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Trade in Fishing Services

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Abstract

While the importance of international trade in fish products has long been recognized, international trade in fishing services (TIFS), involving harvesting, processing, transportation and marketing has received but little attention. Yet, one half of the world's EEZs involve foreign fishing arrangements, resulting in such trade. The World Bank report, *Trade in Fishing Services* (2016), represents a first step towards building the understanding of TIFS and its potential impacts. This paper discusses the key economic findings of the report, which point to the potential enhancement of resource rent through time that TIFS offers. The economics of TIFS is seen to rest upon a blend of standard fisheries economics, international economics and Principal-Agent analysis. The paper discusses as well an attempt to apply some of the key economic findings of the report to coastal states of West Africa, and the potential opportunities opened up by such an application for south-south cooperation. The paper concludes by arguing that TIFS open up a major avenue for future research by fisheries economists.

I Introduction

While the importance of international trade in fish and fishery products has long been recognized, international trade in fishing services involving harvesting, processing, transportation and marketing and ancillary services has received but little attention. There has been no serious attempt to collect data on the trade. Yet fully one half of the world's EEZs involve foreign fishing arrangements, giving rise to international trade in fishing services¹, with these foreign fishing arrangements being of particular importance to developing coastal states².

A key reason for this lack of attention, we shall argue, is because in many instances foreign fishing arrangements are simply not recognized as giving rise to international trade in fishing

¹ We can make a guess as to the value of these services, albeit a somewhat wild one. The European Union estimates that 30 per cent of its exports are accounted for by services. If services are of such importance in international trade, should we expect the fisheries sector to be any different? According to the FAO website, the value of fish commodity exports in 2015 was in the order of US\$ 130 billion. If what holds true for the EU were to hold true for the world fisheries sector, that would give us a total of US\$55 billion in fishing services being traded. Of course this is a guess, but we can expect with confidence that the value of fish service trade would prove to be very substantial upon being measured.

² Prominent examples are provided by the Pacific Island Countries of the western and central Pacific, and by the coastal states of West Africa.

services. This lack of recognition, this misperception, can impose a heavy cost on coastal states, once again, particularly those in the developing world.

The World Bank has now undertaken a first step towards building understanding of this international trade in fishing services and its implications, through the publication of the report: *Trade in Fishing Services: Emerging Perspectives on Foreign Fishing Arrangements* (World Bank, 2016). This paper will discuss some of the key economic findings of the report, and will report on initial attempts to implement some of the report recommendations.

The basic economics of international trade in fishing services was, in fact, developed some 25-30 years ago (see, for example, Clarke and Munro, 1987; 1991), but then was allowed to lie dormant. With the World Bank's report, *Trade in Fishing Services (TIFS)*, interest in the economics has been revived. The economics of international trade in fishing services of several decades ago is the *basic* economics, very basic indeed. Much more work remains to be done. Clark and Munro, in their address to the IIFET 2016 Conference (Clark and Munro, 2017), set forth two areas of future research in fisheries economics, which they argued should be pursued with vigour. We modestly propose that international trade in fishing services (*TIFS*) should be seen as a third area of future research in fisheries economics.

II Foreign Fishing Arrangements

In the discussion to follow, we shall initially focus exclusively on fishery resources wholly within the coastal state EEZ. We will comment at a later point on coastal states sharing fish resources with neighbouring coastal states.

Having said this, the 1982 UN Convention on the Law of the Sea (1982 UN Convention from hereon in) (UN, 1982) grants the coastal state what amount to property rights to the fish resources within the EEZ. Under the 1982 Convention, the fleets and vessels of other states cannot enter the coastal state EEZ to fish, unless granted explicit permission to do so by the coastal state (Mfodwo, 2008).

The coastal state is called upon to determine the allowable catches of the fishery resources within its EEZ, and is called upon further to determine its harvesting capacity with respect to the allowable catches (UN, 1982, Articles 61 and 62; Mfodwo, 2008, p. 27). If the coastal state determines, with respect to a given intra-EEZ fishery resource, that its harvesting capacity is not sufficient to take the allowable catch, it must be prepared to grant access to "other" states to the "surplus", under foreign fishing arrangements (UN, 1982, Article 62; Mfodwo, 2008, p. 27). The "other" states would most likely take the form of Distant Water Fishing States (or entities), but could also take the form of neighbouring coastal states.

If the coastal state enters into a foreign fishing arrangement, it is expected to give away precisely nothing for free. Article 64 of the 1982 UN Convention grants the coastal state the right to impose a wide range of terms and conditions on "other" states being granted access, certainly including the demand for remuneration (UN, 1982, Article 64).

