ECONOMIC ANALYSIS OF NEW ZEALAND'S DEEMED VALUE SYSTEM

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ABSTRACT

In 2001, New Zealand modified its quota management system (QMS) to function as a hybrid ITQ/tax system. Catches in excess of annual catch entitlements (ACE) incur payments, called “deemed values”. The deemed value system was part of the reforms that separated ACE from quota, which reduced transactions costs for both the industry and government. However, the deemed value system introduces some new issues, and this paper addresses those problems from practical and theoretical perspectives. This paper will explain the catch balancing regime used prior to deemed values, and the problems with that system. It will then explain the mechanics and practical issues for the New Zealand deemed value system. A core problem is that limited information is available for a large proportion of the 629 stocks managed in the QMS, so setting both quota and deemed values is inherently imprecise. The paper will then examine how economic theory, such as Arnarson’s minimum information management, might be applied to the process of setting deemed values.

Keywords: deemed value system, New Zealand, quota management system, Arnarson’s minimum information management

INTRODUCTION

Deemed values were introduced into New Zealand’s quota management system (QMS) in 2001 as part of the new catch balancing regime that was implemented to shift from a criminal offence-based regime to an administrative regime based on economic incentives (Peacey 2002). This shift effectively created a hybrid ITQ/tax system, where deemed value payments became taxes on fishers who do not balance their catch with ACE. It is important to note that while in economic terms, this system can be interpreted as having a tax element, the New Zealand Ministry of Fisheries (the Ministry) has successfully defended in court that deemed values are a service not a tax. The new catch balancing regime introduced several unforeseen issues into New Zealand’s fisheries. This resulted in a review of how deemed values where set, and on 7 March 2007, the Minister of Fisheries signed a deemed value review standard that allowed deemed values to be reviewed on an annual basis in order to address issues in individual fisheries.

In this paper, we will outline the catch balancing regime prior to 2001 and the 2001 changes that introduced deemed values. We will then examine the unforeseen issues that arose from their introduction and explain them from a practical and theoretical perspective. We then explain the deemed value review standard and its implications on the catch balancing regime. We then examine economic theory, such as Arnason’s minimum information management, to see if it can be applied to the deemed value setting process.

NEW ZEALAND'S QUOTA MANAGEMENT SYSTEM

New Zealand implemented the QMS, an ITQ management system, in 1986 and introduced 161 fish stocks for 28 species/species complexes into it. Since 1986 more species have been introduced into the QMS and currently the Ministry manages 629 fish stocks for 97 fish species/species complexes. The ITQ management system is the core of New Zealand’s commercial fishery management system but it does not operate in isolation. Other management tools such as minimum length size, seasonal restrictions, spatial restrictions and method restrictions are also used to manage New Zealand’s fisheries.

The QMS has evolved over time. ITQ shares originally were issued as fixed annual tonnages, which required the Crown to operate in the market to change Total Allowable Commercial Catch (TACC) (Sanchez et al. 2006). This made the operation of the QMS both complex and costly. It also led to some perverse incentives. The Crown only gained when TACCs were increased and they could sell additional ITQ and fishers were compensated for overfishing as the Crown had to buy back ITQ to decrease a TACC (Ackroyd et al. 1990). The Fisheries Amendment Act 1990 changed the ITQ from a right to take a fixed tonnage to a right to catch a proportion of the...
TACC. This was done to make the QMS operate more efficiently. In 2001 the Crown separated the asset right (ITQ) from the annual harvest right, called “annual catch entitlement” (ACE). Again efficiency was the main driver of this change. The impact of the 2001 ITQ/ACE split is discussed in further in this paper.

While this paper briefly covers the evolution of the QMS, the key point to take away is that the QMS is a comprehensive management framework that relies on input controls as well as property rights to ensure that New Zealand’s fisheries are managed in a sustainable manner. Further details on the development, implementation, operation and evolution of the QMS are provided by Hersoug (2002) and Lock and Leslie (2007).

CATCH BALANCING REGIME 1986 – 2001

Catch balancing is the system of rules and processes that a fisher must follow to account their catch versus the catching rights they hold. Between 1986 and 2001, fishers had to hold ITQ for the species they were targeting before they went fishing and were required to balance their catch by the end of each fishing year.

