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Title: Exploring the efficiencies of using competitive tenders over fixed price grants to protect biodiversity in Australian rangelands

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Exploring the efficiencies of using competitive tenders over fixed price grants to protect biodiversity in Australian rangelands

Abstract

In rangeland areas, improved biodiversity management can be achieved by changing the financial incentives facing land managers. Competitive tenders and fixed price grants can both be applied to achieve the same environmental outcomes. In the case study described in this paper, the efficiencies of the two methods are compared. Operationally, the two mechanisms are similar in both cost and process. Both mechanisms have very important indirect benefits of building skills and knowledge in both landholders and the implementing agency, and building trust between the two. However, the heterogeneity in landholders' opportunity costs revealed in the competitive tender trial means a discriminatory price mechanism is more efficient at matching program costs with direct environmental benefits. In terms of transfer payments, the competitive tender was 30% more cost efficient than a fixed price grant scheme. While the initial design and development costs of a tender may be greater than a grant, there was no evidence of any difference in operating costs in this case study. There was also little evidence of any indirect costs associated with the tender process, but it may be too early to make a realistic assessment.

Keywords: Competitive tender; Conservation auction; Grant; Biodiversity; Rangelands

1. Introduction

In Australia, significant amounts of biodiversity occur on agricultural lands, particularly in rangeland areas used for cattle and sheep grazing. Low levels of public reserves mean that governments rely on on-farm conservation to minimise biodiversity losses and meet targets for biodiversity protection (Sinden, 2004; Greiner and Lankester, 2006). However, production tradeoffs mean that private values faced by landholders for biodiversity conservation are often lower than the associated public benefits, potentially resulting in sub-optimal levels of biodiversity protection (Rolfe, 2002). A market failure problem exists when information is transmitted in markets about the productive use values of rangelands for beef and wool production but not the non-use values of preserving biodiversity (Rolfe et al., 2000).

A key policy issue is how to adjust the incentives faced by landholders to ensure more socially optimal levels of biodiversity conservation. Governments have four broad tools available to achieve on-farm biodiversity conservation: education and suasion, regulation, direct grants and market-based instruments (Young and Gunningham, 1997). While there has been widespread use of the first three mechanisms to achieve outcomes, there has only been recent interest in Australia in the application of market-based instruments such as conservation auctions to achieve the provision of public benefits.

The use of suasion and education mechanisms is often an important first stage in addressing environmental problems, where the process of social learning can lead to positive biodiversity outcomes over large areas (Pretty and Smith, 2004). Generating awareness of issues can encourage compliance and reduce the transaction costs of implementing policy instruments. However, in the absence of economic incentives, awareness-raising does not necessarily translate into better land management practices (Vanclay and Lawrence, 1995; Cary and Webb, 2001; Lawrence et al., 2003; ABS, 2006; Rolfe, 2006).

Regulation has also been used in Australia to limit environmental problems in rangelands areas, with examples such as controls on the clearing of native vegetation and caps on extraction of water from inland rivers. However, regulations mean that landholders focus on compliance at the expense of searching for better and less costly solutions to environmental problems (Industry Commission, 1998). Furthermore, without community support, there maybe not be the political will to introduce legislation and ensuring compliance could be costly.

While both suasion and regulatory mechanisms can be efficient for some issues, it is more difficult to address many aspects of on-farm conservation with these tools. There is a recognition that existing agri-environmental policies are failing to deliver satisfactory environmental outcomes (van Bueren, 2001) or to provide a satisfactory return on public investment (Industry Commission, 1998). In the broadscale grazing industry, adoption of conservation practices is still relatively low (Barr and Cary, 2002). In recent years there has been increased interest in voluntary engagement with landholders to use grants or market-based instruments to improve the supply of environmental services.

A grant mechanism typically involves a standard fixed rate of payment for achievement of a set of pre-determined actions (Latacz-Lohmann and Schilizzi, 2005), while market-based mechanisms involve the use of competitive behaviour and market signals in the provision of environmental services. Market-based mechanisms can be classified into three main categories; price-based, quantity-based and market friction mechanisms (Australian Government, 2004). Price-based approaches are designed to adjust the price or cost of either a polluting or mitigating activity and include the more traditional mechanisms such as charges and subsidies as well as conservation auctions such as BushTender (Stoneham et al., 2003). Quantity-based approaches usually involve the setting of an imposed limit or cap and entities then trade amongst themselves to find the most cost efficient ways of meeting the limit (Murtough et al., 2002). Examples include emissions trading and offset or mitigation banking schemes (van Bueren, 2001). Market friction measures generally work to improve the functioning of an existing market that interacts with a target market. They work by providing more information to the market or by encouraging private investment in activities that may have better environmental outcomes (Windle et al., 2005). Examples include conservation insurance (Econsearch, 2006) and debt-for-conservation swaps (Greiner and Lankaster, 2006).

In this paper the focus is on the use of a conservation auction or competitive tender where an auction process is used to purchase environmental services from landholders using public funds (Latacz-Lohmann and Van der Hamsvoort 1997, 1998). Landholders are invited to submit proposals to provide a specified environmental service, together with the level of financial incentive they would need. The proposals are assessed to identify the net environmental benefits that would be generated, ranked in terms of their cost-effectiveness, and then the most cost-effective proposals were funded to the level of budget available.

