Individual Fishing Quotas in Peru: Stopping the Race for Anchovies

by

Sigbjorn Tveteras
Professor, CENTRUM Católica, P. Universidad Católica del Perú
(Email: stveteras@pucp.pe)

Carlos E. Paredes
Researcher, Instituto del Perú, Universidad de San Martin de Porres
(Email: carlos.paredes@institutodelperu.org.pe)

Julio Peña-Torres
Associate Professor, Facultad Economía y Negocios/ILADES, Universidad Alberto Hurtado
(Email: jpena@uahurtado.cl)

Abstract.
In January 2009 a new management regime of individual vessel quotas (IVQs) was put in force in the world´s largest fishery, the Peruvian anchovy fishery. Until 2009, the fishery was managed by a regulated open access system with clear symptoms of the race for fish. We argue that the new regime has stopped the race for fish, reduced the number of vessels participating in the fishery and prolonged the fishing season. Furthermore, the IVQs appear to have improved profitability in the fishery and increased value-added production in the Peruvian anchovy value chains. This provides support that other developing countries can reap benefits of such management systems. However, there appears to have been setbacks in 2010 as the number of participating vessels has once again increased. This indicates that the institutions that regulate and monitor the fishery must be further strengthened.

Corresponding author: Sigbjorn Tveteras, CENTRUM Católica - PUCP, Jr. Daniel Alomía Robles 125. Urbanización Los Álamos de Monterrico, Surco, Lima, Perú, tel: (511) 313 3400

Introduction

While 22 June 2008 might not qualify as a red letter day for global fisheries management, it is an important date as it marks the legislation of a new individual vessel quota (IVQ) system for the world's largest fishery. Landings of Peruvian anchovies (*Engraulins ringens*) account for around 10% of global fish catches in peak years. Hence, the share of global fish catches managed by rights-based management systems has increased drastically with the introduction of the new management regime in Peru. This is good news as these kinds of systems can benefit both biological and economic sustainability of fisheries (Costello, Gaines og Lynham 2008, World Bank 2009).

It also means that the representation of developing countries using rights-based management systems in fisheries has increased substantially. Of the 18 countries that had ITQ schemes in 2006 only six were developing countries (Chu 2009), including Argentina and Chile that score high on the human development index and are probably better classified as emerging economies. Consequently, it seems like individual quota systems are best suited in countries with strong institutions. However, if a developing country with presumed weak institutions can successfully introduce ITQs for a fishery that generated more than 1 billion USD in export revenues in 2009, it could pave the way for a broader application of rights-based management systems around the world.[1]

The Peruvian anchovy fishery has received much attention because of its size, and also because it is the most important input for the fishmeal and fish oil industry. The rise of aquaculture as the largest consumer of these marine inputs as feed ingredients has led to a debate on the impact of aquaculture growth on the sustainability of forage fisheries like the anchovy fishery (Naylor, et al. 2000, Asche og Tveteras 2004, Kristofersson og Anderson 2005, Tveteras og Tveteras 2010). There is little doubt that worldwide demand for fishmeal and fish oil is currently strong as prices for both commodities have reached record levels during the last years.[2] Asche and Tveteras (2004) show that when demand pressure is strong sustainability of fish stocks depends on the fisheries management regime. Thus, an efficient management regime is important to maintain a large Peruvian anchovy stock. For these

[1] The value figure refers to the joint export value of fishmeal and fish oil exports from Peru in 2009 of which more than 99% is based on anchovies.

[2] Tveteras and Asche (2008) have shown that this is a competitive market, thus the surge in price must be seen in relation to limited biological resources combined with growing demand.

reasons it is of interest to make an early assessment of the success of the IVQ system in Peru that was put in force in January 2009. This is the main objective of our article.

A volatile fishery

The Peruvian anchovy fishery is characterized by very large quantity fluctuations. During the last fifty years catches have varied from a record high of 12.3 million metric tons (mmt) in 1970 to a record low of 23 thousand tons in 1984 as shown in Figure 1.[3] The main cause of the stock fluctuations is *El Niño*, a climate event that increases the temperature of the sea surface water in the Southeast Pacific and suppresses upwelling of cold nutritious water. As a result the anchovy stock tends to diminish drastically when these events occur. Figure 1 indicates the particular strong effect of *El Niño* in 1972, 1982-83 and 1997-98. However, catches have been fairly stable from 2000 to 2009 compared to the historical landings. The average annual catch during this period is 7.1 mmt. However, in 2010 there was another *El Niño* associated drop in landings to 3.4 mmt.