As a consequence of taking their target species, it was inevitable that fishers would catch species for which they did not hold ITQ. This was especially the case in the inshore mixed fisheries in New Zealand. When fishers targeted a species within the inshore trawl fishery, they would catch several species they did not want to catch. If they held no ITQ for these species, there was an incentive to dump the fish\(^c\). To cover this situation, the catch balancing regime gave fishers six mechanisms to balance their catch at the end of each fishing year:

- Pay the deemed value
- Surrender catch not covered by ITQ to the Crown
- Carry over up to 10% of ITQ from the previous year (uncaught ITQ only)
- Bring forward up to 10% of the ITQ from next year
- Lease or buy additional ITQ for the species caught
- Use the Bycatch Trade Off System

Deemed values were a financial penalty that fishers had to pay for catching fish without the relevant quota holdings (Lock and Leslie 2007). New Zealand is unique in its use of deemed value payments (Sanchirico et al. 2006) but at this stage of the catch balancing regime they were just one of six mechanisms to balance catch. Paying deemed values at this stage of the QMS was the normally the last resort for fishers to balance their catch. Fishers preferred the other five mechanisms over paying the deemed value. Although the other mechanisms were preferred by fishers, they were far from perfect from an administration point of view.

Surrender of catch meant fishers had to surrender all the fish they caught without ITQ to the Government. Fishers had to put the surrendered fish through a processor and the processor then had to pay the government a set price for that species. If the price set by the government was below the market value of the fish, the processor then returned the remainder to the fisher. This required the Ministry to set a price for each of the commercial species at the start of each fishing year. This enabled fishers to figure out what species they could surrender and make some economic return from and what species they would have to use one of the other mechanisms to balance their catch.

Under the amended 1983 Fisheries Act\(^d\), fishers where given the ability to either bring forward or carry over 10% of their catching right. If the 10% was brought forward, the fisher was only allowed to catch 90% of their catching right the following fishing year. If the 10% was carried over, the fisher was able to catch 110% of their catching right the following fishing year. This was a popular catch balancing mechanism as fishers could adjust their fishing behaviour to take advantage of good market conditions (bring forward 10%) or bad market conditions (carry over 10%).

Fishers could buy or lease quota from another quota holder to cover their extra catch. This was the most common method used to balance catch as it involved trading rights between fishers and had little government involvement. This allowed fishers to get ITQ for the species they needed and trade away the ITQ for species they did not need. However, there was some risk involved in these transactions. The owner of the ITQ was responsible for the behaviour of the party leasing the ITQ. If the party leasing the ITQ engaged in illegal behaviour it could result in the ITQ being forfeited to the Crown. The owner of the ITQ could only resort to contract law to protect itself against bad behaviour by the leasing party. This made the process of leasing ITQ complicated and resulted in
hugely complex quota leasing agreements being drawn up. The large transaction costs involved in leasing ITQ made these transactions relatively unattractive for small fishers who could not afford to purchase ITQ either. This resulted in few ITQ trades and exacerbated small fishers leaving the industry.

The Bycatch Trade-Off System allowed fishers to trade ITQ of one species for ITQ of another species. Trade-offs were only permitted between selected species and trade-off ratios were based on the relative values of the species traded (Peacey 2002). The bycatch trade off system allowed fishers to trade ITQ for one species for another at ratios set by the Ministry; this allowed the TACC for key target species to be exceeded without a financial penalty to the fishers involved. This system was complex and hard for people to understand. This also upset the recreational fishing sector in New Zealand especially, as they believed this mechanism reduced the amount of fish available to them.

These problems were the main drivers behind the change to the new catch balancing regime in 2001. This change dramatically increased the importance of deemed values as a fisheries management tool in New Zealand. Further details on all the phases of the catch balancing regime are provided by Peacey (2002) and Lock and Leslie (2007).

CATCH BALANCING REGIME 2001 TO PRESENT

The Fisheries Amendment Act 2001 was intended to simplify the catch balancing regime. The major change was the introduction of ACE. The introduction of ACE allowed the harvesting right for a given fishing year to be split from the long term property right (ITQ) (cf. Townsend, McColl and Young 2004). This change to the catch balancing regime was introduced to reduce transaction costs and to simplify the transfer of harvesting rights between fishers. The interim deemed values are held in a trust until the end of the fishing year. At this time, catch balancing takes place either by balancing catch with ACE or paying the difference between the interim and annual deemed value. The revenue from the deemed value regime then goes into the New Zealand Treasury’s consolidated fund.