In Australia here has been growing interest in the use of conservation auctions and several pilot applications, including the BushTender trial in Victoria (Stoneham et al., 2003), have shown that auctions can deliver large cost savings relative to traditional natural resource management mechanisms (Grafton, 2005; NMBIWG, 2005). Stoneham et al. (2003) found cost-effectiveness gains in the order of 700% (compared with a uniform price auction), while two other conservation auctions conducted in Australia have generated efficiencies of between 24% and 33% (Bryan et al., 2005) and between 200% and 300% (Gole et al., 2005) over a fixed price grant scheme.

However, fixed price grant mechanisms remain dominant in the allocation of public funds for landholders providing environmental services. Although there are strong theoretical advantages of using single round auction mechanisms (known as competitive tenders) to purchase environmental services from landholders in preference to fixed payment schemes (Latacz-Lohmann and van der Hamsvoort, 1997, 1998; Stoneham et al., 2003; Latacz-Lohmann and Schilizzi, 2005), the take-up of competitive tender mechanisms remains low.

In this paper, the potential benefits and costs of using competitive tenders over grant mechanisms to purchase environmental services are explored in relation to a case study in central Queensland, Australia. A competitive tender to protect biodiversity by improving the management of native vegetation on beef cattle grazing properties was trialled by a regional natural resource management (NRM) group[1]. The results of the trial provide some insights into the relative advantages of the competitive tender mechanism over fixed payment schemes, and generate wider implications for land use policy in rangeland grazing systems.

The paper is organised in the following way. Some of the issues to consider in assessing the efficiency of a competitive tender are discussed in the next section. Details about the case study of interest are presented in Section 3, while details of the competitive tender trial are outlined in Section 4. The cost efficiencies of the tender are discussed and compared with a fixed price grant scheme in Section 5, and the conclusions are drawn in the final section.

2. The potential efficiency of competitive tenders

2.1 Theoretical background

[1] Also known as catchment management authorities, regional NRM groups are community-based and funded by the Government to address NRM issues at a regional level. All groups have developed regional NRM plans and investment strategies that are accredited by the government and which identify local issues, targets and priority areas for investment. These groups have no regulatory authority.

It is difficult to design on-farm biodiversity conservation mechanisms because of problems of asymmetric information (Latacz-Lohmann and van der Hamsvoort, 1997, 1998; Stoneham et al., 2003). Landholders have little knowledge about the public values for biodiversity conservation, while governments and community groups have incomplete knowledge about landholder costs of changing management practices. One consequence is that grant schemes tend to be designed with incomplete information about both the public benefits and the private costs of conservation actions. They may also suffer from adverse selection issues, where landholders already generating environmental outcomes are most likely to be the ones who can take up grants at minimal cost (Latacz-Lohmann and van der Hamsvoort, 1998; Latacz-Lohmann and Schilizzi, 2005). This means that contracting landholders to change management practices through grant processes may not be very effective at matching program costs with the desired benefits.

The market-like process generated in a competitive tender addresses these issues of asymmetric information. The tender process provides a framework where the purchaser identifies the outcomes that are required and the supplier identifies the cost of providing those outcomes. This allows information about costs and benefits to be revealed. The process also helps to address adverse selection issues. In a discriminatory auction, where successful landholders are paid at their asking-bid level, the process matches the scale of benefits with the opportunity costs incurred much more closely than is possible with a grant mechanism. The competitive process limits the scope for rent-seeking behaviour and helps to ensure that environmental benefits are generated at lowest cost (Latacz-Lohmann and van der Hamsvoort, 1998).

There are additional benefits of competitive tenders over grants in some situations. A key one is that tenders tend to be focused on the purchase of outcomes (e.g. an improvement in riparian condition) while grants tend to be focused on the funding of inputs (e.g. fencing a riparian area). As well, the tender process provides landholders with an on-going incentive to find more efficient ways of generating the required outputs, as well as increased flexibility to innovate new solutions. This is likely to make tender mechanisms more adaptable to changed conditions.

Competitive tenders are not necessarily efficient, and failure can occur if the auction process or contracts are poorly designed, if the market is too thin to generate real competition, if there is little variation in opportunity costs across participants, or if structural issues can generate inappropriate use of market power. Klemperer (2002) has highlighted some of the failures that can occur in poorly designed auctions. One of the main concerns about the design of conservation auctions has been the erosion of cost efficiencies in sequential auctions as bidders learn the public value of the good they are providing (Reichelderfer and Boggess, 1988; Hailu and Schilizzi, 2004).

2.2 Cost efficiencies

Trials of competitive tenders are beginning to emerge in Australia since the success of BushTender (Stoneham et al., 2003) but examples are limited and adoption remains low. The application of a competitive tender normally involves a careful planning process to identify if a market can be created and to deal with issues of auction design, metric design (bid evaluation) and contract design. While the additional skills required to implement a competitive tender may help to explain the limited adoption rates, there are a number of other potential reasons which are discussed below.

The first key reason why there may be low rates of use of competitive tender mechanisms to purchase environmental services is that the potential efficiency gains are poorly understood or appreciated by policy makers. Economic theory indicates that problems of rent-seeking and adverse selection are likely to be lower for competitive tenders than for grant schemes, helping to establish why efficiency gains should be generated (Stoneham et al., 2003). The greater the heterogeneity in landholder costs, the greater the potential gains. However, there are few practical examples to identify the size of the efficiency gains in real-world settings.

The second reason for low take-up is that there are concerns about the extent of associated transaction, transformation, administration and compliance costs. These costs are mostly likely to fall on the administering body that is conducting a tender process. Where additional costs (such as administration and compliance costs) fall on landholders, there is a risk that this will have a negative effect on participation rates. In some cases the administration of tenders is more difficult than for a fixed payment scheme, implying higher ex ante transaction costs (Latacz-Lohmann and van der Hamsvoort, 1998).

