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Evidence of package trading in a mature multi-species ITQ market

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Abstract :

In multi-species fisheries managed under ITQs, the existence of joint production may lead to complex catch-quota balancing issues. Previous modelling and experimental research suggest that, in such fisheries, some fishers may benefit from the ability to trade packages of fishing quotas, rather than fulfil their quota needs by simultaneously bidding on separate single-species quota markets. This note presents evidence of naturally occurring package trades in a real fishery. Based on this evidence, we suggest that further empirical and modelling research is required on the potential and limitations of package quota trading in mixed fisheries managed with ITQs.

Highlights

► We examine quota trading behaviour in the Australian Coral Reef Fin-Fish Fishery. ►Evidence of naturally occurring package trades in a multi-species fishery is provided. ►Observed trading patterns appear to support findings from recent experimental work. ►Further research is needed on package trading in multi-species ITQ systems.

Keywords : ITQs, Mixed fisheries, Package trading, Joint production, Great Barrier Reef

Introduction

Individual Transferable Quotas are increasingly being used as a means to allocate access to wild fish stocks in commercial fisheries [1-2]. This includes multi-species fisheries in which some joint production may occur, leading to complex catch-quota balancing issues [3-7]. Two articles recently published in this journal [8-9], based on modelling and experimental research, suggest that, in such fisheries, some fishers may benefit from the ability to trade packages of fishing quotas, rather than fulfil their quota needs by simultaneously bidding on separate single species quota markets. The authors show that such benefits are likely to be higher for mature market places when the harvesting rights being purchased present higher degrees of complementarity and when complementarities vary between market participants. This can be the case in high synergy environments, when joint catch of multiple species occurs, or if holding certain packages of quota allows for significant economies of scale - implying that the value of a package is effectively greater than the sum of its parts when held in isolation. The presence of non-trivial transaction costs may similarly increase the value of being able to obtain any quota required in as few trades as possible.

In this note, we provide empirical evidence that such package trading of fishing quota may in fact represent a significant component of the day-to-day operation of a fishing quota market, using information on the quota market of the Australian Coral Reef Fin-Fish Fishery (CRFFF) on the Great Barrier Reef. The natural occurrence of package trading in a free market situation serves to validate the suggestions that such trading behaviour may be beneficial to quota traders under certain circumstances [8-9]. Based on this evidence, we suggest that further empirical research be carried out on the potential value of package quota trading in mixed fisheries with ITQs.

Case study

The CRFFF is multi-species in nature. Catch in the fishery is regulated via the allocation of quota for three groups of species: coral trout (CT), red throat emperor (RTE), and other species (OS) [10]. As the name suggests other species incorporates a number of (approximately 154) reef fish species, other than coral trout and red throat emperor, however only a relatively small proportion of these are actively targeted by the commercial fishery [10]. The CRFFF is heterogeneous in the spatial distribution of species exploited, their value, and the scale and setup of the vessels that target them [11]. The commercial fishery ranges from Cape York (10º41'S) at the north of the Great Barrier Reef, to Bundaberg (24º30'S) in the south. In general, coral trout and other species tend to be available throughout this entire range whereas red throat emperor is more confined to the southern half of the fishery. While a part of the fishing businesses typically focus on targeting coral trout in order to supply the higher value live export market, they may still incur small amounts of catch of the other species. In addition, a part of the fishing businesses, usually operating smaller vessels, will generally land higher proportions of dead fish, with a greater proportion of other species. This heterogeneity results in fishers requiring more than one type of quota, and in different fishers requiring differing combinations of quota, to operate in the fishery. Fishers in the CRFFF quota market thus face a multiple unit heterogeneous goods allocation problem, as described by Tisdel and Iftekhar [9].

The CRFFF quota management system was introduced on the 1st of July 2004: shares of total allowable catch limits were allocated to existing licence owners as individual tradable quotas based mainly upon their history in the fishery. The quota is completely transferrable meaning that anyone

with a quota account is able to buy, sell or lease quota. Landings cannot be balanced against quota retrospectively so sufficient quota must held in a quota account at the time of landing. A more comprehensive description of the quota system and the fishery in general can be found in Thébaud et al. [11]. The Queensland Department of Agriculture Fisheries and Forestry (QDAFF) keep records of all temporary and permanent quota transactions that take place in the CRFFF. The information presented here is based on an anonymised version of the dataset that accounts for eight years of lease (i.e. temporary) quota trading: from the 1st of July 2004 up to the end of the 2011-12 financial year (30th of June in Australia). Having now been in operation for eight years this system arguably represents what may be considered a mature marketplace. For the purposes of this analysis, trades have been grouped in three separate quota market categories (coral trout-only, red throat emperor-only and other species-only trades) and one package quota trade category, based on the assumption that trades occurring between the same individuals on the same date could be considered as package trades.