Under the new catch balancing regime, the following mechanisms where available to fishers to balance their catch at the end of each fishing year:

- Buy additional ACE for the species caught
- Carry over up to 10% of ACE from the previous year (uncaught ACE only)
- Pay the deemed value

The deemed value system creates not a single deemed value rate, but a set of rates that apply under different circumstances. The “base rate” is the “annual deemed value”, which is charged at the end of the fishing year on catch in excess of ACE. The harvester must pay “interim deemed values” prior to the end of the year. These interim rates are, by statute, less than the annual rate and have historically been set at 50% of the annual rate. The interim rates are charged monthly on any catch landed in excess of ACE. These interim payments are refunded when and if the fisher subsequently sources the necessary ACE. Finally, “differential deemed values” result in an escalated schedule of rates as the percent by which catches exceed deemed values increases.

An example of the most common deemed value regime would be for stock HPB3 (hapuka/bass):

- Annual deemed value rate is $2.30 per kg.
- Interim deemed value rate is $1.15 per kg, which is 50% of the annual rate.
- Differential deemed value rates as outlined in Table I

Table I: Differential deemed value rates for HPB3 (hapuka/bass)

<table>
<thead>
<tr>
<th>Catch in excess of ACE holdings (%)</th>
<th>Differential deemed value rate ($)</th>
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<tbody>
<tr>
<td>20</td>
<td>2.76 per kg</td>
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<tr>
<td>40</td>
<td>3.22 per kg</td>
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<tr>
<td>60</td>
<td>3.68 per kg</td>
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<tr>
<td>80</td>
<td>4.14 per kg</td>
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<tr>
<td>100</td>
<td>4.60 per kg</td>
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The deemed value rate is 20% higher for catches that exceed ACE holdings by more than 20%, 40% higher for catches that exceed ACE holdings by more than 40%, and so on. The maximum rate is 200% of the annual rate. For obvious reasons, these differentials are often called “ramped” rates and the decision over to structure the differential rates is called “ramping”.

Note that the differential deemed values rates could result in different vessels paying different marginal rates. The Ministry has often emphasized that the result is to create increasingly strong incentives for individual vessels to find ACE to match catches. However, economists would immediately notice that arbitrage opportunities should in fact result in all vessels paying the same marginal deemed value rate. Indeed, a company that services the New Zealand fishing industry, Solution-Multipliers, operates an annual arbitrage pool at the end of the fishing year to minimise deemed value payments among any group of willing participants. The arbitrage pool results in the counter-intuitive result that a firm that fishes within its ACE for a year may pay deemed values on some catch in order to sell the ACE to a firm that is paying very high deemed values. The savings are shared between the firms who participate.

The effect of differential deemed values, in combination with the arbitrage, is to create a single market-determined deemed value at the end of the year. On economic grounds, this is desirable, because all agents are using the same marginal value of the right to land. One problem, however, is that the agents may not know during the year (when they are making decisions) what the year-end market-clearing price will be. Thus, a vessel with no ACE that faces an annual deemed value of $1/kg and a maximum ramped value of $2/kg may face significant risk with regard to bycatches on any particular trip. There are also concerns that ACE owners with large blocks may withhold ACE from the market (and also the arbitrage pool) in order to bid up ACE prices. A few firms decline to participate in the annual arbitrage pool. They argue that firms should be balancing catch against ACE during the fishing year by going into the ACE market. A firm that knows it will be able to reduce payments in the arbitrage has less incentive to go into the market for ACE during the year.

These changes to the catch balancing regime placed the emphasis on keeping catches within TACCs squarely on the deemed value regime. An incorrect rate would provide inappropriate incentives to fishers. If the deemed value is set too low (below market value of ACE), it provides an incentive for fishers to fish on deemed values instead of acquiring ACE to balance their catch. The low deemed value would constrain and depress the ACE price for the fish stock, which would also reduce the capital value of the ITQ right. From a biological perspective, a low deemed value rate would not protect the TACC for that fish stock. There is also some concern that low deemed values may not only constrain ACE price but also create the situation where a vessel might willingly pay a deemed value slightly above the ACE price simply to deny a competitor who owns quota the revenue from the ACE.

On the other hand, if the deemed value is too high (above market price of fish), it provides an incentive to fishers to dump fish instead of acquiring ACE to balance their catch. This is especially case if the high deemed value is for a bycatch species and the fisher has uncaught ACE for the target species. Some potential buyers also alleged that some ACE holders without ACE from the market in order to force competitors to pay the highest deemed value differential.

DEEMED VALUE REVIEW STANDARD

The Minister of Fisheries approved the deemed value review standard on 7 March 2007. This standard materially altered the way the Ministry approached adjustments to the deemed value rates for fish stocks. Deemed values came under an automatic annual review process, whereas previously deemed values were often reviewed only when TACCs were reviewed or some obvious problem arose. The deemed value review standard set out that the general standard that the annual deemed value rate should be set at a level between the ACE price and landed value for most species. But the standard also provided that the approach to deemed values, including annual, interim, and differential deemed value rates, could vary among stocks and depend upon the specific management objectives and issues for that stock.

