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## **Title**

**Incentives to academic commercialisation activity and mixed signals about *identity* in researchers' perceptions of utility**

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# Incentives to academic commercialisation activity and mixed signals about identity in researchers' perceptions of utility

## Abstract

Akerlof and Kranton have analysed for a number of people and situations 'their motivations in terms of the *identities* of members of the organization, where workers lose or gain utility insofar as their behaviour matches the ideal for their social identity'. They have proposed a utility function that incorporates '*identity* as a motivation for behavior'. They have postulated *identity* as being based on social categories. Their utility function provides both for each person to assign people to these categories with each person having a conception of their own and of other people's categories. They then add the concept of *prescriptions* (recognizing that other scholars may have tended to call these *norms*) that indicate the behaviour appropriate for people in different social categories in different situations. They use the word *identity* 'to describe both a person's self image as well as her assigned categories'

This paper has drawn on data collected during a consultancy involving the author for the Australian Government Department of Education, Science and Training. This study explored incentives and disincentives to academic researchers to commercialise their research outcomes and their impact on university research commercialisation performance. This consultancy identified confused signals about *identity* as important disincentives. Such confusion has derived from a number of issues, including lack of effective recognition of commercialisation activity in reward and promotion systems and lack of time available to younger academics after fulfilling their teaching, publication and administrative responsibilities. The study also found that in publicly funded universities financial incentives, such as access to a share of royalties, were classic Herzberg hygiene factors. Royalty sharing had to be available but increasing the royalty share was unlikely to affect commercialisation performance.

The present paper has explored the relevance of Akerlof and Kranton's concept of *identity* as a tool to analyse the motivation of academic researchers to commercialise their research outcomes. It has sought to analyse how the motivation of a researcher to divert time and mental effort to commercialisation activities related to each individual's conception of their own and each other's categories (in the Akerlof and Kranton terminology), having regard to their institutional environment and the *prescriptions* that are seen by the researchers and by others in their environments to determine appropriate behaviour. The first objective has been to achieve improved understanding of incentives and disincentives motivating or demotivating academic researchers to commercialise their research outcomes. The analysis, as a secondary objective, has sought to evaluate the likely impact on commercialisation motivation of the implementation of Research Quality Frameworks (RQF) as the methodology for determining access to research funding by Australian universities. The RQF proposal is being designed to take into account the impact of research as well as its quality based on quality of publications. However, it concludes that the implementation of RQF in Australia is likely to seriously weaken the motivation of academic researchers (under increased pressure from university research managers on research quality related effort) to devote effort to commercialization unless new incentives and related initiatives are introduced. Finally, the research has been designed to answer the question raised by Akerlof and Kranton: 'If monetary incentives do not work, what does?'

*Key words:* Commercialisation, incentives, identity, research, utility

## Acknowledgement

This paper has drawn heavily on the 2004 consultancy report by Karingal Consultants, with authors John Yencken and Liss Ralston, entitled *Evaluation of Incentives for Commercialisation of Research in Australian Universities: A survey of selected Australian universities*, which resulted from a consultancy study for the Australian Commonwealth Department of Education, Science and Training (Yencken and Ralston, 2005). The author wishes to acknowledge the approval of the Department to quote material from the above report, the copyright for which is owned by the Commonwealth of Australia. An earlier version of this paper was presented at the Monash University Australian Centre for Research into Employment and Work “Shifting the Boundaries of Employment and Work” in June 2005.

## Introduction

International economic integration, on the liberal view, is what happens when technology allows people to pursue their own goals and they are given the liberty to do so...Adam Smith’s invisible hand does its work. People choose what serves their self-interest, each of them making that judgement for himself (*herself*). The result is that society as a whole prospers and advances—spontaneously, not by design of any person or government (Economist, 2001, *present author’s italics*).

Innovation is not just the idea—innovation is only achieved when the idea has been transferred into an outcome which has value (Livingstone, 2000).

The translation of knowledge into economic activity has emerged as a recognised university function, alongside research and teaching (Etzkowitz and Leyesdorff, 1997: 1).