What form might such a foreign fishing arrangement take? The coastal state under the arrangement could grant access to foreign vessels to harvest the "surplus", but require that all

such harvested fish be landed in the coastal state for processing. This could be done under a joint venture arrangement, or an arrangement under which a domestic fishing companies charter foreign vessels to do the harvesting. Alternatively, the foreign vessels could be permitted to fish the surplus and then carry the fish off to a foreign port for processing and marketing in return for a “fee”, which might take any number of forms.

There has been some degree of controversy over the implications of Article 62 of the 1982 UN Convention. What is uncontroversial, however, is the fact that a coastal state could in time, if not immediately, eliminate any such “surplus” by building up its domestic harvesting capacity. This then raises the question of whether it would ever be rational for a coastal state not to eliminate such “surpluses”. The answer is that it could indeed be rational for a coastal state not to eliminate all such surpluses, if the coastal state’s objective in fishery management is to maximize the stream of net economic returns (broadly defined) from its fish resources – resource rents – *through time* for the benefit of the coastal state as a whole³.

III International Economics and Fisheries: The Comparative Advantage Argument

The reason lies in the fact that the vessels of “other” states coming into the EEZ to harvest the “surplus” are, argues the *TIFS* report, properly seen by the coastal state as itinerant harvesters, not unlike itinerant harvesters in the field of agriculture. As such they are to be seen as agents of the coastal state. If the “other states” not only harvest the “surplus”, but also process and market the processed product, they are to be seen as itinerant harvesters, processors and marketers – still as agents.

Since these agents are by definition foreign, a coastal state employing the services of such agents can be seen as “importing” harvesting, and/or processing and/or marketing services. The argument for importing, or not importing, these services is basically the argument for free trade, resting upon the Doctrine of Comparative Advantage, which celebrates its 200th anniversary this year (2017).

Let it be said at once that the argument does not go through, if the coastal state’s fishery resource management is completely inadequate. If the fishery resource management is completely inadequate, importing the foreign fishing services, on apparently sound grounds, could make a bad situation worse. This is but typical of the perverse results arising from a de facto common pool situation.

We shall assume in the discussion to follow that the coastal state’s fish resource management is in fact adequate. Let us first, however, digress for a moment to review very briefly the Doctrine, even though the Doctrine is supposed to be known and understood by everyone, who has had an introductory course in Economics. Nobel Laureate Paul Samuelson famously stated that comparative advantage does in fact provide an excellent example of an economic principle that is undeniably true, yet is not obvious to intelligent people (cited in Krugman, Obstfeld and Melitz, 2015, p. 24)⁴.

³ That is to say, not just for the benefit of the domestic fishing industry, or one region of the coastal state, but rather for the benefit of the coastal state as a whole.

⁴ In fact, Samuelson recounts the following amusing anecdote: “..our subject puts its best foot forward when it speaks out on international trade. This was brought home to me years ago when I was in the

The Doctrine commences with the fundamental proposition from Economics that the productive inputs available to any society are scarce in relation to that society's wants and needs. Therefore, allocating inputs to production of given goods and services comes with an opportunity cost in that society must forgo the production of some other goods and services. International trade provides societies of the world the opportunity to make more efficient use of these scarce productive inputs. If two societies, for example, find that their *relative* abilities to produce certain goods and services differ, they can both benefit by specializing in the production of the goods and services in which their relative (comparative) abilities (advantages) are the greatest, and by then engaging in trade with one another.

The World Bank *TIFS* report provides a non-fishing service example from Canada, a country that exports and imports a wide variety of goods by sea. Canada unquestionably has the technical capability to build and maintain a fleet of deep-sea merchant ships to transport these goods. Nonetheless, one is hard pressed to find any deep-sea merchant ships flying the Canadian flag. The reason is that Canada has a clearly revealed comparative disadvantage in providing deep-sea merchant shipping services. The Canadian economy (as a whole) is better off seeing the inputs that could have gone into building and maintaining a fleet of deep-sea merchant ships allocated to other activities in the economy, and then importing the needed deep-sea merchant shipping services (World Bank, 2016, p. 49).