3. Evidence of package quota trading in the CRFFF

The number of trades and quantity of quota traded each year are presented in Fig.1a & b, respectively. Both figures are broken down into the categories of quota traded and illustrate that package trades represent a substantial component of trading activity in the lease market. The first year of quota management (2004-05) was a period of significant adjustment in the fishery, with relatively low levels of leasing and high levels of permanent transfers taking place. In particular, the quantity of coral trout quota leased was exceptionally low, and the proportion of package trades appeared relatively high. Information on temporary trades at this time is however not considered particularly representative. From 2005-06 onwards there has been a gradually increasing trend in the annual proportion of lease trades based on packages of quota (Fig. 1c): by 2011-12, temporary package trades accounted for close to one third (27%) of annual transactions, having increased from 18% of trades in 2005-06. The proportion of temporary trades of coral trout-only quota fell substantially over the same period (from 66% to 38% of the total annual number temporary trades, Fig. 1c). On the other hand, the proportion of temporary trades for other species-only quota regularly increased, up to slightly under that of package quota trades.

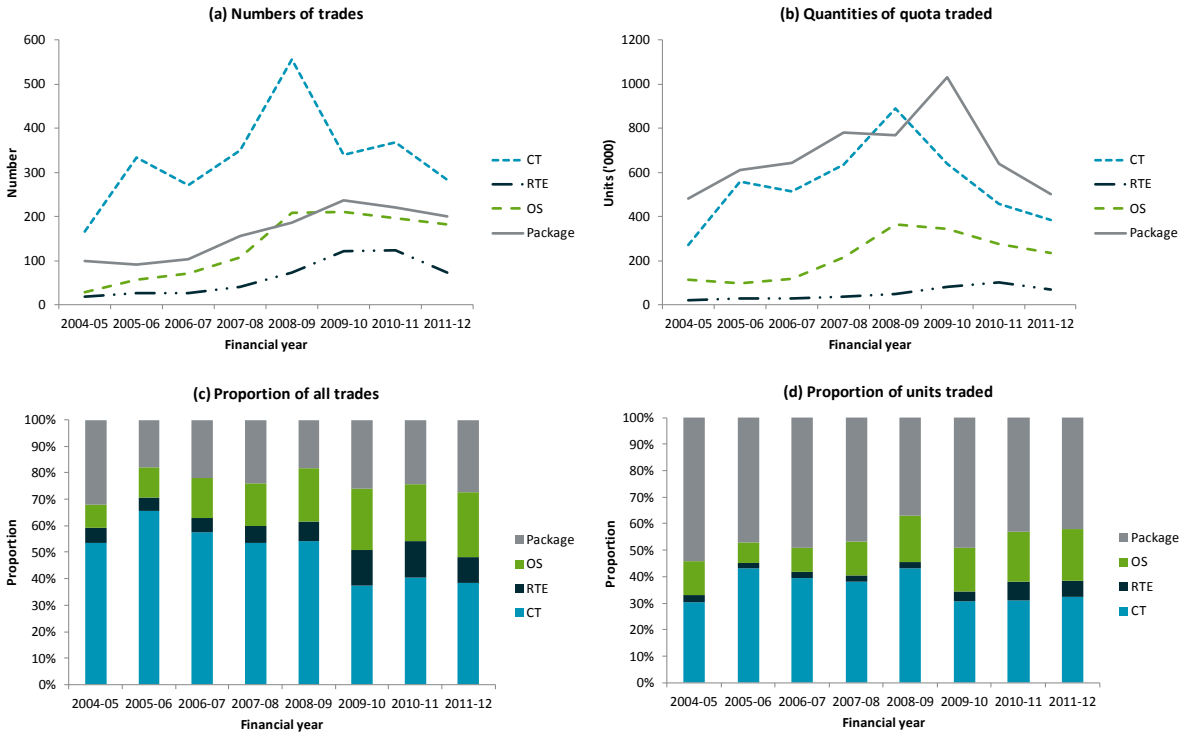

Fig.1. Numbers of temporary trades (left) and quantities of quota traded (right), by trade category (coral trout-only (CT), red throat emperor-only (RTE), other species-only (OS), and package quota trades); a) and b) as absolute numbers (top); c) and d) as proportions of annual trades and units traded annually (bottom)