The quotations set out above show the changing attitudes in the world’s developed economies to the role of universities not only as generators of new knowledge, but also as key participants and intermediaries in ensuring the effective exploitation of the new knowledge so generated for the economic, social and environmental benefit of the communities involved. This can result either directly with the universities as resources for both new knowledge generation and technology transfer or more indirectly through the economic processes of globalisation and technology diffusion. The research reported in this paper has suggested that for Australian universities, as for many overseas universities, the process of organisational learning how to integrate these new emphases on the exploitation, not just the generation, of new knowledge, into university resource management and academic staff award and career development systems has for many been difficult. The research identified problems of *deep trust* and perceptions that despite formal change in, for example, promotion protocols entrenched historical attitudes still continue to result in a lesser credit for performance in the exploitation of new knowledge than in the traditional measures of research performance such as peer refereed publications and citation indices. We will discuss later in the paper what we have called confused signals about *identity* and the application in this context of Akerlof and Kranton’s (2000) work on economics and identity.

### **University strategies, performance measurement, incentives and disincentives**

Acceptance of these propositions has implications for university governing bodies. They need to have in place valid strategies for the exploitation and commercialisation of the new knowledge and new technologies that their investment in research and development generates (Cripps et al., 1999; Wright et al., 2002). This in turn requires that they establish valid

quantitative objectives against which performance in the achievement and distribution of benefit from the investment in the creation of new knowledge can be measured.

Once such measurable key performance indicators (KPIs) have been agreed, university managements need to consider the incentives and disincentives that are likely to affect the commercialisation commitment and performance of the individual academic researcher. At the same time managements have to recognise that academic researchers have traditionally been recruited, rewarded and promoted for the excellence of their teaching, research and, for some, administrative skills. The need for, commitment to and performance in the commercialisation of their research outcomes, important now for some but usually not all, is relatively new and is not always adequately recognised in academic career development and reward systems. Recent studies in the UK and Australia have shown that for many, particularly younger academics needing publications to establish their academic careers, there is little or no time left after they meet what they see as their primary responsibilities to teaching and research (Cripps et al, 1999; Howard Partners, 2002; Wright et al., 2002).

The organisational environment therefore in which incentives and disincentives will be considered is complicated and there is no strong *a priori* case that financial incentives, either alone or at all, are likely to be effective in increasing commitment to research outcomes commercialisation as only one of the activities in which the staff concerned may be involved and on which their performance will be assessed.. The literature on the effectiveness of financial incentives to management may have only limited relevance. There will be a need to consider other types of incentives that provide perceived benefit to the academic researcher across the totality of his or her career commitments: teaching, research, publications, administration, career progression generally.

The research reported here will show that while a perceived fair level of participation in royalties and other income derived from commercialisation of research outcomes is essential, this is essentially a Herzberg hygiene factor (Yencken and Ralston, 2005). The effective incentive to an academic researcher to increase his commercialisation commitment is to have access close by to sufficient support so that he or she does not have to commit scarce time resources to commercialisation activities such as intellectual property protection, business planning or deal making, activities in which he or she will usually have little skill or experience. In Akerlof's terms, university administrations need to recognize the need for positive contributions, not just confused signals, to *identity* to optimize researchers' perceptions of *utility* arising from the commercialization process. The danger is always that good researchers might be turned into poor entrepreneurs.

### **Confused signals about *identity***

Akerlof and Kranton (2000:1) have introduced "identity—a person's sense of self—into economic analysis".

We incorporate identity into a general model of behavior, then demonstrate how identity influences economic outcomes.

They have shown how the concept of identity expands economic analysis:

First, identity can explain behavior that appears detrimental...

Second, identity underlies a new externality. One person's actions can have meaning for and evoke responses in others...

Third, identity reveals a new way that preferences can be changed. Notions of identity evolve within a society and some in society have incentives to manipulate them...

Fourth, because identity is fundamental to behavior, choice of identity may be the most important “economic” decision people make... (p.716)

Their utility function is based on categories,  $C$ .

Each person,  $j$ , has an assignment of people in these categories, so that each person has a conception of her own category and that of all other people. Prescriptions,  $P$ , indicate the behavior appropriate for people in different social categories in different situations”.

We propose the following utility function:

$$(1) \quad U_{j=} = U_j(\mathbf{a}_j, \mathbf{a}_{\cdot j}, \mathbf{I}_j)$$

Utility depends on  $j$ 's identity or self-image,  $\mathbf{I}_j$ , as well as on the usual vectors of  $j$ 's actions,  $\mathbf{a}_j$ , and others' actions,  $\mathbf{a}_{\cdot j}$ . Since  $\mathbf{a}_j$  and  $\mathbf{a}_{\cdot j}$  determine  $j$ 's consumption of goods and services, these arguments are sufficient to capture the standard economics of own actions and externalities.