With the digression now complete, let us continue with the argument. It is that, if "other" states have a comparative advantage in harvesting and/or processing and/or marketing with respect to an EEZ fishery, the coastal state should import these services, rather than using domestic services, if it wishes to achieve the goal of maximizing through time the net economics returns (resource rent) from the fishery. Suppose for example that harvesting in a particular EEZ fishery is a highly capital intensive operation. Suppose further that the coastal state is relatively capital poor, but does have the opportunity of obtaining the services of a capital rich DWFS. The DWFS will be revealed to have a comparative advantage in harvesting the resource in relation to the coastal state. It would be to the economic advantage of the coastal state to "import" the harvesting services of the DWFS. Let it at once be observed that the comparative advantage argument applies, regardless of whether the domestic fishing industry is privately or publicly owned

Return now to the basic forms of foreign fishing arrangements described. It is straight forward to apply these arguments from international economics to the joint venture/vessel charter case, in which foreign vessels are invited into the EEZ to harvest in an EEZ fishery and then to deliver the catches to coastal state domestic processors. It is far more difficult to apply these arguments in the case of "fee fishing" foreign fishing arrangements. Let us proceed to each in turn, noting as

Society of Fellows at Harvard along with the mathematician Stanislaw Ulam. He used to tease me by saying, 'Name me one proposition in all of the social sciences which is both true and non-trivial'. This was a test that I always failed. But now, some thirty years later, on the staircase so to speak, an appropriate answer occurs to me: the Ricardian theory of comparative advantage; the demonstration that trade is mutually profitable even when one country is absolutely more – or less - productive in terms of every commodity. That it is logically true need not be argued before a mathematician; that it is non-trivial is attested by the thousands of important and intelligent men who have never been able to grasp the doctrine for themselves or believe it after it was explained to them." (Samuelson, 1969, p. 9). This quote gives some idea of the challenge to be faced in dealing with TIFS, where most countries adopt a strictly sectoral view of the exploitation of their fish resources.

we proceed that the “fee fishing” foreign fishing arrangements case will show us the need to supplement international economics with Principal-Agent analysis.

With regards to the joint venture/charter vessel case, an example is provided by New Zealand. This is drawn from a case study, which formed part of the *TIFS* report (World Bank, 2016, Appendix H).

In the development of the deep sea fisheries, over which New Zealand gained control by virtue of implementing its EEZ, the New Zealand government allowed its fishing companies the option chartering foreign fishing vessels in the exploitation of the resources – foreign charter vessels: FCVs. It was initially expected that this would be a temporary measure, while the New Zealand fishing industry was building up its deep sea fleet. At the time of the publication of the *TIFS* report, however, the “temporary measure” was still very much in place. Of the 56 vessels engaged in the deep sea fishery, 27 of these were FCVs (World Bank, 2016, *ibid.*).

This was and is a clear cut case of importation of foreign harvesting (and to some extent processing) services. Indeed, the New Zealand government has explicitly referred to its policy of permitting FCVs as one of “free trade in fishing services” (World Bank, 2014, p.129). The comparative advantage argument, which could be made, is that the capital and labour services, which might have gone into building and maintaining a New Zealand fleet sufficient to take the entire fish harvests, are better allocated to other parts of the New Zealand economy.

The *TIFS* report makes the point that implementing “free trade in fishing services” in this fashion blunted criticism coming from the domestic industry. New Zealand fishing companies choosing to ignore the dictates of comparative advantage were/are subject to swift financial punishment (World Bank, 2016, p. 51).

Next let us turn to the “fee fishing” case, very common among developing coastal states. It is here that the misperception arises, for the good reason that, in this case as we have noted, the comparative advantage – free trade- argument is anything but obvious. We will use the specific example of the distant water fishing entity, Taiwan (Chinese Taipei). Taiwan has been described as a “middleman”, in that the Taiwanese harvest EEZ “surpluses”, process the fish and then market the resultant fish products largely outside of Taiwan (Mfodwo, 2008, p.223).

The “received” view is that, in the case of “fee fishing” foreign fishing arrangements, the coastal state is not importing anything. Rather it is rather selling harvesting rights to “other” states or entities (see, for example: Mfodwo, 2008). The coastal state is an exporter; the “other” state is a buyer. From this, one can logically infer that the coastal state’s legitimate interests in the fish caught under a “fee fishing” foreign fishing arrangement cease at the point of capture.

The argument maintained in the *TIFS* report is that the coastal state is in fact an importer of fishing services; that the exporter of such services is paid by the coastal state, but that the payment is implicit, rather than explicit. The *TIFS* report maintains further that the coastal state’s legitimate interests in the fish caught under a fee fishing foreign fishing arrangement, far from ceasing at the point of capture, extend all the way up the value chain.

We develop the argument by first taking a simple intuitive example, and then following up the example with something more sophisticated, drawn from the Clarke-Munro Principal-Agent analysis (Clarke and Munro, 1987; 1991). In our intuitive example, we shall assume that there is

but one distant water fishing entity of the Taiwanese “middleman” type. We shall simply further by supposing that the processing is negligible.