High value single target species (e.g. rock lobster, paua [abalone] and eels) have used a different deemed value approach under both the previous deemed value process and the current deemed value review standard. Due to their high commercial value and the single-species target fishery, the annual deemed value rates for these species are set at twice landed value. This makes these fisheries essentially “fish on ACE” fisheries, because the financial penalty for not balancing is harsh. These species also have minimum ACE holdings limits that must be meet before
harvesters can legally fish for them. The minimum ACE holdings are four tonnes for eels, three tonnes for rock lobster and one tonne for paua. Again, the minimum ACE holdings reinforce the “fish on ACE” aspect of this approach.

When a bycatch species constrains the catch of a different target species, it may have a shadow value in excess of its landed value. The issue of shadow value is addressed by the deemed value review standard. In the context of deemed values, The Ministry considers shadow value to mean the value of a bycatch species ACE or ITQ derived from its ability to allow a fisher to continue to catch a higher value target species. The maximum shadow value is calculated by dividing the value of the ACE of the target stock by the bycatch-to-target proportional catch rate. When adjusting a species deemed value rates, the Ministry must consider the species shadow value along with its landed value.

The deemed value review standard also moved away from an automatic adoption of an interim rate equal to 50% of the annual rate. The standard recognised that the effect is to create an interest-free loan between the date of capture and the end of the year. While an interim of 50% is still used in most fisheries, higher interim rates are adopted on a fishery-by-fishery approach. Note that the fisheries statutes require that interim rates be below the annual rate, so the obvious policy of setting interim rates at the annual rate is not available. This may be an issue for legislative review at some time in the future.

The deemed value review standard also moves toward targeted use of differential deemed values to achieve specific goals. In fisheries where the objective is to tightly constrain catches to the TACC, steeper ramping has been adopted. An example of a fishery-tailored deemed value regime for HOK1 (Hoki) is:

- Annual deemed value rate set at $0.90 per kg
- Interim deemed value rate set at $0.45 per kg
- Differential deemed value rates set at $1.30 and applies to all catch that is greater than 102% of a fisher’s ACE holdings.

This allows a vessel to overrun its ACE by a very small amount (2%) and pay a deemed value that is similar to the market price of ACE. But intentional overfishing would result in significant payments (and given the integrated catching-processing-marketing structure of the fishery, ACE would be very difficult to source). Hoki stocks have suffered from reduced recruitment in recent years and TACCs have been significantly reduced. Some fishing on deemed values seemed to have occurred, and this over-fishing was not acceptable to either the Ministry or to most quota holders. The above differential structure was strongly supported by the industry stakeholder organisations.

There is a growing understanding that differential deemed values can serve as a “backstop” mechanism. If the annual deemed value rate is set incorrectly (perhaps because of limited information), ramping limits the incentives to land against ACE. And if market changes render a deemed value too low, ramping again results in increasing disincentives to exceed TACCs. This backstop is important, because deemed values may be adjusted once per year (on 1 April or 1 October, depending upon the stock).

**ECONOMIC THEORY: IS A SECOND TOOL NECESSARY?**

The initial reaction of economists to the deemed value system is often that New Zealand is using two instruments, a quantity-based ITQ system and a price-based tax system, when theoretically only one is necessary to achieve the goal of efficiently regulating fisheries. This leads to the suggestion that the deemed value system is superfluous.

Note, however, that two-part systems are, in fact, used routinely in cap-and-trade emissions trading system to alter the distributive effects. Governments may set a carbon tax and simultaneously award some volume of free credits for reasons of equity. If the tax is greater than the price at which the allocated credits will trade, then no tax payments are made. Likewise, under the combination quota/deemed value system, the market price is determined in the quota market if the price is below the deemed value. Otherwise the deemed value rate becomes the market-clearing rate. In any given year, the deemed value system operates exactly as an emissions tax with free allocations would operate.

However, the design of the QMS was not intended to be a tax system in which free quota allocation were made for “equity” reasons. It was intended to be a quantity-capped cap-and-trade system, in which a price mechanism as a
“safety valve”. It was a practical response to practical problems. We will now examine some of those practical issues, how well New Zealand has addressed the practical issues, and whether there is room for improvement in how New Zealand manages the practical issues of catch balancing.