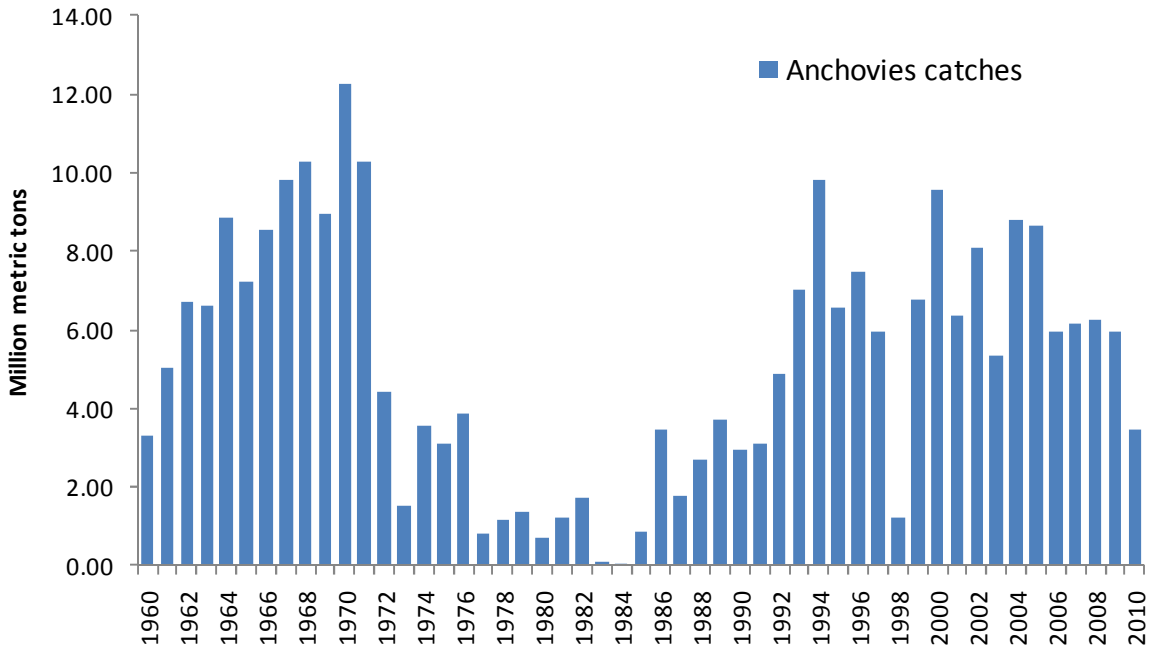

Figure 1. *Historical catches of anchovies from 1960 to 2010 (FAO, Ministry of Production - Peru)*

[3] The Peruvian anchovies catch in 1970 accounted for 19% of the global catches, which gives an idea of the magnitude of the fishery during its golden era.

Natural variability is not the only explanation for fluctuating landings. Poor fishery management has increased variability in catches of anchovies with especially severe consequences in the 1970s, leading to a prolonged period of 15 years with relatively low catches. At the same time, the fishery management has fostered widespread economic inefficiencies caused by the race for fish (Paredes and Gutierrez, 2008). From 1960 to the turn of the century the political regime in Peru ranged from a military populist dictatorship in the 1970s with subsequent nationalization of the fishmeal industry, via democratic regimes in the 1980s that led to hyperinflation and economic collapse of the Peruvian economy, followed by the right-wing government of president Fujimori in the 1990s with privatization of the fishmeal processing industry and liberalization of the economy combined with a high level of corruption. These regime changes neither helped to spur a stable fishery management regime nor to enforce the institutions that regulate and monitor the fisheries.