Let it be supposed that the relevant amount of harvest per year in the coastal state EEZ fishery is 10,000 tonnes and that the world market price is € 400 per tonne, giving a gross revenue of € 4 million. Let it further be supposed that the harvest could be taken by the coastal state’s domestic fleet, and that the combined harvesting and marketing cost to the coastal state operation would be € 300 per tonne. This would provide a net return of € 1 million per annum.

Next, suppose that the harvesting/marketing costs of the relevant distant water fishing entity would be € 100 per tonne, leaving a net potential revenue of € 3 million. The gains from trade by allowing the distant water fishing entity to harvest and market the fish would be: € 3 million - € 1 million = € 2million

If a foreign fishing arrangement were established with the distant water fishing entity, the coastal state would expect a return on “its” fish, which would be paid by the agent, through an access fee. The access fee must be sufficiently below € 4 million, however, to cover the distant water fishing entity’s costs. The distant water fishing entity will, of course, try to bargain for more, to obtain a share of the gains from trade. Suppose that the agreed upon access fee is € 2million per annum. The distant water fishing entity is left with € 4 million - € 2million, which will cover its costs and leave it with a return, over and above its costs of € 1 million. The distant water fishing entity, the agent, has indeed been “paid”.

What about the coastal state? It will receive a net return of € 2 million, which is € 1 million greater than it would have earned, if had harvested and marketed the fish on its own. It has thus enjoyed a part of the gains from trade. The resource rent from the fishery through time received by the coastal state will have been enhanced by having entered into this foreign fishing arrangement.

We can do better than this, however, by introducing some Principal-Agent based analysis. To this we now turn.

IV A Principal-Agent Approach

To repeat, the analysis to be used is based upon Clarke and Munro (1987; 1991)⁵. Their Principal – Agent model is unusual in that it is deterministic. As such, it is, however, very useful for our purposes in that it lays bare the situation facing the coastal state, the relationship of Principal to its Agents, the “other” states.

The Clarke and Munro model is based upon standard issue dynamic economic model of the fishery, having the Schaefer biological model as its foundation, with which the reader is familiar (see, for example: Bjørndal and Munro, 2012, Chapter 3). Many simplifying assumptions are made, beginning with the assumption that all prices and unit costs can be treated as parameters and that these prices and unit costs are constant over time. We next assume that the coastal state has the opportunity of entering into a foreign fishing arrangement with but one “other” state, a distant water fishing entity, much like Taiwan. The distant water fishing entity is seen to have a

⁵ See, as well, World Bank, 2016, Appendix A.

clearly revealed comparative advantage in harvesting the relevant fishery, in processing the catch and in marketing the processed products. We now allow for processing explicitly⁶.

It is assumed that the coastal state, the Principal, does not live in a First Best World, in that it cannot dictate and enforce the distant water fishing entity's, the Agent's, fishing effort profile over time. Rather the Principal, lives in a Second Best World and must be content with influencing that fishing effort profile through an incentive scheme. This gives rise to the concept of *agency cost*, which is the difference between what the Principal actually receives and what it would receive under First Best conditions.

Clarke and Munro assume that the incentive scheme consists of an access fee arrangement, taking the form of a tax or taxes. At the time that Clarke and Munro were writing, access fees commonly took that form. Moreover, the taxes could be seen as more than a means of gaining revenue from the fishery. In 1987, the then Deputy Director of what is today called the Pacific Islands Forum Fisheries Agency, wrote that such access fees "had the purpose of fostering operational efficiency in the use of the resource; and providing an instrument for [coastal state] governments to regulate, develop, conserve and generally manage the fishery" (Doulman, 1987, p.19).

The objective of the Principal is to maximize its net economic return from the fishery resource through time. The Principal does, however, face a constraint in that the Agent must receive a minimum return, if it is to make its services available. In our case, the Agent must obviously receive enough to cover its fishing effort costs, processing and marketing costs, what we might term its "out of pocket" costs. Over and above this, there may be an Agent's opportunity cost, in that the Agent could deploy its fleet to the fishery of some other coastal state from which it could expect a return in excess of its "out of pocket" costs.

In any event, the Principal will endeavor to keep the Agent's net economic return from the fishery over time to the minimum. The Agent, of course, will attempt to gain a return well in excess of its minimum.

Clarke and Munro consider a range of taxes and then settle on two, a harvest tax and an effort tax. They demonstrate that, even in this world of perfect information, if the Principal is going to come anywhere close to achieving an optimal outcome from its perspective, it would have to use both taxes (Clarke and Munro, 1987). We shall go along with this⁷.

