

# ITQs and Fisheries Management: Policy Risk in Canadian Sablefish

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# Importance of ITQs

- Fisheries quotas has been a topic of much interest to Prof. Clark, and an ongoing issue in fisheries literature
- Advantages in using ITQs as tool to help manage open access fisheries are well known, especially with transferability permitted via purchase/sale and leasing, and enforcement
- They are acknowledged to
  - Limit catch effectively
  - Hence promote conservation of stocks
  - Reduce overcapitalization
  - Slow or eliminate “race to fish”
  - Give greater flexibility over rate/timing of harvest

# Key Issues in Managing ITQs

- However, many issues arise in their use and management
- These include questions of
  - Fairness of initial allocation, given their potentially substantial monetary value
  - Degree of competition in ITQ sale or lease markets
  - High grading, and need for enforcement measures
  - Whether such programs can be terminated, and if government buyouts are then necessary, and
  - What is degree of security of these property rights

# Discount Rate Issues in Fisheries Mgmt

- Colin Clark also brought attention to the problem of high discount rates in fisheries
- It is this issue we address in this paper, via ITQs
- This was in fact the motivation for my earlier work on farm quotas: why were they capitalized at such high (>25%) apparent rates of discount?
  - Quota values were much less than one might calculate on the basis of “normal” interest/discount rates
- We find that even using “rational” fisheries mgmt, with ITQs, discount rates are still often relatively high, albeit for different reasons than for investment in a fishery with open access

# Focus of this paper

- The issue we focus on here is the security or risk associated with the quota harvest rights (ITQs)
  - Are these special property rights secure?
- The government agency issuing ITQs usually has the right to
  - revoke them entirely
  - change their details, and
  - implicitly alter their profitability
- So the economic rent stream that flows from ITQs is subject to some uncertainty
- We examine this risk empirically for the Sablefish fishery in BC to determine how large it is

# Evidence of risk associated with ITQs

- Anecdotal evidence of the riskiness of government-sanctioned quotas is easy to find
- ITQ holders often repeat the “danger” that government can change its policy in a way so that ITQs can become worthless, or worth much less, both in Canada and US
  - Can be due to biological constraints that may lower TAC or impose other restrictions to keep catch levels sustainable, or
  - Changes in quota regime *policies* that reduce profits (removal of ITQ scheme, some tax on quotas, limits on their transferability, etc.)

# Similarity with Farm Quotas (Canada)

- Same comment widely heard among Canadian farmers in the supply managed commodities—dairy and poultry—who worry that
  - Government may reduce prices or remove support for domestic quotas, or
  - New trade agreements (NAFTA, WTO-Uruguay Round, Doha Round, TPP) will remove import quotas and subject farmers to lower milk prices
  - Either scenario would remove entirely or at least reduce their current policy-generated profit stream

# Property Rights Insecurity v. Policy Risk

- If one starts from a New Zealand model where ITQ user rights are enshrined and given very strong protection against govt interventions, the Canadian or US ITQ model appears to involve considerable *property rights insecurity*
  - This is the language used by Grainger and Costello (2011) where they analyze this phenomenon across countries
  - We use the term “policy risk” to describe this insecurity



# Model of Policy Risk

- Virtually all models of quota values begin with a basic PV approach, where the asset price ( $P_q$ ) is equal to the discounted flow of annual profits (dividends).
- A more sophisticated model is augmented by some expectation of growth ( $g$ ) in annual profits (capital gains); this factor often important in quota values due to substantial and sustained increases in their value over time
- Our model is further augmented by a factor,  $d$ , which is the probability that the stream of profits will fall to zero, due to example to a government policy change

# Our Model of Policy Risk

- This gives us

$$P_q = R (1-d)/(r+d-g) \quad (1)$$

where  $P_q$  = sale price of ITQ (as a stock),

$R$  = annual profits (price-MC) generated by ITQ from fish harvest (lease rate),

$r$  = real rate of interest

$d$  = policy risk probability (probability that policy rents will be reduced to zero), and

$g$  = expected (real) rate of growth in  $P_q$  due to possible new future benefits of quota ownership such as price increases, allocations of new quota (e.g., increase in TAC)

## Model of Policy Risk 2

- Re-arranging terms can make this model easier to use, if we have data on the “dividend-price” ratio (lease rate/purchase price) [see Grainger-Costello]
  - Then  $R/P_q = (r+d-g)/1-d$  (2)
- To calculate  $d$  we have
$$d = (R + (g-r)P_q)/(P_q+R)$$
 (3)
- This model has been applied to Canadian dairy industry for two decades to reveal high but widely varying levels of policy risk (Barichello, 1996, 2000)
  - It has also been used to explain those variations in policy risk with some success (Nogueira et al, 2012)

# Application to BC Sablefish Industry

- The sablefish fishery has been regulated by ITQs since 1990, giving us 20 years (1990-2009) of data with which to apply this model
- Quota values and lease rates were obtained from Munro, Turris, Clark, Sumaila, and Bailey and Pacific Boat Brokers, all adjusted into 2007\$
- The real interest rate is calculated as the previous 5-yr average for Canada
- To estimate  $g$ , the expected rate of quota price growth, we use historical data on those purchase prices over a 7-yr retrospective period and then calculate the compound growth rate