Package quota trades appear even more significant when considered in terms of the number of units traded (at present 1 quota unit equates to 1kg of fish), accounting for the greatest number and proportion of total quota units traded in all years, other than 2008-09 (Fig. 1b & d). On average over the period considered, units traded in packages represented 46% of the total number of units traded annually. Coral trout units represented an average 42% of the number of units traded annually as part of these package trades.

Influence of expectations, the potential role of transaction costs and the perceived risks of not being successful on the quota market may all serve to explain some of the dynamics observed in these markets. 2008-09 was a peak year with respect to coral trout landings [10], which ultimately resulted in increased demand for quota of this species when compared to previous years. The higher demand for coral trout quota was unlikely to have been immediately apparent at the beginning of the year though, when many fishers lease in bundles of quota based on expectations formed at least in part on the compositions and levels of catches in previous years (Fig. 2a & b). Given these circumstances, it is likely that there was a tendency, in the first instance, to not acquire sufficient coral trout quota for the year. As the season progressed and it became clear that fishers targeting coral trout would require higher proportions of coral trout quota than initially expected, this may have resulted in the increase in coral trout-only quota trades (Fig. 1a, Fig. 2a & b) and consequentially a reduction in the relative quantity of coral trout traded in packages in that year (Fig. 2c). Subsequent expectations, created by the high coral trout landings in 2008-09, are believed to have then fuelled the large

increase in the proportion of coral trout traded in packages (as a proportion of total coral trout traded) in 2009-10, despite coral trout landings ultimately being lower in this year (Fig. 2c).