Now some a more simplifying assumptions. We have the standard harvest production function: $h = qEx$, where x denotes biomass, E the rate of fishing effort and q the catchability coefficient. We shall assume that: $q = 1$.

Next with respect to processing, we shall assume a one to one relationship between raw fish going into the plant and the fish products. That is to say one tonne of raw fish going into the plant

⁶ The Clarke and Munro model in fact assumes that all harvested fish goes into the fresh market. The model can, however, easily be extended to incorporate processing and marketing (World Bank, 2016, Appendix A).

⁷ Since we are assuming perfect information, tax evasion should not be a problem. The Principal could stipulate that, if any of the Agent's vessels should be foolish enough to try to evade the taxes, the foreign fishing arrangement would be terminated.

yields one tonne of finished product – very unrealistic, but it simplifies our exposition. With this simplification, we can combine unit processing and marketing costs.

We now denote the Agent’s unit fishing effort cost as b_1 , and denote its combined unit processing and unit marketing costs as b_2 . We assume that the fish products take but one form, and denote the price of that fish product as p_m .

Next, the taxes levied by the Principal. We assume, as is reasonable, that the taxes can be levied only at the harvesting stage. The rational Principal will, however, be vitally interested in the fish as it moves up the value chain. In any event, let us denote the unit fishing effort and harvesting taxes as τ_E and τ_h respectively.

Given our simplifying assumptions, we can, at any given point of time, t , express the net economic return (resource rent) from the fishery to the coastal state, Principal, as:

$$\pi_{CS} = \{\tau_h x + \tau_E\} E \quad (\text{Eq. 1})$$

(recall that, by assumption, $q = 1$).

The net economic return to the distant water fishing entity, Agent, and the same point in time, t , can be expressed as:

$$\pi_{DW} = \{(p_m - [b_2 + \tau_h])x - (b_1 + \tau_E)\} E \quad (\text{Eq. 2})$$

But, return to Eq. (1) and now note the following:

$$\pi_{CS} = \{\tau_h x + \tau_E\} E \equiv \{(p_m - b_2)x - b_1\} E - \{(p_m - [b_2 + \tau_h])x - (b_1 + \tau_E)\} E \quad (\text{Eq. 3})$$

Eq. (3) is saying that the net economic return to the Principal at time t is properly to be seen as the true net economic return from the fishery, all the way up to the marketing of the fish products, minus the economic return to the Agent, over and above its “out of pocket” costs. The second term on the RHS cannot be negative. If it is equal to zero, it means that the Agent does no more than cover its “out of pocket” costs.

As the reader will observe, Eqs. (1) and (3) will also allow us to express the net economic return to the Principal at time t as:

$$\pi_{CS} = p_m x E - (\phi + \gamma) \quad (\text{Eq. 4})$$

where $\phi = \{b_2 x + b_1\} E$, and where $\gamma = \{(p_m - [b_2 + \tau_h])x - (b_1 + \tau_E)\} E$

Seen in this fashion, π_{CS} is equal to the gross value of the finished fish products minus two “payments” to the Agent, one to cover its “out of pocket” costs, and the other, which we might refer to as the Agent’s premium.

We said earlier that there would be a minimum return to the Agent. That minimum will likely exceed ϕ , because of the opportunity cost to the Agent arising from the possibility of gaining access to the fisheries of other coastal states. We can then talk of a minimum premium to the Agent, which we can express simply as: $\gamma_{\min} \geq 0$.

To continue, from Clarke and Munro the net present value of the economics returns from the fishery through time to the coastal state, Principal, can be expressed as follows:

$$NPV_{CS} = \int_0^{\infty} e^{-\delta_{CS}t} p_m x(t) E(t) dt - \int_0^{\infty} e^{-\delta_{CS}t} \{ \phi(t) + \gamma(t) \} E(t) dt \quad (\text{Eq.5})$$

where δ_{CS} is the coastal state, the Principal's, social rate of discount. Let us denote the distant water fishing entity's, the Agent's, social rate of discount as: δ_{DW} . The Principal's objective is quite simply to maximize NPV_{CS} .

Clarke and Munro demonstrate that, in this world of perfect information, the Principal can achieve what amounts to First Best outcome (no agency costs), using the two taxes, *if* $\delta_{DW} = \delta_{CS}$. If this highly unlikely situation does not exist, if, as is only too possible, we have $\delta_{DW} > \delta_{CS}$, then, while the economic return to the Agent can be kept to a minimum, an *agency cost* will emerge. The Principal will receive less than what it would under a First Best situation (Clarke and Munro, 1991)⁸.