PRACTICAL ISSUES IN CATCH BLANCING UNDER THE QMS

This section will examine some practical issues in enforcement procedures; managing data deficiencies, risk and systemic inflexibility and the transactions costs of balancing. It will specifically look at the carry-over/bring forward balancing regime that is common elsewhere.

Enforcement

Any ITQ system must enforce the quota. But enforcement must separate intentional overfishing from simply “bad luck” of catching something that you did not intend to catch. In a judicial setting, it may be very difficult to separate these two. Moreover, criminal enforcement is inherently expensive.

Under a strict, “fish on quota” enforcement system, a vessel that catches an unintended catch is typically required to self-report themselves for the violation. The penalties will typically be financially punitive, if not criminally sanctioned. Such self-reporting is understandably limited, and courts have to acknowledge the inherent problems of a system that essentially requires testifying against one’s self-interest. Under a deemed value system, a person does not have to “testify against themselves” if they overcatch their quota. They simply pay the civil penalty. On the other hand, under the deemed value system, not reporting some amount of catch is clearly intentional law-breaking (because the civil penalty was available). When the judicial system faces someone who has misreported catch under a deemed value system, the intent is obvious.

Important to New Zealand’s circumstances, criminal enforcement cannot be devolved, while a system based on civil penalties can be. The administration of the quota and ACE reporting system is devolved to an industry service bureau, FishServe. Because the deemed value payments are civil, FishServe collects those payments and remits them to government as part of its routine business. Not only are transactions costs lower for the industry, but the entire management system is able to use a more cost-effective private institution for managing the bycatch balancing regime (Shallard forthcoming).

Information Challenges and Inflexibility

The Ministry of Fisheries has some significant issues with data limitations and limited flexibility in the deemed value setting process that limits the efficiency of QMS administration. This raises the possibility that, when information is uncertain or risk is increased due to process constraints, that there maybe an advantage to having two tools to pursue the same objective.

The information deficiencies facing the QMS are obvious. New Zealand manages 632 stocks. Only for the most significant of these stocks is annual stock assessment warranted. And even where annual stock assessments are conducted, significant uncertainty remains. For many stocks, TACCs will remain unchanged for five years or longer. The ITQ assumption that the overall TACC-setting is a mechanical process is seriously flawed.

Nor would a pure tax system avoid the information deficiencies. The Ministry faces constraints on the data for landed prices, ACE value and quota value. The Ministry does not require fishers or Licensed Fish Receivers (LFRs) to report landed price. Instead, the Ministry relies on a yearly voluntary survey of LFRs for “port price”. But because port prices are used to calculate the cost recovery levy for each fish stock, LFRs who own quota have incentives to misreport. Many LFRs are integrated companies that both own quota and process and market landed fish. A rule on port price collection also states that, if the responses from LFRs do not cover over 10% of the total catch from a fish stock, the port price from the previous year is carried forward. Non-reporting (the system is voluntary) may therefore maintain low prices that reduce the firms cost recovery levies. The deficiencies of the available price data limit the ability to set appropriate deemed values (to address the obvious question, the authors are indeed working towards collection of better price data).
The Ministry also faces limits on the data on quota and ACE prices. The information is voluntary, and the provision of data to date seems not to be plagued by inherent misreporting. Some ACE trades are under non-market prices for legitimate reasons. LFRs often own ITQ and make ACE available to fishers with the requirement that fish be landed to the LFR at pre-specified prices. An economist will recognise that the ACE price and market price in such a transaction are inherently arbitrary; what matters is the difference between the two. The result of these arrangements is that a majority of trades are for $0 or $1. These trades are excluded from estimates of ACE value, but the result is often that data on few market-determined exchanges are available.

The deemed values process begins decisions six months before the new fishing year, and rates are then effective for twelve months. The deemed value decision process has up to an eighteen month lag. If the Ministry sets an incorrect deemed value, or if market changes render a deemed value obsolete, it may need to take twelve months to correct the problem with incentives for overfishing remaining in place (a cumbersome tool for emergency closure is theoretically available, but of limited practical value).

Greater flexibility under the deemed value review standard

A primary virtue of the deemed value system over the previous regime was that a host of complicated rules structures were replaced with a single, system-wide approach. And the value of having a simple system that everyone understands should not be underestimated, especially in a system that manages 629 stocks with a total Ministry staff of about 450. But the Ministry may have carried the virtue of simplicity too far in its initial implementation of deemed values under the 2001 legislation. Deemed values are a price schedule, how exactly to craft and apply that price tool might reasonably vary with the specific features of an individual fishery.