There is little information available on transaction costs in the context of public goods provision. Falconer and Whitby (1999) report a very wide range of values in their results of pan European research into administration costs of agri-environmental schemes, involving 37 case study schemes in eight European member States. Average annual administrative costs ranged from €9 - €75 per hectare and from €140 - €2446 per participant. Administration costs as a proportion of total payments to landholders varied from 6% to 87%. This range of values suggests that administration costs may be specific to sites and programs.

In Australia, there is a diverse institutional structure used to administer environmental policy and run funding programs for landholders (Young and Gunningham, 1997). This can include three levels of government, a number of regional NRM groups, mostly located at a major catchment level, as well as smaller groups[2] and private conservation organisations. This means it may be difficult to coordinate changes in mechanisms across a complex institutional structure and source the technical skills. Consequently, the transaction and administrative costs associated with a tender process are likely to vary across different regions. In the central Queensland region, these costs will be relatively high because there is a low level of knowledge and understanding of the mechanism both amongst the NRM managers and the landholders. As a result, there will be extra costs incurred in assisting NRM groups to design, develop, and implement the instrument, and in assisting landholders formulate their proposals.

Once the administrative costs of the new mechanism design have been incurred, the operational cost of running a tender are similar to that of a grant scheme. In two other auctions trialled in Australia, there was no indication that once the initial costs of design had been incurred, that running a tender was any more expensive than a fixed price grant scheme (Bryan et al., 2005; Gole et al., 2005).

The third potential reason for low adoption rates are arguments that there may be a range of indirect costs, particularly those relating to subsequent attitude change and participation rates by landholders. The application of grant schemes is likely to generate both direct and indirect impacts, with the latter including factors such as changed levels of trust, participation and capacity by landholders. It is possible that a different process involving competition between landholders will not be as efficient at generating these indirect benefits as a more generous grant program.

[2] An example is Landcare, the first national community-based, voluntary approach to issues of environmental degradation.

To explore these issues, a competitive tender was recently piloted in central Queensland. At the same time, a grant scheme which had the same environmental objectives was operating in a neighbouring catchment. This provided an opportunity for the results of the competitive tender to be directly compared with those of a fixed price grant scheme. The methodology applied in the case study comparison had three components.

1. A comparison of the direct costs of the two schemes.
2. An analysis of the cost heterogeneity revealed in the tender bids which underlies the potential efficiencies of the mechanism.
3. A follow-up evaluation survey was conducted of all participants in the tender process. Information from the survey was used to gauge the attitudes of participants and highlight any indirect impacts of the scheme.

3. The case study of interest

3.1 The Fitzroy Basin case study area

The Fitzroy Basin is the second largest river system in Australia and covers a large area of 142,645 square kilometres (more than twice the size of Tasmania) to the west of Rockhampton in central Queensland. The competitive tender was trialled in the Isaac/Connors and Mackenzie catchments within the Fitzroy Basin that cover a combined area of 35,276 square kilometres (see Fig. 1). Property sizes in the region are large and can cover many thousand hectares. The majority of the region (96%) is classified as being in the Brigalow Belt (north and south) regional ecosystem and is characterized by the presence of Brigalow (*Acacia harpophylla*) and associated ecosystems of eucalypt forests, vine thickets, grasslands, cypress pine forests, dry rainforests and riparian communities. Annual rainfall is low with a median range of 500mm to 700mm (Fitzroy Basin Association, 2004).

FIGURE 1 ABOUT HERE

The basin is home to around 185,000 people or 5.3% of the State's population. In terms of area, rangeland grazing is the principal land use and comprises 87.5% of the basin area (Jones et al., 2000). As rangeland grazing occupies such a large area in central Queensland, it is the land use which has the potential to impact most heavily on biodiversity.

3.2 Rangelands and biodiversity

Rangeland ecosystems in central Queensland are both an important source of biodiversity and the productive base for a number of different rural industries and communities. Managing this multifunctional (Dobbs and Pretty, 2004) resource is challenging. The interplay between rangeland condition and production and environmental outcomes is complex, with variations between enterprise type, across areas and over time (Rolfe et al., 2005).

There is evidence that the condition of Australian rangelands has deteriorated since European settlement, partly as a consequence of poor management of grazing, fire and vegetation (Woinarski and Fisher,2003, McLeod et al., 2004). In recent years, there is increasing pressure to intensify production and the threats to on-farm biodiversity from grazing are multiple (Greiner and Lankester, 2006). However there are also many cases where there is a direct, positive relationship between environmental condition and production outcomes. For example, Sangha et al. (2005) demonstrate that there are many positive relationships between pasture health and beef cattle production in a rangelands ecosystem in the Fitzroy Basin.

Until recently, one of the main pressures on rangeland ecosystems in central Queensland has been the high rate of tree clearing, but the 2005 Vegetation Management Act has effectively brought this under control. Remnant vegetation now covers approximately 45% of the Fitzroy Basin region (Fitzroy Basin Association, 2004). However, only low levels (approximately 6%) are protected in National Parks or under other forms of public ownership. The remainder, which includes 89% of regional ecosystems classified as “Endangered” and 93% of those listed as “Of Concern”, occur on private land, principally used for cattle production.