V A World of Imperfection and Complexity

The real world is, of course, one of imperfect, often highly imperfect, information, and one of complexity. With respect to information, we can expect the asymmetry problem to arise in full force. Take the “fee fishing” case. The Agent, the “other state”, will have far more information on its harvesting costs, to say nothing about its processing and marketing costs, than will the coastal state Principal. In addition, the problem of monitoring, the curbing of cheating, which we were able to dismiss in our world of perfect information, becomes of paramount importance. In terms of the analytics, it means that a great deal more work has to be done on the Principal- Agent analysis, jumping off from what is now the decades old work of Clarke and Munro.

Of immediate concern is what we referred to earlier as the “received” view of “fee fishing” arrangements in which the coastal state is seen as “selling” harvesting rights to “other” states. As we have maintained, this can lead to the seemingly reasonable conclusion that what happens to the fish, after being harvested by the “other” state, is entirely the business of that “other” state, and not the business of the coastal state. This mistaken view of the world is very beneficial to the “other” state, and very, very detrimental to the coastal state. It will serve to intensify the coastal state's lack of relevant information, and do so for obvious reasons. We would then be all but

⁸ The problem arises from the fact that, in this situation, future payments to the Agent will be worth more to the Principal than they will to the Agent. The consequence will be that the Principal will be forced to accept a harvest regime over time that will result in the fishery resource being “overexploited”, as seen from the Principal's perspective (Clarke and Munro, 1991).

guaranteed that the “other” state’s”, the Agent’s, premium will far exceed the minimum, i.e.

$$\gamma_{actual} \gg \gamma_{min} .$$

There are furthermore complexities, which we can no longer ignore. A prominent example is that of the coastal state sharing the fishery resources of its EEZ. The coastal state may share fishery resources with neighbouring coastal states, or its fishery resource may migrate to the adjacent high seas. We referred to prominent examples of developing coastal states for whom TIFS are important, the Pacific Island Countries and the coastal states of West Africa. For both, the sharing of fishery resources is a key fact of life. Having said all of this, we turn now to examine the Pacific Island Countries in detail.

VI The Pacific Island Countries of the Western and Central Pacific

The *TIFS* report makes clear that the developing coastal states, which have made greatest progress with foreign fishing arrangements, are the Pacific Island Countries of the western and central Pacific. Collectively, they stand as an example to other developing coastal states⁹.

Some background is in order. The 1982 UN Convention ushered in the EEZ regime. At the dawn of this regime, the Pacific Island Countries (PICs) were seen collectively as one of the great beneficiaries of the regime. They gained sovereign rights over tropical tuna resources of immense size, resources which were in turn of central economic importance to them (Kearny, 1983). It is estimated that currently, the tuna harvests from the PIC region have an annual value at point of delivery to the processors of almost US\$ 3.5 billion (Pacific Islands Forum Fisheries Agency, 2014).

They faced great problems, however. Tuna is the ultimate highly migratory species, which means that the tuna are widely shared among the PICs, as well as extending out to the adjacent high seas. There were at the time 14 independent PICs, having a land mass of not more than 500,000 km², with the area of their EEZs combined equaling that of the continent of Africa. The PICs were incapable of taking no more than a small percentage of the potential harvests and were faced initially with but one “other” state, a DFWS that was a world power. There were serious doubts that PICs would realize the potential economic benefits from the tuna resources, other than to a trivial degree (World Bank, 2016, p.53).

The PICs recognized from the beginning that they would achieve the requisite bargaining power with this monopoly DWFS, only if they cooperated. If they did not cooperate, the DWFS would do the obvious, namely play one PIC off against another.

This realization led, in 1979, to the establishment of what is today referred to as the Pacific Islands Forum Fisheries Agency (FFA). Cooperation among the PICs has been, and will continue to be, central to their progress over time. The current Deputy-Director of the Pacific Islands Forum Fisheries Agency (FFA) says that a central theme of the FFA members is “strength through cooperation” (Norris, 2017).

In economic terms, what was emerging among the PICs was a cooperative game. There were many who doubted at the time that there existed a stable solution to this game. A general rule of

⁹ See: World Bank, 2016, Appendix B.

thumb in game theory is that the difficulty of achieving a stable solution to a cooperative game, of achieving a stable Grand Coalition, increases exponentially with the number of players. There were 14 players in the 1979 game, players who were dispersed over a wide geographical area (Munro, 1991).