Following our discussion above, we propose the following representation of  $\mathbf{I}_j$ :

$$(2) \quad \mathbf{I}_j = \mathbf{I}_j(\mathbf{a}_j, \mathbf{a}_{\cdot j}; \mathbf{c}_j, \bullet_j, P).$$

A person  $j$ 's identity depends first of all on  $j$ 's assigned categories,  $\mathbf{c}_j$ . The social status of category is given by the function  $\mathbf{I}(\bullet)$  and a person assigned a category with a higher social status may enjoy an enhanced self-image. Identity depends further on the extent to which  $j$ 's own given characteristics,  $\bullet_j$ , match the ideal of  $j$ 's assigned category, indicated by the prescriptions,  $P$ . Finally identity depends on the extent to which  $j$ 's own and others' actions correspond to prescribed behavior indicated by  $P$ . We call increases or decreases in utility that derive from  $\mathbf{I}$ , *gains or losses in identity* (p.718).

Akerlof and Kranton (2000) discussed the application of these concepts of utility and identity in a number of situations, including gender in the work place, behaviour of school children and poverty and social exclusion. These concepts will be applied later in this paper in exploring the relationships between academic researchers and academic administrators in their attitudes to commercialization of university research outcomes

## Incentives and disincentives

A full literature review on incentives to academic researchers was carried out as part of a consultancy report for the Commonwealth Department of Education, Science and Training (Yencken and Ralston, 2005). Approval has been sought and given for the use of extracts from this report.

This literature has explored the effectiveness of incentives generally where there has been a quite direct relationship between the individual or incentive group performance and that individual or group's contribution to an identified commercial outcome. In a university environment, commitment to research commercialisation activity is only one of the several differing commitments required of the academic researcher and which will determine his career progress. Similarly there will be a much greater variability in the time between the researcher committing to a commercialisation activity and the parent university receiving commercial benefit from such commitment.

## **Incentives for knowledge workers such as academic researchers**

Yencken and Ralston (2005) generated a list (Table 1) of possible tangible and intangible incentives that might be available to knowledge workers such as academic researchers.

### **Tangible monetary incentives**

The Yencken and Ralston's (2005) review showed that almost all the literature that formally addresses incentives for commercialisation has been focussed in four areas:

- The share to the inventor of net commercialisation proceeds and equity in spin-off companies that best promotes researcher commercialisation activity.
- Payment by the university of IP protection costs.
- Providing increased access to pre-seed finance (preferably without the need to incorporate the new venture) through mechanisms, internal and external to the university, for technology development, proof of concept and other pre-seed funding needs, such as IP protection and the market and competitor intelligence needed to assess the commercial opportunity and later develop the first business plan.
- Subsidised access to second tranche early stage venture capital.

There was no evidence of direct and immediate cash rewards for commercialisation performance (eg for disclosure of a new commercially attractive opportunity).

### **Inventor share of commercialisation proceeds**

The commonly quoted inventor share of commercialisation net proceeds (royalties and sale of equity) was 30 per cent (Auril/UUK/Patent Office, 2002). However Lach and Schankerman (2003) have indicated that a much higher share of royalty income (but not usually other commercialisation income) was common in US universities. A recent comment from the experience of the University of Auckland (Rotherham, 2002) illustrates the problem of meeting the aspirations of academic staff:

Some researchers are unhappy with a one-third share of a spin-off company and think that they should get 100 per cent, Kernahan says, and they get more upset when their shareholding gets diluted as commercial partners put in capital to take the invention to market. Ten per cent of a company worth \$1 million is better than 30% of one worth \$100,000, but New Zealanders don't tend to see that — they always think about control.

### **Intangible commercialisation incentives**

Yencken and Ralston (2005) identified intangible incentives (Table 1) that included

- a supportive University culture and commercialisation strategy
- the importance of *trust*. The offer of increased incentives will not be effective if the target groups do not trust the institution's willingness and ability to deliver on them.
- reward and promotion systems, that could be incentive or disincentive

### **The risks to avoid**

Recent discussions have drawn attention to two *caveats*:

- Personal incentives to academic research staff must be aligned to incentives for the business, that is the University.

- The problem of toxic revenue: just enough finance to get a spin-off company started but not enough to make it sustainable. This usually results in failure or at best equity disposal at a very low valuation.

A recent survey involving the UK Patent Office (Auril, UUK and Patent Office, 2002) has also commented:

- Incentive structures need not be restricted to financial benefits. Support for academic staff engaged in IP commercialisation, and consideration of IP-related activities, as a criterion for promotion can also be important.
- Equity stakes may not be the best way of compensating departments for the temporary loss of staff to spin-outs, and more direct and immediate financial compensation should also be considered (eg buying out of teaching time or relieving researchers of administrative responsibilities).