The 2007 Deemed Value Standard did, in fact, propose more flexible use of the deemed value tool, with deemed value policy settings more closely tuned to features of individual stocks.

The pre-2007 system did differentiate the high-value, single-species stocks and set a very high deemed value that essentially turned deemed values in a penalty system for poor planning. The deemed value system can essentially be “turned off” if a sufficiently high deemed value is set. This in effect created a fish on ACE only fishery. Crayfish and paua were the traditional fisheries where deemed values were set at twice landed value.

One option would be to include more species in the category where deemed values are set at twice landed value. In any single-species, highly targeted fishery, reliance on ACE balancing only may be appropriate, regardless of whether the species is “high valued” or not. Very high deemed values are also now used for a small number of fisheries that are shared between commercial and recreational users. Recreational fisheries prefer higher deemed value rates in the fisheries they value to ensure that commercial fishers do not take more than they are entitled to. They tend to regard deeming as “stealing” their fish. Management problems are in fact much more complicated in the shared recreational/commercial fisheries than in the commercial-only fisheries. Deemed values may be one tool to manage some of this complexity.

Differential deemed values as a risk-management tool

The 2007 deemed value review standard has set the stage for thinking of the differential deemed value schedule as a kind of risk-management tool. The lack of flexibility in the deemed value system to respond to changes, whether in markets or biological systems, is an ongoing concern. This can lead to the TACC being breached, which in turn, can cause long run sustainability problems. Differential deemed values are used as a response to the lack of flexibility. The Ministry can set a deemed value based on its current knowledge, but then set the differential schedule so that increasing severe deemed values will prevent rampant overfishing during the period of administrative lag.

Carry-over, bring-back balancing rules

Carry-over, bring-back rules are perhaps the most common form of catch balancing regime under ITQs elsewhere in the world. Carry-over, bring-back rules do not make biological sense when stocks fluctuate widely and unpredictably from year-to-year, as happens in many shrimp fisheries. But for long-lived species whose populations tend to stable over time, carry-over, bring-back rules have some attractive features.
New Zealand did use carry-back, carry-forward systems prior to 2001. New Zealand found, as many other countries have found, that carry-over, bring-back rules create very complicated accounting problems. The advent of a simple deemed value system seemed like a good opportunity to get rid of these cumbersome rules. The 2001 Act substantially reduced carry-over, bring-back rules. Carry-overs are now limited to 10% of the ACE owned by a firm. Moreover, the carry-over will be lost if the quota is reduced (regardless of the amount by which the quota is reduced.) Carry-back is no longer allowed.

What the reforms may not have realised is that the accounting problems of carry-over, bring-back systems may have been substantially reduced by the ACE/quota split. When quota was leased or transferred, government had to follow all subsequent leases and transfers to make sure that the quota that moved over time was tracked. With ACE separable for quota, carry-forward becomes almost trivial, by simply issuing ACE with no cancellation date. Bring-back requires advance issuance of ACE, but this might be accommodated by simply issuing some amount of ACE several months in advance of the fishing year.

It might be worth asking if more generous carry-over, bring-back balancing rules might be part of a more flexible balancing regime. Carry-over, bring-forward rules could be tailored to specific fisheries. For long-lived species, expanding the 10% carry forward rule to 20%, 30% or more carry over for some stocks does not seem unreasonable. Leaving fish in the water is generally good for stocks, so why should this be unnecessarily discouraged? In particular, why should a “use-it-or-lose-it” incentive result from the risk that a TACC might be reduced? Bring-back rules create more problems, because there are biological costs of harvesting sooner and any bring-back regime needs to appropriate penalise harvesters for those costs.

TRANSACTION COSTS

One justification for the deemed value system is that provides a simple mechanism to reduce transactions costs. The catch balancing regime established in 2001 resulted in lower transaction costs for the fishing industry. The transaction cost of the deemed value regime are especially low. Fishers are simply required monthly to pay the interim deemed value rate for the amount of fish they landed for which they held no ACE. They have the rest of the fishing year to purchase ACE either (a) to balance their catch and then to have the interim deemed value payment refunded to them or (b) to pay the difference between the interim and annual deemed value rates.

The transaction cost of the deemed value regime are significantly lower than that of the ITQ/ACE market. This is particularly true for small trades of ACE. The cost of registering an ACE trade is NZ$16.65 for electronic exchanges and $29.25 for manual transactions. Someone looking for ACE must spend time to locate the ACE and may also pay a broker fee. It would not be unreasonable to suggest that the transaction cost of an ACE trade might be in the range of NZ$100. Someone looking for 20 kg of ACE worth $1/kg would face very high transactions compared to the value of the trade. (However, as balancing is annual, a buyer can enter the market once late in the year to balance a number of small catches.) Note also that the industry bears the transactions costs, so the industry has an incentive to reduce those costs.