Fortunately, the players were, and are, not symmetric. The tuna resources are not spread out evenly in the region, but rather tend to concentrate around the equator. In crude, rough terms this has the result that there are “haves” and “have - nots” among the players. In 1982, a group of “haves”, becoming alarmed at what appeared to be a disintegrating cooperative game, met on the island of Nauru and signed an agreement, the Nauru Agreement. The signatories to the Agreement, now referred to as the Parties to the Nauru Agreement (PNA)¹⁰, invited the “have - nots” to join them, but made it clear that the PNA would go its own way, if the invitation was refused. The invitation was not refused. The intractable 14 player game had become a coalition game, with two sub-coalitions. The Grand Coalition now proved to be stable (World Bank, 2016, p. 51).

The theory of cooperative games, as applied to fisheries, puts forth what is known as the *Compensation Principle*. This is, where the players are asymmetric and hold different views on resource management policies, optimality is achieved by allowing the player, or players, placing the greatest value on the fishery resource to dominate the management, which will require it (them) to compensate the others (through side payments). In the two sub-coalition game, which emerged in 1982, the PNA obviously places a greater value on the tuna resources than does the other sub-coalition. The Compensation Principle is at work in the region. The PNA became, and continues to be, the cutting edge in fishery resource management in the region, certainly including the establishment and management of foreign fishing arrangements (World Bank, 2016, p. 54).

The *TIFS* report Appendix B, a case study on the PICs, discusses how the members of the FFA coped with problems of asymmetric information and of monitoring and surveillance. In the early 1980s, they coped not at all well. The access fee rates of return ranges from just over 2 per cent to 5 per cent¹¹. Surveillance and enforcement measures were inadequate; the bargaining power of the PICs vs. DWFSs was manifestly weak (World Bank, 2016, Appendix B). One could with confidence assert that at the time $\gamma_{actual} \gg \gg \gamma_{min}$

All that was to change with the coming of the PNA, which led to the adoption of Harmonized Minimum Terms and Conditions for Foreign Fishing Vessel Access, to prevent “other” states from playing one PIC off against another, along with immense improvements in surveillance and enforcement. Since that time, there has been gradual, but steady, progress.

The latest development, due to a PNA initiative, applies currently to purse seiners, which account for approximately 60-65 per cent of the tuna harvest (Norris, 2017)¹². The development takes the form of a Vessel Day Scheme (VDS). The VDS can be seen as a fishing effort equivalent of an ITQ scheme.

¹⁰ The current members of the PNA are: Federated States of Micronesia, Kiribati. The Marshall Islands, Nauru, Papua New Guinea, Solomon Islands and Tuvalu.

¹¹ The access fee rates of return are expressed as the access fees as a percentage of the value of catch taken by the DWFS fleets upon whom the fees are levied (World Bank, 2016, Appendix B).

¹² There are plans to extend the scheme to longliners.

The PNA members agree among themselves on a season by season Total Allowable Fishing Effort (TAE), which is then divided among the members on a vessel day basis, to use as they see fit. Having said this, the members agree among themselves on a minimum per vessel day price (Norris, 2017).

Most of the vessel days end up being issued to foreign vessels, through auction or tender. The results have been dramatic, yielding rates of returns 17-20 per cent (Norris, 2017). Compare this with the returns from the early 1980s.

The PNA now has its own office. One PNA official is quoted as saying that, if “the VDS were to become fully effective, the result would be the stripping out of rents, in terms of above market returns, *throughout the value chain*” (World Bank, 2016, p.14).

What is the economics of the VDS; what explains its ability to mitigate the information asymmetry problem? At this stage, the answer is that we do not know. One can conjecture that it will likely require an application of Principal-Agent analysis and the theory of auctions.

As a final comment, the PICs make it clear that they understand fully the view that foreign fishing arrangements should be seen as coastal states importing fishing services from DWFSs and “other” states¹³. A foreword to the *TIFS* report was prepared by the Director- General of the Pacific Islands Forum Fisheries Agency, James Movick. In the foreword, he states that: “----- this report [*TIFS* report] illustrates how they [“fee fishing” arrangements] – together with charters and joint ventures – can actually be regarded as a trade in services. As with other trade, the principles of comparative advantage apply and can, under the right circumstances, benefit all parties” (World Bank, 2016, p. vii).

VII South-South Cooperation

One of the key recommendations of the *TIFS* report is that, in dealing with the TIFS problems faced by developing coastal states, south-south cooperation should be fostered. If the members of the FFA have made far more progress than have other groups of developing coastal states, then their knowledge and expertise should be made available to these other groups of developing coastal states (World Bank, 2016, p.38). The World Bank has now responded to this recommendation.

The World Bank has as one its ongoing projects the West Africa Regional Fisheries Program (WARFP or PRAO in French)¹⁴. A Program workshop was held in Saly, Senegal in February 2017, associated with which was a full day of training devoted to TIFS issues. Recent research indicates that rates of return from foreign fishing arrangements by the relevant African states are, at best, no better than what were being earned by the PICs in the early 1980s (World Bank, 2017). Obviously these states have a great deal that they could learn from the FFA.