### **Disincentives in university systems**

The disincentives are firstly the lack of supportive university strategies, plans and resources and reward and promotion systems that do not reward and may discourage researcher involvement in commercialisation activity.

#### **The importance of time**

Australian studies (Cripps et al., 1999; Johnson, Matthews and Dodgson, 2001; Howard Partners, 2002;; Yencken and Ralston, 2005) have identified *time* as probably the most serious barrier to academic involvement in research commercialisation activity in Australia. Increased teaching loads and the need to generate sufficient refereed publications particularly have limited the incentive to younger academics, even if they would like to be involved in the commercialisation of their research.

The UNICO/NBS survey (Wright et al., 2002: 29) came to a similar conclusion in the UK about time in relation to technology transfer offices. Wright et al. (2002) showed that in the majority of UK universities a significant impediment to the commercialisation of university IP is the non-availability of incentives and rewards for university staff to spend time on spin-outs and licensing.

### **The effectiveness of incentives**

European Commission (EU) reports on best practice in the transfer of university technology to industry have in the past focussed almost solely on the organisational implications and models and not at all on the incentivisation of the individuals involved (INNO, 96). The Yencken and Ralston (2005) literature search did however identify several major studies of the effectiveness of financial incentives to academic researchers. The most recent has been the Lach and Shankerman (2003) econometric study of *Incentives and Inventions in Universities*. The Abstract to this paper states:

As Lazear points out in his important study of pay and productivity (2000:1346), “a cornerstone of the theory of personnel compensation is that workers respond to incentives”.

They claimed to show that economic incentives affected the number and commercial value of inventions generated in universities and that for 102 US universities during the period 1991-99 universities that gave higher royalty shares to academic research scientists generated more inventions and higher license income, while controlling other factors including university size, quality, research funding and technology licensing inputs. *The incentive effects that they*

*found were much larger in private universities than in public ones.* The incentive effect, particularly in private universities, appeared to work both through the level of effort and sorting of academic scientists. “This finding is important because it implies that the design of intellectual property rights and other forms of incentives in academic institutions can have real effects”. (Lach and Shankerman, 2003:27).

Three qualifying findings from this study are relevant to the Australian environment:

1. The incentives effect was much greater in private than in public universities. All the Australian universities in the Group of Eight and ATN are in the category of public universities and therefore the incentive effect might be expected to be lower. The most important finding is that royalty shares have positive, and significant, incentive effects both for public and private universities (significant at the 0.10 per cent level for public). However the incentive effect is four times as large for private institutions (Lach and Schankerman, 2003:15).
2. The effect of royalty share incentives on invention disclosure rates was positive (but less so than for royalty revenue) for private but negative for public institutions.

The differences in incentive effects on disclosures and on royalty revenue merit further discussion. These differences suggested firstly that incentives increase royalty revenue per disclosure. This in turn suggested that the impact on academic researchers of increasing royalty shares as financial incentives was to generate increased commitment and effort from the researcher in the stages after invention disclosure rather than in increasing awareness of a potentially commercialisable opportunity (Yencken and Ralston, 2005)

The other recent paper on financial incentives with a whole chapter on the subject identified in the Yencken and Ralston study has been the recent UK Patent Office review of managing IP in universities (Auril/UUK/Patent Office, 2002). It was to some extent limited by its focus on earnings from licensing of intellectual property and did not directly address incentives related to the broader issues of building and maintaining research-user relationships and generation of new spin-off ventures.

The purpose of inventor incentives is to promote directly the generation and exploitation of IP, but there are important issues relating to other staff [*other than the academic inventors*] in the department or unit. They may, for example, have assumed higher teaching or management loads, freeing up the time of those directly involved in the invention and, more generally they are part of the academic community. It needs to be clear however, that if a reward is made to participants (who are non-inventors), then this does not accord joint inventor status; otherwise further disputes could arise (p.62).

The UK Patent Office review collected details of IP related incentives in seven UK universities. They noted that some university achieved such equity in rewards by allocating a share of exploitation revenue to the department in question. The review suggested about 30 per cent as the appropriate revenue share to faculty or school.

Di Gregorio and Shane (2003) have studied the effects of a number of factors in new spin-off venture creation (as opposed to licensing IP to existing companies) by the most active US research universities. They concluded:

...we find evidence that several university technology transfer policies enhance start-up activity. In particular a low inventor share of royalties and a willingness

to make equity investments in TLO start-up companies increase start-up activities (Di Gregorio and Shane, 2003:225)<sup>1</sup>.