3.3 The Fitzroy Basin Association – the regional NRM group

The Fitzroy Basin Association (FBA) has developed a NRM plan for the region which formalizes the identification of priority environmental issues and the setting of resource management targets to address these issues in a sustainable manner, i.e.

without compromising social and economic outcomes. As a community-based organisation with strong representation from the agricultural sector, and without any regulatory authority, the FBA work on a policy of landholder cooperation. The FBA and other regional NRM groups have favoured the use of a grant system to provide landholders with an incentive to improve their management practices. This is a popular NRM tool as it provides an incentive for landholders to focus on environmental goals while continuing to achieve production outcomes.

In 2006, the FBA trialled the use of a competitive tender to improve and protect biodiversity values in areas of remnant vegetation. At the same time a biodiversity stewardship scheme (with a fixed-rate grant payment) was operating that had the same minimum management conditions as specified in the tender – a minimum level of ground cover/grass biomass had to be retained at the end of the dry season. This provided an opportunity to compare the efficiencies of the two schemes.

4. Design and application of the competitive tender

In a competitive tender, landholders are invited to submit proposal/s that outline area/s on their property which they are prepared to manage to a specified minimum standard (minimum grass biomass levels). Standards are set (by the implementing agency) at a level that will ensure the biodiversity values of the area will be protected. Landholders have the flexibility to manage the area as they wish as long as the standards are maintained. The bid proposal also includes a price, which is the payment required to enter into a management agreement and represents the opportunity cost of changed management practices. All bids are assessed on the biodiversity values of the bid area and the bid price. The key to the operation of a competitive tender is the selection of the most cost effective bids for funding. This is done by considering all the submissions from landholders in a single process, and comparing what could be achieved by the proposal (the biodiversity outcomes) against the amount of payments to landholders.

There are two key design issues to consider in developing a conservation tender. The first relates to the auction design and the second to the contract design. Some of the issues that were considered in auction design are outlined in Table 1.

TABLE 1 ABOUT HERE

The other key component in the auction design was the metric used to assess and rank bids. One of the key differences between a grant and a competitive tender is that the main focus of a tender is on environmental outcomes, compared with a grant where the focus is generally on management inputs. To ensure that bids with the best environmental outcomes were selected, a metric was designed that was easy to understand and apply, with full details available to bidders. The metric for the FBA tender was designed by a multidisciplinary team of ecologists and economists, with the following objectives:

- To maximize the use of desk top analysis;
- To keep the use of field site assessment to a minimum and therefore reduce potential differences between site assessors;
- To eliminate the need for bids to be assessed by an expert panel;
- To be transparent and easy to understand; and
- To be easy to apply.

The metric had three components; a biodiversity score (BS = 50% of the total score), a land condition score (CS = 30%) and a management improvement score (MS = 20%). Applying these criteria would ensure that bids of high ecological value and those where the land is in good condition were more likely to be accepted. In addition, landholders could make their bids more attractive by choosing to implement certain management improvements. The assessment score was used to estimate values for different ecosystem types within a bid area in the following way:

$$\text{Total Assessment Score} = \text{Area}_1(BS_1 + CS_1 + MS_1) + \text{Area}_2(BS_2 + CS_2 + MS_2) \ldots$$

The price of the bid was then divided by the total assessment score to obtain the relative bid value. Full details are provided in Windle and Rolfe (2006).

$$\text{Relative Bid Value} = \text{Bid value (\$)/Total Assessment Score}$$

All bids were ranked in terms of their relative bid values. The bids with the lowest relative bid value represented the most cost efficient bids and were ranked the highest. Successful bids were then selected in order from the highest ranking until the funding budget had been fully allocated.

Finally, consideration was given to the design of contracts (Table 2).

TABLE 2 ABOUT HERE

The FBA was limited in the resources they could allocate to the tender and once the initial preparation had been completed, a simple six step process was implemented following the guidelines for competitive tenders in Queensland (Windle and Rolfe, 2005):

- **Preparation:** Tender designed, developed and publicized.
- **Step 1:** Calls for expressions of interest (EOI) and information workshops[3].
- **Step 2:** Landholders receive tender documents and prepare bids. All EOIs receive a property visits to assess land condition.
- **Step 3:** Tender bids submitted.
- **Step 4:** Bids are evaluated and the most cost effective bids are selected.
- **Step 5**: Winners are notified and management contracts are signed.
- **Step 6:** Contract implementation with regular monitoring and payment schedules.

4.1 Tender results

A total of 21 bids were received from 16 different property owners. There was a wide range of bids both in terms of the area offered and the bid prices. Bid areas ranged from under 20 hectares to approximately 4,500 hectares, with bid prices ranging from approximately $2,000 to over $100,000[4]. Participants were informed

[3] A special auction game had been developed for the purpose which helped participants prepare for the tender. Details of the game are presented in Windle et al., 2004.

[4] All dollar amounts quoted in this paper refer to Australian dollars. One Australian dollar is approximately 0.60 Euros.

about the budget limit of $200,000, but there was no cap placed on bid amounts and successful bids covered a similar range.

All bids were assessed and ranked in terms of the relative bid value (Fig. 2). There is a gradual increase in bid values highlighting the heterogeneity in the farm level biodiversity benefits and costs of provision. The last bid was for a small area of land where the landholder wanted a very high price to protect the area as a nature refuge (a more secure form of protection on private land that is tied to the land title). In effect, the bid was for a permanent arrangement rather than a two year period, explaining why it was less cost-effective. Nine of the bids were successful and 12 were unsuccessful.

FIGURE 2 ABOUT HERE

The tender resulted in a total of 13,647 hectares with high biodiversity values being protected for a two year period. This included 2,405 hectares of “Endangered” (regional ecosystem) vegetation; 2,291 hectares of “Of Concern” vegetation and 2,983 hectares of mixed “Endangered” and “Of Concern” vegetation.