Overcapacity and the race for fish

The General Law of Fisheries (*Ley General de Pesca N^{o} 25.977*) introduced in 1992 meant that building of new vessels for fishing anchovies required decommissioning of existing ones (Aranda 2009). However, a recuperated stock of anchovies plus an increasing international demand for fishmeal and fish oil gave the privatized fishmeal industry incentives to expand capacity. A weak regulatory regime thus allowed the number of fishing vessels and processing plants to expand during the 1990s with deteriorating effects on profitability despite the limited entry regulations. Financing from banks fuelled the investments that led to overcapacity and, ultimately, brought several companies in this industry to the edge of bankruptcy resulting in exit of some companies (Caya and Paredes, 2002).

Paredes and Gutierrez (2008) estimated that the resulting overcapacity implied an annual rent dissipation of about US$400 million. This estimate is in line with Homans and Wilen's (1997) model on how regulated open access can lead to shorter fishing season and rent dissipation. The situation at the end of the 1990s reactivated discussions about fisheries management reform and individual transferable quotas (Hidalgo 2002), but with little immediate results. Consequently, capacity continued to increase along the 2000s.

The race for fish is the main driver behind the over-investment in the fishery and processing industry. According to official sources, overcapacity in fishing fleet and processing

plants in 2008 ranged between 35-45% of the industry total.[4] On the other hand, Paredes and Gutierrez (2008) estimated the overcapacity of the fishing fleet in 2007 to be between 2.5 and 4.6 times its optimal size, and the fishmeal and fish oil processing capacity to be 3 to 5 times its optimal size. In either case, it is evident that overinvestment in the industry was substantial in the late 2000s.[5] One of the most apparent effects of the overcapacity situation on fishing activity was a reduction of the annual number of fishing days. The fishing season of Peruvian anchovy decreased from 270 days in 1986 to 50 days in 2007 (Paredes, 2010). In the same period the number of active fishing vessels increased from 950 to 1250.

Stopping the race for fish

During the last decade there has been an ongoing consolidation in the fishmeal industry. In 2009 the seven largest companies accounted for 50% of the fishing fleet and 80% of the fishmeal production (Instituto Español de Comercio Exterior 2010). It should be noted, however, that the anchovy fishing fleet consists of two different segments, the large-scale steel fleet and the smaller-scale wooden (the so-called 'Viking') fleet. The fleet of steel vessels is predominantly owned by large vertically integrated companies that process anchovies into fishmeal and fish oil, while the fleet of wooden vessels comprises mostly individual boat owners. When the IVQ system was introduced in June 2008, the government used separate initial quota-allocation mechanism for the two segments of the fishing fleet. Individual vessel quota allocation to steel vessels was based on historical catches (i.e., best year of catches since 2004) and hull capacity, very similar to the initial vessel-quota allocation criteria that was used in Chile almost a decade earlier (Peña-Torres, 2002; Gomez-Lobo, Peña-Torres & Barria 2011). For the wooden fleet, the initial quota allocation was only based on historical landings (Aranda 2009).

The new management system, introduced by legislative decree no. 1084 of June 2008, came into effect in January 2009. Figure 2 shows that the introduction of the IVQs had as immediate effect a lengthening of the annual fishing season and a reduction of the total number of operating fishing vessels. Note that the subsequent shortening of the fishing season in 2010 is linked to many juveniles in the sea which led authorities to decide on an

[4] From presentation by Vice minister of fishery José Nicanor Gonzales Quijano in 2010.
[5] This is also in line with what has been found in other studies such as Weninger (1999), Eggert and Tveterås (2007) and Asche, Bjørndal and Gordon (2009).

early closure of the fishery. This is most likely due to natural variation in the anchovy stock. Another indicator variable that is only available for the three last years, shows a reduction in the number of operating fishing vessels per day from 869 in 2008 to 257 in 2009 and, finally, 253 in 2010. Overall, these figures provide support that the IVQs have put an end to the race for the fish and increased profitability of the fishery. However, the increase in the number of vessels operating in 2010 gives reason for concern and we return to this issue in the concluding discussion. First, let us turn to the issue of economic efficiency of the fishery.