If the only goal is to avoid uneconomic transactions costs, a relatively simple deemed value rule can be derived. Assume that the goal is to allow ACE traders to use deemed values if:

\[ T \geq P_a A \]  

where \( T \) = transactions costs of an ACE trade, assumed to be independent of the size of the trade. \( P_a \) = ACE price, \( A \) = quantity of ACE required

If we define \( A^* \) as the level of ACE at which the trader would be indifferent to buying ACE or paying the deemed valued, equation (1) will hold with equality at \( A^* \):

\[ T = P_a A^* \]  

An individual trader faced with the option of using a deemed value or entering the ACE market with transactions costs \( T \) will use deemed values if...
\[ P_d A \leq T + P_a A \]  \hspace{1cm} (Eq.3)

where \( P_d \) = deemed value rate

For the trader, the point at which the trader will switch from use of deemed values to the ACE market occurs when equation (3) is satisfied with equality:

\[ P_d A^* = T + P_a A^* \]  \hspace{1cm} (Eq.4)

To incentivise the trader to switch to the ACE market when the transactions costs are less than the value of the trade, substitute condition (2) into equation (4), which yields:

\[ P_d A^* = P_a A^* + P_a A^* \]  \hspace{1cm} (Eq.5)

or

\[ P_d = 2 P_a \]  \hspace{1cm} (Eq.6)

This result is interesting, because the optimal deemed value does not depend upon the transactions costs or the break-even level of ACE required.

We can generalise the result to include the possibility that the deemed value payments themselves are valued. The deemed value payments flow to government, rather than to the quota owners. As the decision maker for deemed values, the government might see its primary obligation as protecting the rights of quota owners, but still place some value on the deemed values collected. Let \( \gamma \) represent the weight placed on deemed value (relative to the value of ACE payments to quota owners), where \( \gamma \) is between zero and one. The decision rule for which trades should occur as deemed value trades becomes:

\[ T + \gamma P_d D \geq P_a A \]  \hspace{1cm} (Eq.7)

By the same logic as above, we find the desired deemed value rate by substituting equation (7), when the equality is satisfied, into equation (4):

\[ P_d A^* = P_a A - \gamma P_d A^* + P_a A^* \]  \hspace{1cm} (Eq.7)

which yields the result:

\[ P_d = \frac{2}{1 + \gamma} P_a \]  \hspace{1cm} (Eq.8)

or, depending upon the value of \( \gamma \):

\[ P_a \leq P_d \leq 2P_a \]  \hspace{1cm} (Eq.9)

\( P_d \) equals \( 2P_a \) when no value is placed on deemed value payments themselves, which is the earlier solution. \( P_d \) equals \( P_a \) when deemed value payments are weighted the same as payments for ACE. When the deemed value is set at the ACE price, the transactions costs can be entirely avoided, because paying deemed values without incurring the transactions costs would always be preferable to paying the ACE price plus the transactions costs.

The previous result might suggest that government would prefer a policy of setting the deemed value rate at ACE price, while industry might favour setting the deemed value rate at twice the price of ACE. In fact, the New Zealand industry has generally suggested that the appropriate deemed value is slightly above the price of ACE. This may, perhaps, be because the industry has concerns beyond transactions costs.
ADAPTIVE MINIMUM INFORMATION APPROACHES TO SETTING DEEMED VALUES

The problem facing the Ministry of Fisheries is, for many of its 629 stocks, essentially the problem posed by Arnason (1990). The Ministry has limited information upon which to base its decisions on total allowable commercial catches (TACCs) and upon deemed values. Arnason (1990) proposed that fisheries managers use market information about quota value to set TACCs. Specifically, Arnason (1990) assumes that the participants in the market for quota have the best information on the relation of TACCs and future conditions in the market. Therefore, the market for quota will incorporate this information in the price formation process. When the government sets a TACC that moves toward the optimal TACC, the quota value will increase (and vice versa). Therefore, the government can watch the quota value as it alters the TACC. Government can iteratively find the optimal quota in this process.