Yencken and Ralston noted these implications:

Understanding the implications of these policy tools is also important because they may generate conflicting incentives. In particular, many universities distribute a high percentage of their royalties to inventors in order to encourage the reporting and exploitation of inventions; however our results suggest that high distribution rates also serve as a disincentive to the creation of start-up firms. (Di Gregorio and Shane, 2003:225).

Siegel et al., (2002) revealed palpable differences in these areas that can potentially impede technology transfer. Many universities do not reward activities, such as commercialising research and creating new spin-offs, in their promotion and tenure decisions (Siegel et al., 2002). In John Nutt's (2001) report on the Australian Academy of Technological Sciences and Engineering Workshop on *Commercialising Innovation – The Second Step*, he commented that “a number of speakers highlighted the lack of incentives, ranging from rewarding researchers, to providing resources for commercialisation”. Another commented that “Australian tax laws needed to be amended to tax options and equity at the time when added value is achieved”. Similarly academic administrators have seen the need for change:

It is important that universities recognise the value of applied research and reward people who make significant contributions. There need to be incentives for the exploitation of commercially related research (Professor Andrew Glenn, Pro Vice-Chancellor (Research), University of Tasmania).

## **Research findings for Australian universities**

### **Data collection**

The DEST consultancy survey (Yencken and Ralston, 2005) involved three stages of data collection:

1. Interviews with Deputy or Pro Vice-Chancellors Research at all Group of Eight and Australian Technology Network universities.
2. Mail survey and follow up with managers of the technology transfer offices of these thirteen universities.
3. Focus group discussions and an E-mail based survey of academic researchers in these universities.

Commercialisation performance data was also presented as in Figure 2.

### **Research findings**

The survey found there was a commitment to an effective research commercialisation strategy by senior management in most of the top performing (in terms of research commercialisation) universities. The most important categories of incentives identified were:

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<sup>1</sup> US universities commonly limit researcher revenue share to royalties only, excluding proceeds from sale of equity and other commercialisation revenue.

- *Financial returns*, including access to a share of royalties and other commercialisation net revenue, generally shared equally between the university, the research centre or faculty and the inventors, access to equity in spin-off companies (most commonly around 25 per cent).

Taxation issues were a major issue for researchers both in actually deciding to take up equity offers and in determining the exact form (shares, options, etc.) in which the equity was offered. This issue has been further explored in a recent review of IP related taxation issues by the University of Melbourne Law School (Ryder et al., 2006)

- Support mechanisms, particularly the provision of business development staff and resources, both to help identify commercialisation opportunities and provide support and relief to inventors in the early stages of the new opportunity's commercialisation and development. These enable inventors to better balance their research endeavours without detriment to their academic careers and other responsibilities.

This support is usually quite critical in providing access to the commercial and market related skills and experience that have been identified by in Flanders as a key factor in the generation of new technology based high growth ventures. (Heirman and Charysse, 2004)

- Finance and other resources: provision of pre-seed and seed funding for technology development (proof of concept and working prototypes), funding support for intellectual property protection (including patents), and for market and competitor intelligence to allow business model development.

The Yencken and Ralston survey showed the importance of researchers being able to share in the proceeds arising from the commercialisation of their research, but with some qualifying comment:

Six out the Group of Eight Universities and three out of the five ATN universities indicated (in one way or another) sharing in the economic returns from research commercialisation as the single most effective incentive. Only one respondent specifically mentioned equity in spin-off companies. There was however a comment that "giving IP rights to staff has resulted in an increase in spin-out activity".

Increasingly, access to a share of technology transfer and commercialisation net revenue and to equity in spin-offs had become hygiene factors. They were the norm and were expected. They were included in industrial relations agreements.

...such characteristics as business policy and administration, supervision, interpersonal relations, working conditions and income have been characterized by Herzberg as **hygiene factors**. When they are adequate, people will not be dissatisfied; however, neither will they be satisfied. If we want to motivate people on their jobs, Herzberg suggests emphasizing recognition, the work itself, responsibility and growth. These are the characteristics that people find intrinsically rewarding (Robbins et al., 1996: 251).

Lack of such [*revenue sharing*] arrangements would be a strong disincentive, but their presence and the shares going to researchers could no longer be seen on their own as effective incentives. Increasing the researcher's share would be unlikely to increase commitment to commercialisation activity, but lack of trust and policy consistency in implementation would quickly become disincentives (Yencken and Ralston, 2005).