5. Assessing the cost efficiency of a tender compared to a fixed price grant

At the same time the FBA trialled the use of a competitive tender they were also implementing a new stewardship grant scheme. Both schemes had similar biodiversity objectives and were run in parallel in different sub-catchments within the Fitzroy Basin. Under the stewardship scheme landholders were able to enter into a two year agreement to maintain a minimum land condition (in areas with high biodiversity values); the same conditions as in the tender. However, the stewardship payments were calculated by FBA (rather than nominated by the landholder) and were based on the costs of agistment. Set amounts ($/ha) were assigned for different vegetation types. Higher $/ha values were given to the vegetation types with a higher carrying capacity and potentially higher production losses. Although the stewardship scheme did target vegetation types with high biodiversity value, a metric was not used to assess the biodiversity outcomes of the different applications. Instead, applications were assessed by an expert panel and decisions were more subjective and potentially influenced by individual prejudices and preferences. In the tender process, expert knowledge was used to develop the metric rather than directly assess bids.

A true counterfactual comparison cannot be made between the two schemes as different selection processes would result in different project proposals being accepted. However, a realistic comparison could be made based on the cost of providing the inputs outlined in the successful tender projects. To examine the relative cost efficiencies of the two schemes, three aspects are explored:

- the comparison of the direct costs to achieve the tender project outcomes under the two schemes;
- an analysis of the heterogeneity in landholders' opportunity costs as revealed in the tender bid prices[5]; and
- the issue of the indirect costs and benefits of the two schemes.

5.1 Direct costs

To determine the difference in the direct costs of the two programs, the successful tender projects were subsequently assessed under the criteria used in the stewardship scheme and the results are presented in Fig. 3. The values above the axis represent the additional cost when projects were calculated under the stewardship scheme and values below the axis are bids that would have cost less under that scheme. For example, the first bid (the best value for money in the tender) would have cost an additional $15.30 per hectare for the two year agreement if the project had been priced under the stewardship scheme. Bids 5, 8 and 9 would have cost less under the stewardship scheme, but may not have been accepted by the landholders.

FIGURE 3 ABOUT HERE

Overall, under the tender it cost $175,376 for the two year management agreements over 13,647 hectares of high biodiversity land. If the same area had been submitted under the stewardship scheme it would have cost $227,356. To protect the same area would have cost an extra $52,000 or 30% more if it had been priced under

[5] In economic analysis the opportunity cost describes cost in terms of a foregone opportunity or the benefits of the next best alternative (Wills 1997). Bid prices in an auction are based on the opportunity cost participants face but are also likely to include additional price premiums (Rolfe and Windle 2006).

the stewardship scheme. The overall tender payments represented an average annual cost of $6.40 per hectare, compared with a cost of $8.33 per hectare under the stewardship scheme.

In the tender, once the initial costs of designing and developing the tender had been incurred, there was no evidence to suggest that implementation was more costly than a grant program, confirming the findings of Bryan et al. (2005) and Gole et al. (2005). The skills and knowledge gathered from the experience would considerably reduce the cost of implementing another competitive tender in the region, most notably if the focus remains on biodiversity outcomes and the same metric could be applied.

The costs for landholders to develop a bid will vary according to the change in management practice required to achieve the environmental outcomes. In this tender landholders had to modify their stocking rates and may have included some infrastructure changes such as providing additional fencing and/or watering points. Assessing the cost of these changes should not have been too difficult. In other situations, the costs of developing a bid proposal may be much more costly and could deter participation. In contrast, in the grant scheme landholders were provided with clear direction about what they could include in their funding proposals.

5.2 Individual cost heterogeneity

The efficiency of a competitive tender is based on the heterogeneity in opportunity costs incurred by individual landholders to meet the required standards outlined in the management agreement. The greater the variation in opportunity costs the more efficient it becomes to adopt a discriminatory price mechanism which matches the costs of provision with the environmental benefits provided.

The bid prices in the tender reveal a steady increase and costs ranged from $3.30 to $65.56 per hectare (with an outlier at $310.52 per hectare) for the two year management agreement (Fig. 4). The range in costs for the successful bids ranged from $3.30 to $21.90 per hectare. Given the slope of the cost curve it is clear that setting a fixed price payment would be inefficient.

FIGURE 4 ABOUT HERE

5.3 Indirect costs and benefits

Once the tender had been completed all landholders who had shown an interest in the scheme were interviewed to assess their opinions and attitudes to the new mechanism (Windle and Rolfe, 2006). The evaluation survey targeted all the people who had shown an interest or participated in the scheme. It was delivered in a telephone survey in August 2006, with a 92% response rate.

Respondents were asked a range of questions to gauge their attitudes to the tender and in general most responses were positive with few critical responses recorded. Some of the general comments made by respondents highlighted the importance of indirect social benefits, such as building skills, knowledge and trust. However, these benefits are not specific to a tender process and are also associated with grants and other suasive measures. To further explore some of the indirect benefits more specifically associated with the tender, survey participants were presented with a series of questions and asked to respond on a scale from 1 (strongly agree) to 5 (strongly disagree). There was broad agreement (respondents "agreed" or "strongly agreed") amongst all participants (n=33) that the tender scheme:

- will lead to improved levels of adoption and take-up of environmental programs (61%);
- provides more flexibility than other government programs in dealing with environmental conservation issues (71%);
- means environmental conservation actions can to be tailored to local knowledge (91%); and
- will improve the likelihood of achieving environmental outcomes (85%).