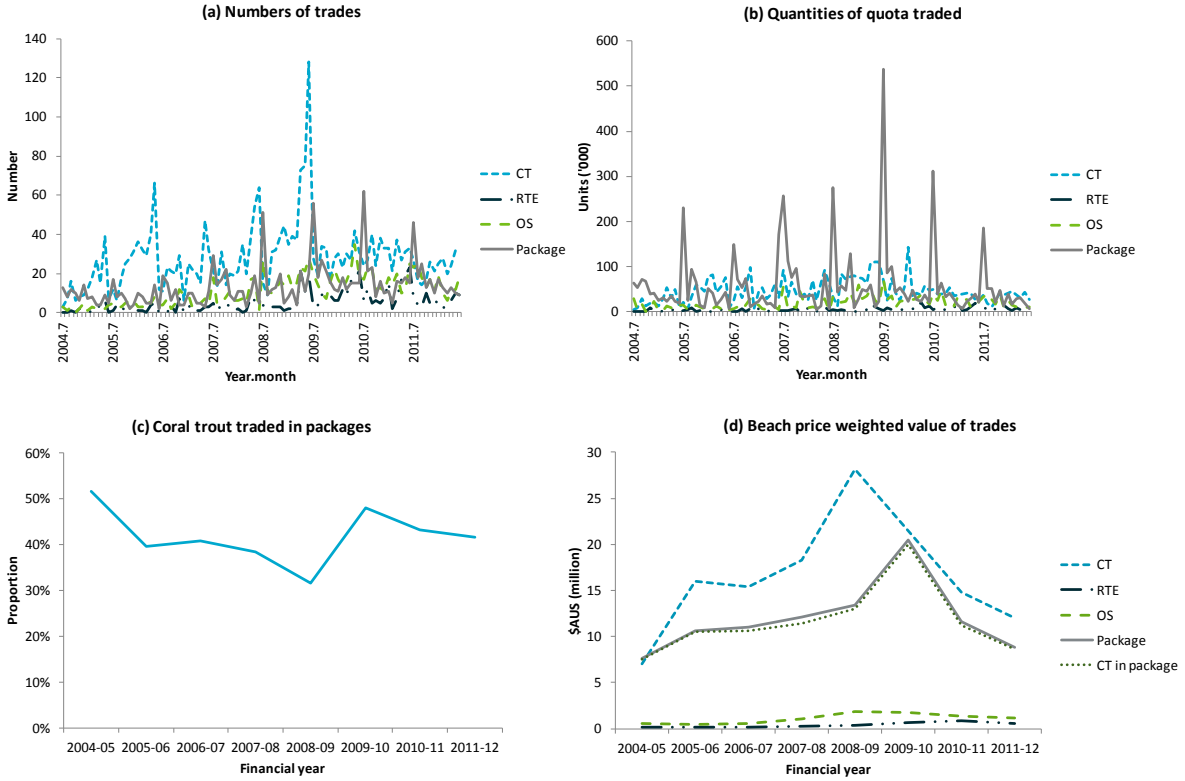

Fig.2. Numbers of trades a) and quantities of quota traded b) per month, c) proportion of traded coral trout quota that was traded as part of a package each year, d) catch value (at annual average beach prices) of units traded by category of trade (AU$)

Interestingly, package trades are always greatest, in terms of both number and quantity (Fig. 2a & b), in the first trading month of each season (July) and then generally fall away quickly. Trades of individual quota types on the other hand typically follow the opposite pattern, particularly for coral trout, as they are often lowest at the beginning of the season and progressively build towards a peak nearer the end of the fishing year. These observations reinforce the belief that fishers generally acquire the quota they expect they will need via a package trade at the beginning of the year. As the year progresses and fishers gain better information on their effective quota needs, they then undertake additional trades for single types of quota.

Assessing the relative economic importance of the quota trades considered would require knowledge of quota leasing prices, which are not readily available for this time period in the fishery. However, when weighted by the annual average beach prices of the different species caught, the relative value of the quotas contained in each trade category becomes apparent (Fig. 2d). In particular, as live CT is sold at a much higher price than dead red throat emperor and other species, the catch value associated with coral trout units traded is high. Over the time period observed, coral trout units traded in packages represented most of the catch value of the quota units traded in these packages, and accounted for 97-99% of the weighted average price. Hence, it appears likely that

most of these trades could be considered as trades focused on obtaining coral trout, but including the necessary quota for the associated catch of red throat emperor/other species (as determined by type of operation, latitude or both).

4. Perspectives

The results obtained by Tisdell and Iftekhar [8-9] indicate that in the presence of joint production or economies of scale, package quota trading may offer advantages over simultaneous bidding for separate quotas across multiple markets. The authors also point to the fact that different types of bidders may be attracted to either one or the other type of trading: operators with high levels of complementarity in quota types and an ability to trade globally (across the entire set of markets) may be more inclined to package trading as this can limit the risks to them of being unsuccessful, while the opposite may be true of operators trading locally as they may have greater interest in a particular (single) species. The lease trading trends observed in the CRFFF ITQ market would appear to support these conclusions, where package trades have represented a significant and increasing part of the market over the period considered. In addition to bidder type driving a preference for one form of trading or another, the inherently unpredictable nature of exactly what will be caught when fishing is likely to create some residual demand for single species trading as it allows unanticipated differences in fishers catch compositions to be balanced (as is believed to have been observed with coral trout in 2009-10). Fishers who own quota mixes that do not align with the typical composition of their catch are also likely to use single species lease trading to balance their quota demands.

Interestingly, while Tisdell and Iftekhar discuss the value of such trading in the context of a formal auctioning system defined and managed by a regulator, our observations are of trading patterns which have emerged endogenously from the market itself. This would lend further ground to the hypothesis that package trading is seen as a preferable approach to bidding for quota by a number of operators in the fishery. This may be due to the reduced transaction costs of undertaking a trade with one as opposed to many other participants, especially if asymmetrical transaction costs exist in this market. It may also reflect the lower perceived risks of being unsuccessful at obtaining the required quota by individual operators in package trades.

Whilst package trading has also been observed in other Australian fisheries managed under ITQs, and included as a possible approach to quota trading in a simulation modelling framework [12] there is limited empirical and modelling research on the actual operation of multi-species fishing quota markets [1]. The observation of package trading in the CRFFF lends support to the need for further work in order to (i) understand the patterns of trading which may evolve in real fisheries, depending on their technical, economic and biological characteristics, and (ii) assessing the overall consequences of these patterns in terms of the efficiency of ITQ systems in multi-species fisheries.

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