A featured speaker at this TIFS training day was Wez Norris, Deputy Director of the FFA, there to talk to the participants about the FFA experience. A key recommendation forthcoming from

¹³ As is made evident from the PNA quote on the VDS scheme (World Bank, 2016, p. 14).

¹⁴ The states involved in the WARFP currently are: Cabo Verde, Ghana, Guinea Bissau, Liberia, Mauritania, Sénégal and Sierra Leone. Gambia and Cote d’Ivoire will join in the near future.

the training day was that study tours to the FFA for Project member states be organized in order to benefit from FFA experience in cooperative fisheries management.

During the training day, there was gradual realization that a rather large amount of TIFS is occurring in the West African region, primarily through “fee fishing” arrangements. There was further recognition that people in the region are simply not accustomed to think of it as trade. The “received” view of “fee fishing” arrangements is firmly entrenched.

The participants, therefore, formulated four main recommendations, in addition to the recommendation that study tours to the FFA be organized. The four additional recommendations are:

1. To formalise the list of tradeable services and establish qualitatively import and export patterns concerning them
2. To develop a methodology for their quantification
3. To undertake a pilot study to test quantification procedures which could then be generalized to include in the regional “Dashboard”
4. To continue TIFS training with smaller, targeted groups of trainees (the group at the first workshop having been rather large) (World Bank, 2017).

Doubtless similar recommendations could be made for other regions in the world.

VIII Conclusions

This paper is concerned with a relatively new potential area of research in fisheries economics; namely trade in fishing services involving harvesting, processing, transportation, marketing and other services. In contrast to trade in fish and fish products, trade in fishing services has received but little attention, with there being no serious attempt to collect data on the trade. Hence, no accurate estimate exists on the magnitude of the trade. There is little doubt, however, that the magnitude is large, conceivably exceeding US\$50 billion per year.

The World Bank has taken a step towards building an understanding of the trade and its implications through the publication of the report: *Trade in Fishing Services*. This paper discusses some of the key findings of the report and initial attempts to implement some of the report’s recommendations.

The trade in fishing services arises from coastal states establishing foreign fishing arrangements with other states, primarily distant water fishing states. The arrangements, in turn, arise by virtue of the fact that coastal states are called upon by international law to set allowable catches for fishery resources within their EEZs and then to assess their capacity to harvest the allowable catches. Where the coastal state harvesting capacity falls short of the allowable catches, surpluses are deemed to exist, resulting in the coastal being required to grant access to other states to these surpluses, albeit subject to a wide range of terms and conditions, certainly including a demand for remuneration.

While there is considerable controversy over the true nature of the coastal state obligations to grant access to the so called surpluses, what is uncontroversial is the fact that a coastal state can in time eliminate any such surplus simply by virtue of increasing its harvesting capacity. A key question is whether there could be circumstances in which the coastal state could find it in its economic interests not to eliminate all such surpluses.

The view taken in the World Bank report is that the “other” states are to be properly seen as an itinerant harvesters/processors/marketers, and thus as agents of the coastal state. Since the “other” states are by definition foreign from the perspective of the coastal state, the coastal state is to be seen as importing these services from the “other” states – hence the trade.

The answer to the key question thus rests first and foremost upon international economics, and in particular upon the Doctrine of Comparative Advantage. The economic argument for a coastal state continuing, or not continuing, to import these services is essentially the argument for free trade.

If the other states are to be seen as agents of the coastal state, then international economics alone is not sufficient to the task at hand. What is required is that we blend international economics with Principal-Agent analysis.

Trade in fishing services is of ongoing importance, particularly to developing coastal states. These states vary widely in their abilities to deal with the problems posed by the trade. The World Bank report comes to the inescapable conclusion that the group of developing coastal states, which has dealt with these problems most successfully, consists of the Pacific Island Countries of the western and central Pacific. The World Bank report recommends strongly that steps be taken to foster south-south cooperation, enabling the Pacific Island Countries to pass on their skills and knowledge to other developing coastal states.

The World Bank has responded to that recommendation by taking an important first step. The World Bank recently brought a senior official of the Pacific Islands Forum Fisheries Agency to the coastal states of West Africa, for whom trade in fishing services is of major importance, to lecture to the West Africans about Pacific Island Countries experience with these services. It is hoped both that this will mark the beginning of collaboration between the coastal states of West Africa and the Pacific Island Countries, and that, in time, this south-south cooperation can be extended to other regions.

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