There was little or no support for more direct financial incentives, eg financial rewards for making a disclosure that ended in a patent, as has become common in some US publicly funded research agencies.

There was however unanimous agreement among the university senior managements (Deputy and Pro Vice-Chancellors, Research) interviewed that, while access to a share of royalties and other commercialisation revenue was the most important individual incentive, deployment of business development people in the faculties and research centres was the most effective incentive in improving both rate of disclosure generation and ongoing commercialisation commitment by researchers.

### **Disincentives to commercialisation**

Many researchers interviewed were unaware what incentives were available, with very few aware how the cost deductions to reach a commercialisation net revenue figure were calculated. Among researchers, there was a quite widespread lack of trust in university administrations that the incentive reward would be paid as expected, particularly where changes had been made *post hoc*, generally to the disadvantage of the inventors or people involved in consultancies and research contracts.

The smaller research profile universities had difficulty in finding the financial and other resources needed to deploy suitably qualified and experienced business development staff, and had been unable to establish their own internal critical mass of commercialisation support. There was scope for ongoing State government assistance in this area.

### **Findings on *identity* and *utility***

This next analysis has followed the broad *schema* of Akerlof and Kranton's study of identity issues in the consideration of poverty and social exclusion (Akerlof and Stanton, 2000: 741-746). In the case for this paper, we have called the researchers with a commitment and interest in the commercialization of their research outcomes the *Greens* and those who have no interest in research commercialization and are solely focused on research to generate new knowledge as assessed for peer reviewed publications the *Reds*. We will propose two types of activities: Activity One is the traditional academic role of teaching, research and some administration, and Activity Two is involvement in the commercialisation of research outcomes. We also need to consider the *prescriptions* involved. Both *Reds* and *Greens* will be expected both by themselves and by others to maintain a high level of commitment to teaching and research. The *Greens* will also have for themselves a *prescription* of ensuring the commercial exploitation of the new knowledge that they generate. There will also be different pecuniary externalities. The *Greens* are much more likely to be interested in improved financial remuneration deriving from their research commercialisation prescription.

The literature on university research commercialization shows that we also need two more categories, those who provide support in the commercialisation process, who we will call the *Blues*, and those who administer, make resource allocation and promotion decisions, who we will call the *Greys*. This last group will have among its *prescriptions* in terms of desired outcomes: financial solvency, research quantity and quality, and maximizing research funding from governments and other external agencies.

Outcomes or the dependent variable will be  $r$ .  $r_{opt}$  will be the optimum level of commercialisation activity that maximises the perceived utility of the various groups. Three scenarios are illustrated in Figure 2:

*Scenario 1:  $r_0$*  The university's focus is solely on teaching and research and the University administrators provide no support for and no recognition in reward and promotion systems for research commercialization performance.

This has been the scenario in the past for many universities in Australia, UK and Europe. This scenario would apply if under the implementation of the proposed Research Quality Framework in Australia (DEST, 2005) research impact was to be measured solely by the citation indices of the researchers involved. The prescriptions of the *Greys* here reject the need for commercialization. This scenario satisfies the *Reds'* prescriptions for them selves, but there can be significant loss of identity and hence reduced perceptions of economic utility by the *Greens*.

*Scenario 2:  $r_m$* . The university provides a limited level of support for the commercialisation of its research outcomes and there is some but an inadequate level of recognition for successful commercialisation performance in reward and promotion systems.

The Yencken and Ralston (2005) study has suggested that this is effectively the scenario that still applies in most Australian universities. The *Greys* do not see their organization as financially able to provide the necessary resources and the *Green* researchers have doubts about the extent of recognition of their commercialization performance in reward and promotion decisions, even where this was stated to be university policy. *Reds* identity is still protected and there is some improvement in *Greens'* identity and perceptions of economic utility.

1.  *$r_{max}$* : The university provides a high level of support for researchers seeking to commercialise their research outcomes and reward and promotion systems reward superior commercialisation performance.

In Australia, the University of Queensland well illustrates the outcomes of such a set of prescriptions. In Figure 1, this University is the outlier when the number of *licences options and agreements* (LOAs) per \$million of research expenditure is plotted. A similar pattern is found for other performance indicators, *disclosures* and *spin-offs* generated. The prescriptions of the *Greys*, the administrators from successive Vice Chancellors down have ranked commercialisation and exploitation of new knowledge generated very highly themselves, as they have in their prescriptions for their researchers. As a result, the identity and perceived economic utility of both researchers and those working in support of research commercialization is maximised.

