments to receive funds there needs to be a large enough amount of resources to distribute. With the continual rationing of total funds available and the constant improvement of high rated departments, it seems that departments that are rated low would receive progressively less or even no funding. This allocation philosophy implies that the low rated departments are encouraged not to pursue research. This calls to question if there is a hidden agenda to return to a binary divide.

The RAE funds, however, are awarded to universities as a block grant and they have the autonomy to distribute the money as they wish. The internal allocation of the RAE funds by the universities can weaken the efficiency of the RAE rationing distribution. The shadow price of a unit of resource to the university is different from the marginal shadow price to the policy makers. Research quality output determines the shadow prices for the policy decision-makers, while the marginal returns to the universities are also determined by the additional funds that the department can obtain.

This inefficiency in internal distribution can be explained in the context of agency theory. The reduction in the principal's welfare from the divergence between the principal's and the agents' interests is known as the "agency residual loss". The universities are agents for the principal, viz., the funding council. The goals of the agents conflict with the principal's. The agent has a "limited holistic" view. This view is limited insofar as it is only a holistic view of the institution while the funding council has an aggregated holistic view. The funding council is more interested in the quality of research at the aggregate per discipline while the institutions view it only at the level of institutions.

Another inconsistency with the allocation process is the interference with the equivalence doctrine. The British higher education system is based on the premise that degrees awarded by all British universities are equivalent. This is the underlying principle for the external examiner system. However, the concentration of research in a limited number of institutions would not be consistent with the equivalence doctrine.

10.2.2 PERFORMANCE MEASURE

The review of the management control literature in Chapter Two has related the dysfunctional behaviours to the higher education context in Table 2.7 of Chapter Two. This thesis has established the existence of such dysfunctional behaviours arising from the imposition of an outcome control on an environment more suited to clan control or self-control.

Several theories of motivation, including level of aspiration (Stedry, 1960), expectancy (Ronen and Livingston, 1975), agency (Chow, 1983), and goal setting (Hirst and Lowy, 1990) are used to predict, assuming the standard goal is attainable, that performance is an increasing function of standard difficulty. This has been discussed in detail in Chapter Two and argues that the level of increased performance is contingent on the level of perceived difficulty of the goal (see Figure 2.7 in Chapter Two). The set goal can have de-motivating effects if it is perceived as unattainable or an easy goal. Therefore, it is hypothesised that the middle-tier academics would yield the highest motivation from the four-paper goal and increased performance. This thesis' results support this hypothesis. However, the statistical results also indicate that the middle-tier academics also engage in gaming activities and generally have a short-term orientation. In general, academics, especially those in the middle tier, are striving to publish only for the sake of the RAE. This is coined in this thesis as the *four-paper effect* and is discussed in detail in Chapters Seven and Eight.

The short-term orientation is comparable to studies in the management literature that documents how an exclusive focus on accounting-based controls may bring

out the worst practices of management aiming for short-term profit maximisation at the expense of long-term effectiveness and competitive strengths (e.g., Hayes and Abetrnathy, 1980; Laverty, 1996; Merchant, 1990; Merchant and Bruns, 1986).

Agency theory, and expectancy and goal-setting theories predict that performance is an increasing function of performance-contingent incentives (Demski and Feltham, 1978; Locke and Latham, 1990; Ronen and Livingston, 1975). Individuals are motivated to expend more effort when they believe that the additional effort will increase performance which, in turn, results in additional valued rewards. This is discussed in Chapter Two and illustrated in the motivational process circle in Figure 2-6, as well as the Porter and Lawler model (Figure 2-5 in Chapter Two). The practice of headhunting and compensation premiums is to the advantage of the very active researchers at the professorial level. This consequence of the RAE, to some extent, reduces the brain drain of academics leaving the UK for foreign locations, in particular the United States of America.

An unintended consequence of the RAE is that of academics reducing their commitments to voluntary academic activities and becoming less proactive in public policy debates. Since voluntary academic activities and public policy participation by academics are not a part of the contract of employment, they are not formally assessed. But, they constitute an integral feature of academic life, something that is invisible and not evaluated by the RAE process.

The key finding of this thesis is that the behavioural consequences of imposing an outcome control in a task complex environment - more suited to clan control or self-control - is contingent on people's self-assessed level of performance.

10.3 FURTHER RESEARCH

The thesis' research can be extended to study the relationship between short-term orientation and performance over time. Also, while managerial short-term orientation is usually considered to be dysfunctional (Van der Stede, 2000: p. 619), it may be situation specific. Short-term actions may be necessary, for instance to bring about an urgent recovery of poor performance (Merchant and Manzoni, 1989). It would be interesting to explore the impact of a short-term orientation on future performance. This would require longitudinal data to understand the effects on an individual's promotion, research quality, and publications track records.

Societal and cultural values may have different effects. Thus, another possible use of the thesis' findings is to replicate the study in other countries such as Hong Kong where a similar Research Assessment Exercise is being adopted.

Finally, as the RAE is essentially a resource allocation tool, the costs of and the value for money from, the allocation process are fundamental. Some research would be useful for understanding the costs of compliance to the RAE, akin to the compliance cost of taxation research.