To assess if there were any indirect costs associated with the tender, participants were asked if they would submit an application in another competitive tender. Very few people responded negatively (Fig. 5). The majority of unsuccessful bidders, as well as those who had shown some interest in the scheme but had not submitted a bid, were willing to participate in another scheme. A key finding is there were no obvious differences in future intentions between the successful and unsuccessful bidders, indicating that the competitive process did not generate indirect costs.

FIGURE 5 ABOUT HERE

6. Conclusions

The application of market-based mechanisms, such as competitive tenders, to achieve improved environmental outcomes is relatively undeveloped in Australia. However, recent trials have indicated that some approaches may be both effective and cost efficient (NMBIWG, 2005). The results from the case study outlined in this paper support these findings and confirm the theoretical advantages of competitive tenders suggested by Latacz-Lohmann and van der Hamsvoort, (1997, 1998); Stoneham et al. (2003) and Latacz-Lohmann and Schilizzi, (2005).

A direct comparison between the FBA competitive tender and stewardship schemes revealed the tender process was 30% more cost effective than the stewardship scheme. This is a substantially lower figure than the cost-effectiveness gains reported by Stoneham et al. (2003) and Gole et al. (2005), but are the same order as those reported by Bryan et al. (2005). One explanation for these variations in cost-effectiveness relate to the way in which the cost comparisons were calculated. For example, Stoneham et al. (2003) compare their results with the cost of implementing a uniform price auction rather than a fixed price grant scheme. They estimate the overall project cost if all participants in the auction were paid a uniform price equal to the cost of the last successful bid. However, this method of comparison is flawed because the uniform price applied is determined by the auction budget, which in turn will determine the number of bids accepted and the relative cost of the last bid accepted.

Fixed price schemes are normally implemented with a number of operational and selection rules (such as capped payment levels) that make them different to auction mechanisms. It is more appropriate to make the cost effectiveness comparisons across these variations in structures, as has been performed by Bryan et al. (2005) and in this study. In both cases, the successful auction bids were costed as if the same inputs had been provided under a pre-existing fixed price grant scheme. This meant the cost comparisons had a more practical focus and were based on the locally determined price of inputs rather than the more theoretical focus on project outputs. However, an implication of this approach is that the differences in efficiency will vary according to the operational and selection rules, and associated transaction costs, and may thus vary on a case by case basis.

A detailed assessment of the efficiency of the competitive tender mechanism under a number of criteria supported the findings that:

- Tenders are more efficient than grants in allocating limited budget funding because they are designed to select the most cost effective proposals.
- Where there is heterogeneity in landholders' opportunity costs, a discriminatory price mechanism is a more appropriate method to match individual costs of provision with the supply of biodiversity benefits.
- The design and development costs of a tender are higher than for a grant, but these costs will decline in subsequent schemes and there are some benefits associated with the learning process.
- There is little difference in the costs of operating a tender compared with a grant.
- The are a range of indirect social benefits associated with running a tender process, but these also accrue in a well run grant scheme and there is no underlying difference between the two schemes.
- A survey of tender participants did not reveal any indirect costs of the tender process. In this tender, the transaction costs of developing an unsuccessful bid did not appear to deter participants from being involved in subsequent programs.

These results are all strong indicators that the FBA biodiversity tender was correctly designed to suit local circumstances and provide efficient outcomes. However, tenders will not be the most appropriate mechanism to apply in all circumstances. They are less likely to be suitable in situations where:

- there is little heterogeneity in opportunity costs;
- there is a small pool of bidders and competition is thin; and
- when the value of environmental benefits are relatively small and do not outweigh the costs of designing a tender.

The trial of the competitive tender in the Fitzroy Basin did not highlight any major design defects, and demonstrated that it is relatively easy to design and apply a competitive tender process at a sub-regional level. While further trials and research are required to fully explore the parameters and efficiencies of competitive tenders over grants, the results of this research suggest that there is potential to increase the efficient use of conservation funding in rangelands areas by increasing the allocation of funding through competitive processes.

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Table 1

Issues considered in auction design

Issue	Considerations	Application
The number of bidding rounds	Running multiple bidding rounds has advantages because it allows landholders to learn about the process and can reduce the risk and uncertainly associated with this new type of incentive mechanism (Rolfe and Windle 2006). On the other hand, holding more than one round takes time and increases the administrative costs of running the tender.	As resources were limited a single bidding round was implemented.
Sealed or open bid	There are some advantages of having open bids as bidders are provided with information about other bids and current prices, which means they are able to learn more about the market they are entering. This could be very useful in a conservation tender where there has been no market for environmental services and landholders have no information about current prices. However, landholders were unfamiliar with competitive tenders and were considered more likely to participate if their bid details remained confidential.	All bids were sealed.
Discriminatory or uniform pricing	With uniform pricing, there needs to be more control over what actions are offered to avoid paying inflated prices for some activities. Uniform pricing also reduces the gains available to the funding body.	A discriminatory bid system was implemented.
Reserve price	Setting a reserve price will ensure that over-priced bids are not accepted if competition is thin.	Reserve price recommended.
Equity and participation	Maximum bid levels can be set to ensure maximum involvement by landholders. If a maximum level is set, it means that there could be a larger pool of successful bids. Having no caps on bid levels means a small number of efficient bids may get most of the funding. Landholders may increase their chances of success by entering multiple bids.	No cap was imposed on bid amounts and multiple bids were encouraged.