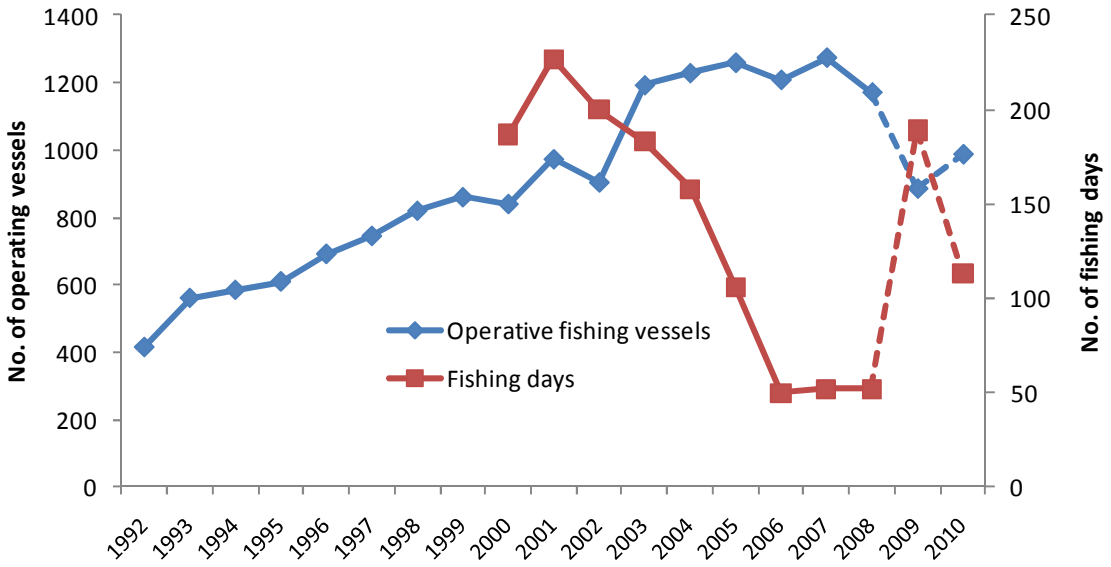

Figure 2. *Number of fishing days and operating fishing vessels in the Peruvian anchovy fishery (IMARPE, Sociedad Nacional de Pesquería*)

There are several causes why profitability has increased in the fishery. First, the individual quotas allow a more efficient use of the fleet capacity. This is the case even if the IVQs are not directly transferable, as a company that owns several fishing vessels can pool individual quotas into a smaller number of vessels. Also, there is the option to rent IVQs between vessels with different owners for a maximum of three years. These two elements allow for some degree of quota transferability and thus lead to a more cost-efficient use of

fleet capacity.[6] Second, the individual quotas allow for more predictable catches. This provides stronger incentives to improve the quality of fish landings, on the one hand, and to invest in value-added production such as premium grade fishmeal (e.g., prime and super prime) and consumer products such as canned anchovies, on the other. The largest integrated fishmeal producer TASA reported that its share of steam dried (i.e., high-quality) fishmeal increased from 51% in 2008 to 76% in 2009, while its share of Fair & Average Quality (FAQ) fishmeal decreased correspondingly from 49% to 24% (Ferreyros, 2010). This sudden shift in the output mix is most likely due to more efficient use of existing capacity to produce premium grade fishmeal.

Non-integrated fishmeal producers, which at the time of the reform represented about 20% of aggregate processing capacity, do not have the same investment incentives. After the introduction of IVQs, their main concern has been to secure supplies of anchovies. Average landing prices of anchovies rose 37% from 2008 to 2009 (Galarza, 2010), which reflects that the reform effectively shifted negotiating power and resource rent from processors to vessel owners.[7] The scarcity of available anchovy for processing not only created incentives to pay high prices, but also to buy illegal catches, i.e., above TAC levels. Historically, processing of 1 ton fishmeal has required 4.4 tons of anchovies. In 2009, the ministry of production reported that an average of only 4.2 tons is actually used per ton of fishmeal produced, and for one month even as low as 3.9 tons (Ministry of Production, 2009).

These discrepancies likely reflect underreported catches, which in turn may indicate that lack of effective enforcement is still an issue.[8] Without any buy-back scheme for removing excess capacity in on-shore processing plants, the independent processors are left with incentive to buy anchovies in the black market (Paredes, 2010). However, due to the limited anchovy supplies, exit from the industry is the more likely outcome for these non-integrated fishmeal producers.