10.4 FINAL CONCLUDING REMARKS

Though the RAE is not coherent, there is some coherence in the overall strategies adopted by the funding council. The present environment in the higher education sector is that the RAE is the strategy to promote research excellence by rewarding it. This has, nevertheless, resulted in a number of unintended consequences such as gaming, smoothing and short-term orientation. The Research Councils continue to be the indirect mechanism for directing research towards national interests.

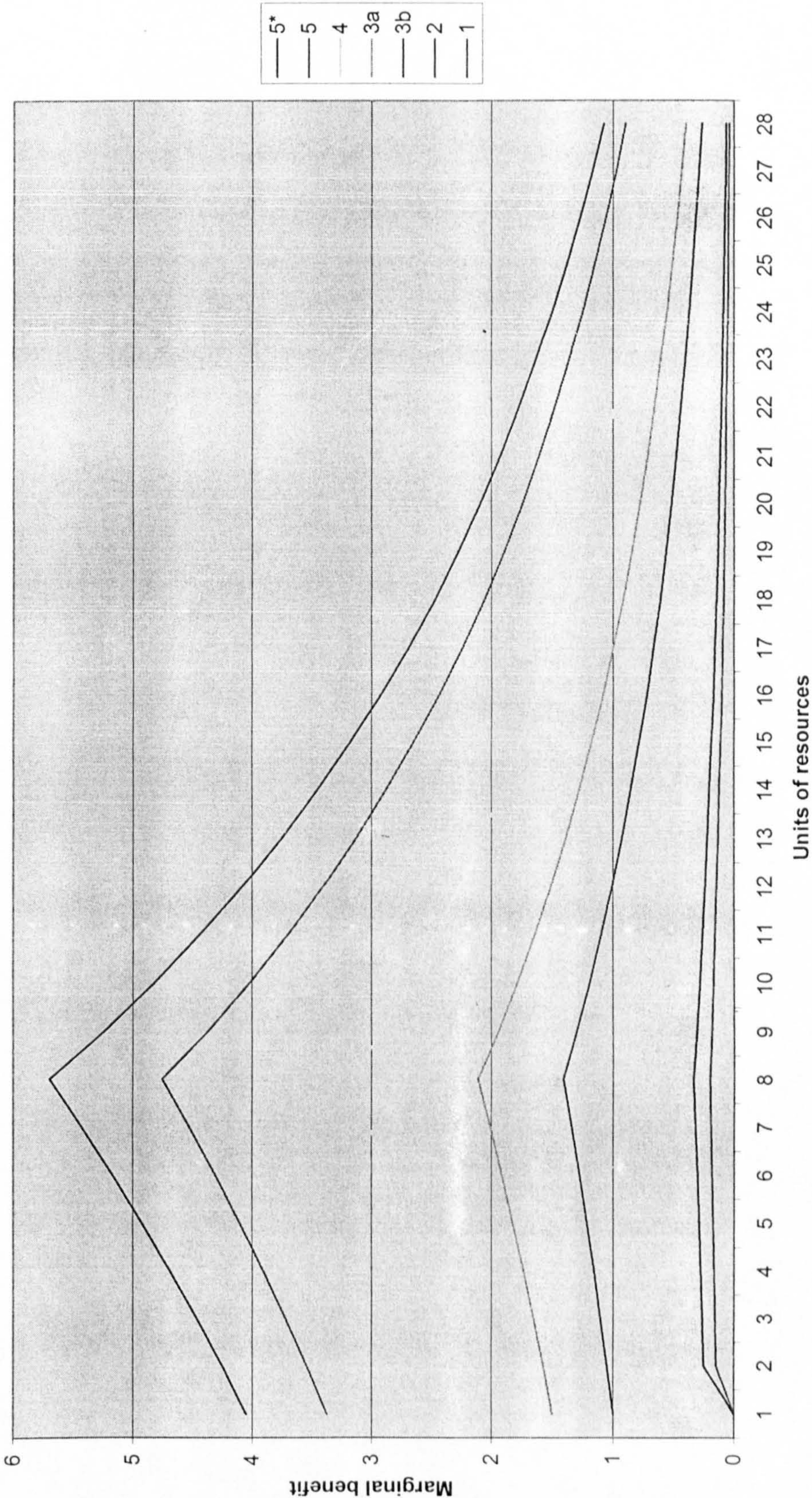
The impact of the RAE on teaching excellence has been a source of concern, and the TQA has some safeguards for teaching competency so that it is not totally negated by the adverse effects of the RAE. But, the current deficiency of the TQA is that it lacks any funding implications. Universities look upon the TQA as important for its effect on student recruitment, thus some universities deliberately hire and retain good teachers. For example, Warwick University, while hailed as a research-led institution, has also promoted a limited number of academics based on their teaching excellence and is considering the appointment of academics to teaching-only positions.

This overall policy has left exposed the other academic work, which is currently unmeasured. These include voluntary academic work, refereeing for journals and participation in public policy matters. To circumvent the reluctance of academia to participate in public policy debates, the government is increasingly inviting established academics to participate in government committees.

The goals of the RAE may be strategic and noble, but as a performance measure it comes up short in the sense that it does not fully capture nor recognise the totality of the activities of an academic who have to multitask between teaching and research; between service to the university and the public at large; between serving one's university and the academic community at large; and between personal goals and institutional goals. In this regard, the RAE is due for a thorough overhaul. However, the main aim of the RAE is the allocation of constrained resources and its failings should be seen in that context.

Figure 10-2

Marginal benefit of resource allocation



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