## Conclusions

The first set of conclusions relates to university commercialization processes. The literature and recent Australian research has shown that improving commercialisation performance has more to do with alleviating or removing disincentives than with direct financial incentives. Throughout the Yencken and Ralston research, as in previous studies in Australia and elsewhere quoted earlier, there was an almost unanimous emphasis on the importance of support close-by for commercialisation activities both to overcome the lack of time, particularly for more junior researchers still establishing their research status and to make available commercial and market related competencies..

There was a strong consensus among the focus group participants that the critical incentive was the close availability of support through access to business development people close-by. In the larger Group of Eight universities, this meant located in the faculty or research centre—even where in one university

such support was not available, survey participants would have welcomed such availability (Yencken and Ralston, 2005).

The effectiveness of such support has been well demonstrated by the top performing universities in terms of research commercialisation, as shown in Figure 1, Queensland, Monash, Sydney and Western Australia. The other more critical disincentive relates to access to small amounts of pre-seed funding. The findings of a recent Australian Institute of Commercialisation survey for DITR are relevant here (AIC, 2004).

From the results of this survey the existence of a gap in funding at the very early stage is verified by 87% of investors and 88% of clients. Respondents believe there is a demand for finance below \$2.0M that is unmet by the current financial market. From comments provided by respondents, this is not necessarily only the result of a lack of available funding being available for specific equity investment, but also comprise a combination of several other issues.

The second set of conclusions relate to the relevance in this context of Akerlof and Kranton's concepts of the contribution of identity to an individual's perceptions of economic utility. Akerlof and Kranton (2000: 753) claim that 'identity affects economic behavior in four ways'. Our conclusions show how this applies in the context of university research commercialisation:

1. *Identity changes the payoffs from one's own actions.*

A researcher whose perceptions of his own identity and the associated prescription include the importance of exploiting and commercialising his research outcomes is more likely to obtain economic benefit from such activity.

2. *Identity changes the payoffs of others' actions.*

The outstanding commercialisation performance of researchers at the University of Queensland (Figure 1) directly relates to the identity and prescriptions of its Vice Chancellors and senior administrators, both for themselves and for the University's researchers.

3. *The choice, or lack of choice thereof, of different identities affects an individual's economic behavior.*

A researcher for whom the perceptions of identity and prescriptions are limited to traditional measures of research performance, that is refereed publications, has a lack of choice about and will be less likely to get involved in the commercialisation of his research outcomes. However, when he is offered a choice, such as when one of his discoveries has real commercial value, his identity and prescriptions, based on experience from the author's research, may change and affect his economic behaviour.

4. *The social categories and behavioral prescriptions can be changed, affecting identity based preferences.*

The changes seen in the research reported here mainly relate to changes in perceptions of identity and prescription for either one's own or others' perceptions of identity. The social categories have remained constant, while identity has changed.

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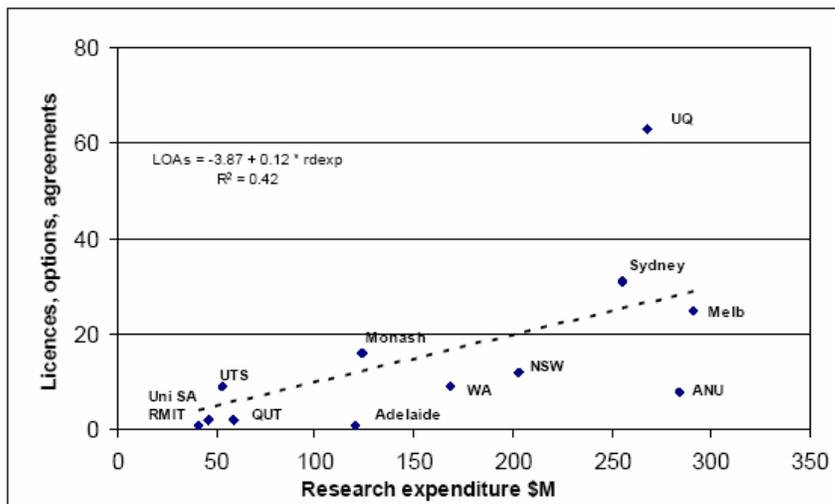
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Table 1 Classification of commercialisation incentives.