[6] However, no types of transferability are allowed between the two types of fleets represented by wooden and steel vessels.

[7] In comparison to landing prices, the average export price of fishmeal only increased with 9% from 2008 to 2009 and the fish oil export price actually reduced 50%.

[8] If, for instance, inspection of landings is inefficient then even vessel owners that possess IVQs can have incentives to participate in illegal fishing activity. As examples of claims about illegal fishing activities in the Peruvian IVQ system, see the Peruvian financial newspaper Gestión (2010).

Concluding remarks

The overall effect on the Peruvian anchovy fishery of the new IVQ system so far appears to be positive in terms of economic sustainability. The number of operating fishing vessels has already reduced while the fishing season has become longer. Furthermore, more predictable short to medium term supply of raw material has provided additional incentives for integrated companies to upgrade processing facilities.[9] As a result, the quality of the anchovy meal – the largest source of fishmeal globally – is now predominantly premium grade, i.e., prime and super prime, at least among the largest producers. This is in line with Homans and Wilen (2005) who pointed out that rationalization of fisheries induced by ITQs often first leads to changes in the attributes in the product rather than cost or capacity reductions as such. The experience of the Peruvian anchovy fishery shows that this empirical observation is also relevant for forage fisheries, although efficiency gains in the industry have also been substantial. Notice that similar effects have also been observed with IVQs in Chilean forage fisheries (Gomez-Lobo, Peña-Torres and Barria 2011).

Another trend in line with changes in the output mix towards more value-added products is the fact that most integrated fishmeal producers are moving into markets for direct human consumption. The majority of large (which also corresponds to vertically integrated) fishmeal producers in Peru now have their own line of canned anchovies which are sold domestically and exported to several international markets. This development is taking place despite of record high prices for fishmeal and fish oil that currently reduce incentives for rapid expansions into consumer markets. These markets will likely continue to grow at a modest pace beyond the 1-2% of catches destined for this use today.

The Peruvian anchovy fishery shows that developing countries can reap important benefits of individual quota systems despite of critics' initial doubts regarding presumed weak institutions to support quota management. However, it also shows the importance of well-functioning institutions and, in that respect, it is too early yet to herald the Peruvian IVQ system as an unconditional success. One the one hand, Peru has IMARPE, a scientific institution that seems to do a decent effort in monitoring and assessing fish stocks. Peruvian authorities have built a capacity to monitor fishing efforts through a satellite tracking system

[9] Longer term supply should remain highly uncertain due to the climate phenomenon *El Niño* and longer-term climate changes.

and private companies that supervise and control landings, in a similar fashion to monitoring mechanisms operating in Chilean industrial fisheries since the early 2000s (Peña-Torres 2002). Without these two elements in place it is doubtful the IVQ system would be successful. But, on the other hand, temporary fishing permits have been granted to vessels that do not necessarily qualify for such rights. In this respect, there have been claims about some judges' corruption (Gestión, 2010). This may explain the rise in the number of vessels registered as active in 2010. Signs of catch underreporting also indicate irregularities among some official inspectors that monitor landings. Lack of compliance with the regulations naturally diminishes the benefits of the new management regime.

The Ministry of Production has recently introduced new measures to curb the illegal fishing activities. For instance, the Ministry now publishes the names of vessels with 'illegal' fishing permits and the organization that represents the largest fishmeal producers, Sociedad Nacional de Pesquería, has committed its members not to buy landings from these vessels. It should also be mentioned that there is a compensation for voluntary retirement among fishermen, which also addresses one of the underlying problems which is overcapacity (Galarza, 2010). For a solution to illegal fishing activities and for the long-term success of the IVQ system, strengthening of the institutions that regulate and monitor the fisheries must be of high priority.

As a final note, the fact that quotas are only partially-transferable is indeed an important weakness of the Peruvian IVQ system. Experience from other fisheries does show that quota transferability is important for reducing overcapacity and increasing profitability (Asche et al. 2008; TDLC 2011). In practice, there is some transferability in the Peruvian IVQ system as explained above, but capacity reduction and value-added enhancement could be more efficient if quotas were more fully transferable. This seems particularly relevant since capacity appears to have been reincorporated into the fishery in 2010.

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