Table 2

Issues considered in contract design

Issue	**Considerations**	**Application**
Time period for contract	Longer time periods preferred, but there were government constraints on funding period available.	Funding available for 2 years – July 06 to July 08.
Payment periods	There are benefits in tying funding to performance, but also in minimising the number of payments.	3 payment points: 1st on contract establishment 2nd at first milestone (1 year), 3rd at last milestone (2 year).
Form of security	Some conservation tenders have involved high levels of security, such as covenants over land titles. Simpler agreements are more likely to be accepted by landholders.	Simple contracts were used that were not tied to land title.
Form of contracts	Preferable to have simple form of contract that is easy to understand.	Standard simple contract used with bid applications attached as a schedule.
Monitoring	Very simple process preferred	Based on the use of established photo points, progress reports and random audits.

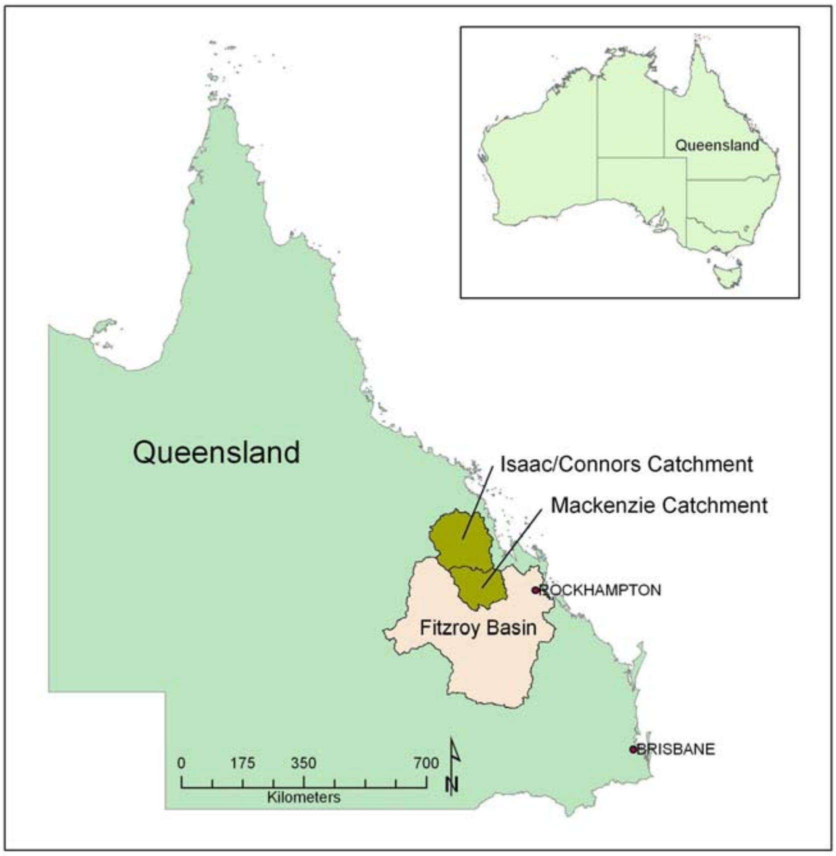

Fig. 1. Fitzroy Basin and the Isaac/Connors and Mackenzie catchments

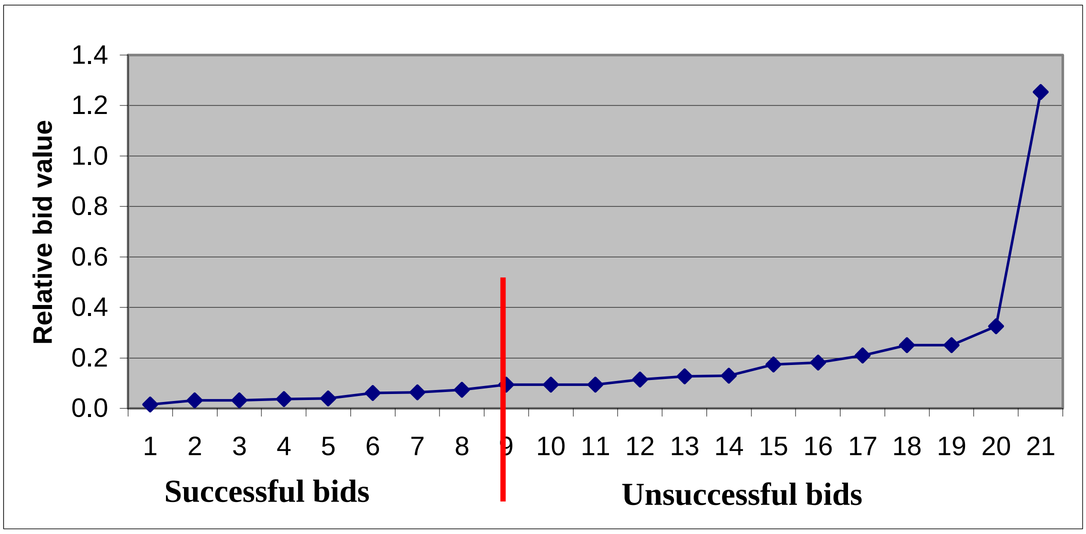

Fig. 2. Relative bid values

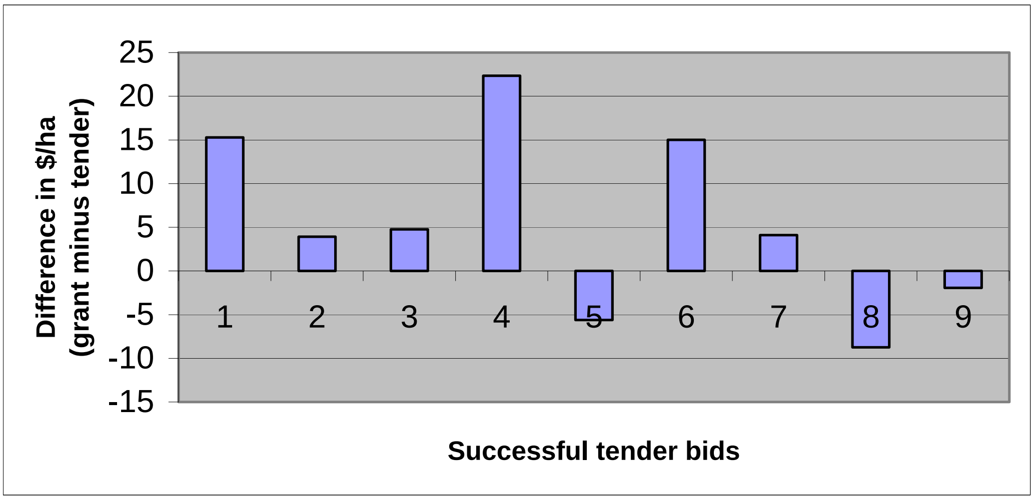

Fig. 3. Difference in bid prices ($/ha) in the tender compared with the stewardship scheme

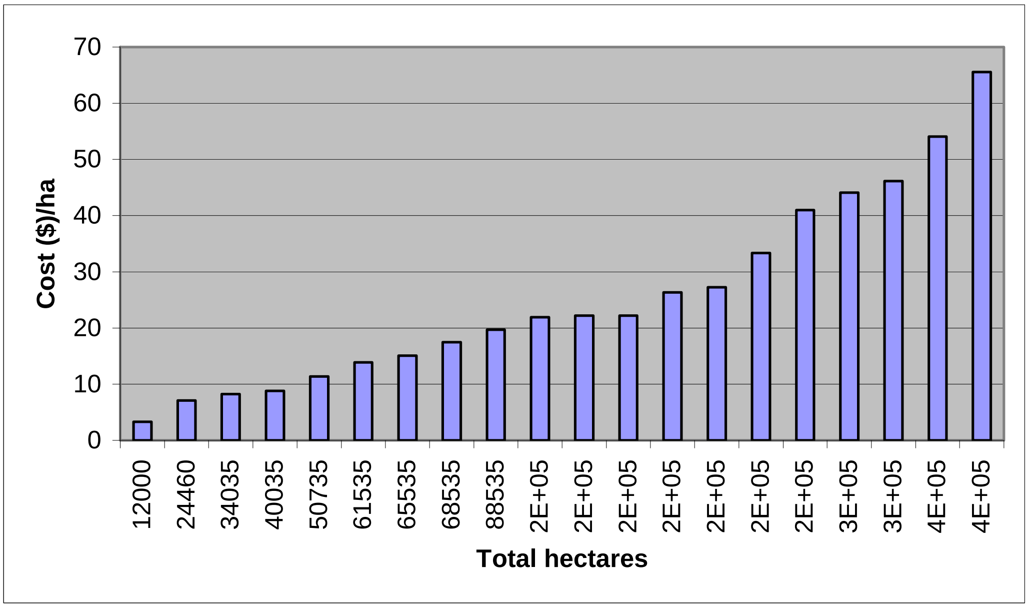

Fig. 4. Costs of tender bids for a two year management agreement

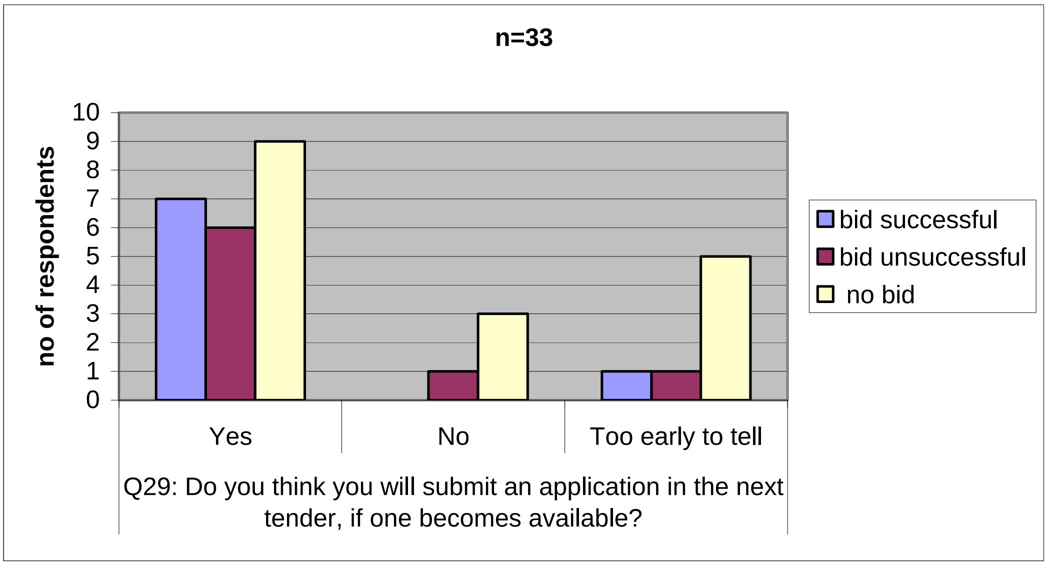

Fig. 5. Expectation of submitting a bid in future tenders