	Direct personal incentives	Removal and/or attenuation of barriers and mediating factors
Tangible monetary incentives:	Royalty/equity participation. Direct cash awards eg for new disclosures. Recognition of patents and other commercialisation activity in university reward and promotion systems Additional research resources. Additional travel, equipment and similar expense provision	Finance for IP related expenses. Finance for market and competitor intelligence gathering. Pre-seed technology development (TD) stage finance to proof of concept
Intangible incentives	Easy access to and support from business development people. More time for commercialisation, eg by buying out teaching time or relieving researchers of their administration responsibilities. Internal commercialisation support and mentoring. Flexible employment conditions, eg to allow short-term secondments and return without loss of promotion opportunities. Access to incubator <i>Start House</i> prior to incorporation of a new venture.	Understanding that the university has a clear and transparent research utilisation and commercialisation strategy and associated policies and procedures. Speed in university decision making on commercialisation issues. Generating <i>deep trust</i> in university senior management decision-making.
Training	Training in opportunity discovery (Siet, 2001). Training in IP management and protection. Improving understanding of the commercialisation process and new venture management.	

Source: Yencken and Ralston, 2005.

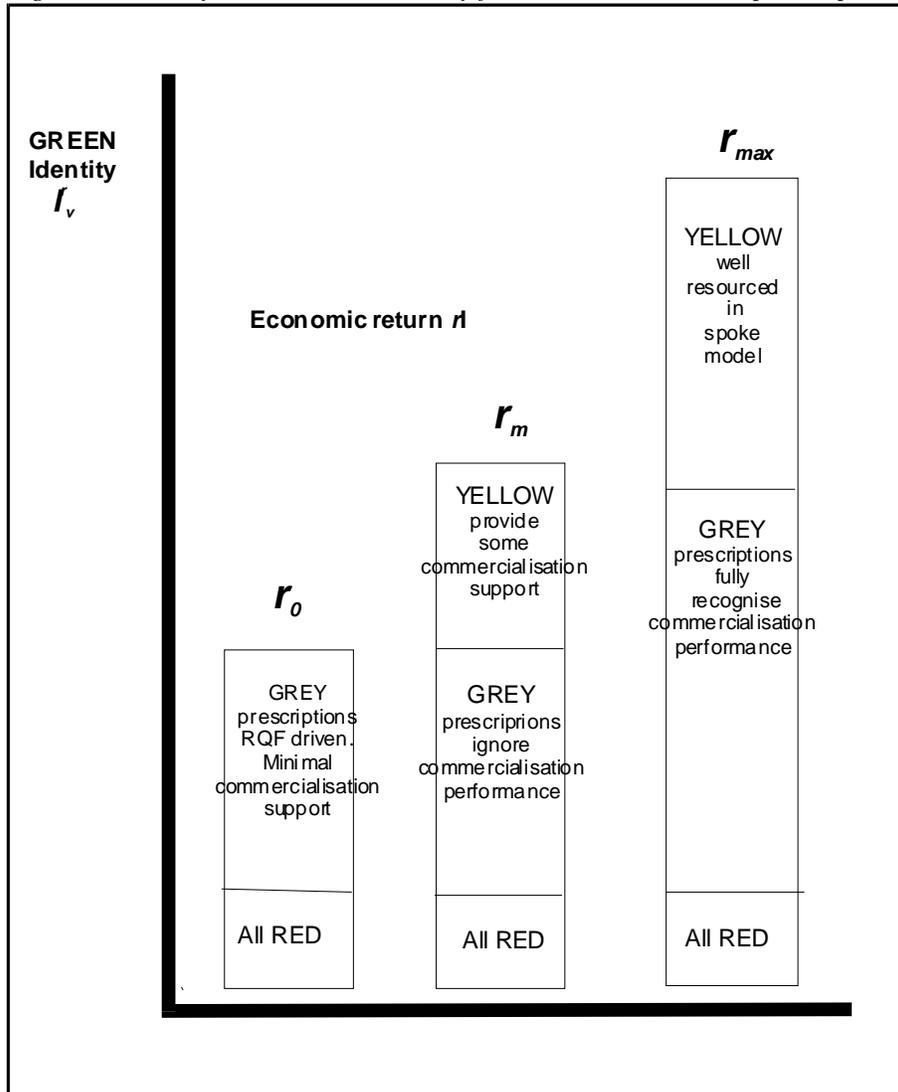
Figure 1. LOAs as a measure of commercialisation performance



Linear Regression with 95.00% Mean Prediction Interval

Source: Yencken and Ralston, 2005: 75.:

Figure 2 Identity and economic utility for commercialisation prescription scenarios



Source: Present author.