# Data for $g$

- Because this variable is an expectation, we have no direct measure; we must assume a price expectation process
- It is also a critical variable in this formulation because our estimate of policy risk (equation 3) is linear in  $g$ , making our risk estimates sensitive to errors in  $g$
- We assume it is guided by longer-run movements in the quota price; for reasons of simplicity we ignore short term adjustments to this expectation
- The longer the time frame, the less data we have for calculating the policy risk parameter
- Our choice was to use a 7 yr horizon, as middle ground between long run trends and shorter term price movements
- This restricted our data period for estimating policy risk ( $d$ ) to 1997-2009
- Sensitivity tests done on various horizons, w/ robust results

# Results

- For each year from 1997 to 2009 our data for quota values, lease rates, real interest rates and expected quota price appreciation were used with eqn (3) to calculate  $d$ , the risk of policy default
- These values are shown in Table 1 (next slide)
- The variables show considerably variation over the period
  - $R/P_q$  varies from 0.07 to 0.20 with mean of 0.104
  - $g$  varies from -0.07 to +0.18 with mean of 0.078
  - $d$  (policy risk) varies from 0.01 to 0.26 with mean of 0.135, trending downward over time

**Table 1: Calculated policy risk (d) for BC Sablefish, 1997-2009**

Year	$P_q$	R	$R/P_q$	r	g	d
1997	53.56	10.88	0.20	4.88	0.16	0.26
1998	56.50	5.38	0.10	5.41	0.15	0.18
1999	66.15	7.28	0.11	5.20	0.17	0.21
2000	92.68	10.94	0.12	4.55	0.18	0.23
2001	91.10	10.39	0.11	4.61	0.15	0.20
2002	93.35	9.83	0.11	4.48	0.10	0.15
2003	103.89	8.79	0.08	3.34	0.11	0.15
2004	93.88	7.98	0.08	2.58	0.08	0.13
2005	80.31	5.74	0.07	2.18	0.05	0.09
2006	66.08	5.46	0.08	1.90	0.00	0.06
2007	71.00	4.85	0.07	1.87	-0.04	0.01
2008	54.56	5.25	0.10	1.76	-0.07	0.01
2009	76.05	9.25	0.12	1.69	-0.03	0.07

# Policy Risk Results

- Pattern of policy risk results: begins very high in the 1990s, a commonly observed result (from Canadian dairy and poultry quotas) in the early years of the policy regime
  - Confidence in policy regime appears to grow over time
- It fell noticeably in 2007-2008, then rose in 2009
  - This fall underlines the fact that some of these parameters move around over time and in ways that are not always obvious ex ante. This could be due to issues related to left-out variables in the PV equation, or misspecification of the g variable. Precision in policy risk estimates at the annual level is probably not realistic; multi-year averages and trends are the areas where we have more accuracy.
- When various sensitivity tests were run (e.g., smoothing price data and varying g calculations) the resulting policy risk always averaged between 13 and 15 percent



# Comparison with Milk Quota Policy Risk

- Using similar methods and data from the Canadian dairy industry, the mean policy risk value from 1998-2009 is 15%
- If one looks back to the earlier years of the supply management quota regime (quotas widely traded beginning 1980), policy risk was estimated at roughly 20% in those years
- More recently policy risk has fallen below 10%, with the dramatic fall in that risk occurring in the mid-late 1990s following the Uruguay Round WTO Agreement on Agriculture, where supply management provisions were formally entered into Canada's commitments

# Recent Fisheries Risk Results

- Grainger-Costello (2011) recently used a similar model to test the security of ITQs as a function of various aspects of property rights security in a sample of “100s” of fisheries with ITQs in Canada, US, and New Zealand, from 1986 to the present
- Their dependent variable was the dividend/price ratio, or  $R/P_q$  in our model, which was intended to reflect property rights insecurity, or policy risk
- Across their sample, the average values were
  - Dividend/P ratio = 0.15
  - Discount rate = 0.05
  - Policy Risk = 0.11

# Observations on these results 1

- Each of these estimates of policy risk come from cases where there are government policies or regulations that embody a fair degree of uncertainty about the future profit stream to the quota holder
- In the case of farm quotas, the uncertainty stems from possible policy changes which would remove monopoly rights, to be replaced with lower profit (per unit) competitive environments
- In the case of fisheries quotas, the risks include possible changes in the regime, or revocation of quotas entirely
- But they also include changes in TAC and what could be described as biological risks that would reduce catch shares to ITQ holders, in the management of the common resource pool
- In our empirics we cannot distinguish between these two

# Observations on these results 2

- In all cases described, the average policy risks are surprisingly similar
  - In sablefish, as in milk quotas, over the period in question the average risk of the policy being entirely removed is 1/7
  - In the cross-country ITQ comparison (NZ, US, Canada), the comparable risk of quota revocation is 1/9
- In both Canadian sablefish and dairy quotas, the policy risk has been moving downward over time, at least to 2008/09
- If one was doubtful about what we in fact measured as policy risk (it is, in effect, a residual factor), Nogueira *et al* (2012) used such a measure and regressed it on factors usually associated with policy risk, with moderate success

# Conclusions

- ITQs, for Canada's sablefish fishery, may be seen by some as *de facto* property, but legally they are not owned by the holder; they exist conditional upon the DFO Minister's approval; there is some insecurity in these property rights
- Measures of the risk associated with CDN sablefish ITQs make this very clear: they are treated by buyers and sellers as a risky asset with the default or policy risk averaging 15% 1997-2009; they are therefore worth less than might be otherwise expected
- This may be due to both pure policy risk as well as the biological risks of changing TACs
- The risks are similar to those for Canada's dairy quotas, and also similar, slightly higher, to findings across approx. 100 fisheries in NZ, US and Canada
- High discount rates still possible in fisheries, even w/ ITQs

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