New Zealand does use an iterative process to set its deemed values. If a deemed value results in fishing in excess of the TACC, then the Ministry would usually raise the deemed value. Is this process in any way analogous to Arnason’s (1990) iterative process for setting the TACC? If not, is there an alternative iterative process that is superior to the current New Zealand model? And is there economic support for the argument by some stakeholders that deemed value rates should be used to compensate for inadequacies in the TACC-setting process. These define a very broad set of questions that economists might tackle with respect to the economics of deemed values. We will suggest one theoretical and one practical direction that might be explored.

The ramping that occurs under differential deemed values has a very plausible justification in economic theory. As TACCs are exceeded, the marginal costs of these excess landings are decreased future productivity of the stocks. As the TACCs are exceeded by larger amounts, the marginal cost of those excess landings will increase. The stock of fish has some growth rate, which is a major determinant of the value of future investments in the stock. Optimal investment in stocks will occur in the area of decreasing marginal rates of return (if not, a higher rate of return could be earned by reducing harvests and investing in the stock). Fishing in excess of the TACC is, in effect, disinvestment in the stock. But decreasing marginal returns to stock size implies increasing marginal costs of higher harvests. To provide appropriate incentives, the private disincentives to harvest in excess of the TACC under the deemed value ramping system should increase.

The information required to set an optimal schedule of ramped deemed value differentials is large, including both information about stock size, stock growth, harvest costs, and present and future price. A truly optimal schedule will be impossible to define. But, if we are trying to link the ramping to marginal costs, we are drawn to ask how serious catch in excess of the TACC is likely to impact future catches? For stocks where we have very serious concerns that catches in excess of the TACC will severely impact future harvests, steep ramping would be appropriate. On the other hand, if the costs of overfishing the TACC seem smaller, than a less steeply ramped deemed value differential may appropriate.

Arnason’s minimum information approach has at least some theoretical applicability to the problem of setting deemed values in bycatch stocks. Consider a fishery that has a directed catch of species A and a bycatch of species B. In setting the deemed value of B, we are determining the incentives to overcatch species B. While that overcatch may reduce the value of stock B (because of stock depletion), it may increase the value of stock A (because more of it can be harvested or because harvest costs are lower). Applying Arnason’s approach, an agency that sets the deemed value for B could look at the combined quota value of stocks A and B to evaluate its deemed value rate for stock B. If a deemed value rate increases the combined value of the two stocks, then that rate increase is optimal.

The practical limits to the theoretical application of Arnason’s approach are two-fold. First, deemed values are set only once per year, so the iterative process is impractical, especially if outside forces (such as price changes) are distorting the signal from the quota value. Moreover, observing the changes in the quota value will be difficult in New Zealand, because the number of trades of quota for any particular stock is small. While the ACE market is fairly active, quota markets are much less active. Since the introduction of the quota/ACE split, market transfers of quota have continued to decline, firms maybe moving towards some set of long-run optimal baskets of quota, while relying on the relatively fluid market for ACE for short run adjustments.
SUMMARY

When New Zealand introduced ITQs as the core of its quota management system in 1986, it drew upon a previously established economic theory. And economists have strongly applauded the system since. But when New Zealand reformed the administration of its QMS in 2001 to split quota from ACE and to introduce a tax-based deemed value system for catch balancing, there were no similar set of theories to rely upon. Moreover, economists tend to be puzzled that the theoretically perfect ITQ would be augmented by a tax-based system.

The separation of quota from ACE has since been endorsed by economists as a logical way to allow different “sticks” in the property rights bundle to be separated (Townsend, McColl and Young, 2007). The present paper also suggests that New Zealand has indeed identified some important roles for the use of a tax instrument to support the quantity ITQ instrument. New Zealand pragmatically implemented the deemed value system and was not guided by any specific economic theory. Economic theory may well be able to help New Zealand improve upon how it implements the deemed value program. This paper has clarified some of the issues in the deemed value system and may also prompt other economists to examine the system more carefully. Economist might also note that New Zealand’s reputation as a leader in ITQ implementation rests on more than simply adopting ITQs at the early date of 1986. With its comprehensive commitment to ITQs, New Zealand has created ITQs for 629 stocks covering 97 species. New Zealand has had to face an array of practical problems that theory ignored as it has tried to find cost-effective implementation strategies for such a comprehensive system. If economists who can look beyond the simple theory of ITQs, they might make a valuable contribution to New Zealand’s pragmatic programme of ITQ administration.

REFERENCES


ENDNOTES

a The views expressed in this paper may not represent those of the Ministry of Fisheries

b Pacific Trawling & Ors v Chief Executive of Ministry of Fisheries, CP 17/99, Napier, 28 July 2000

c Section 28ZB of the Fisheries Act 1983

d Section 28V of the Fisheries Act 1983