EVALUATION OF THE CAPITAL VALUE, INVESTMENTS AND CAPITAL COSTS IN THE FISHERY SECTOR: THE ITALIAN CASE

Monica Gambino, Loretta Malvarosa, Evelina Carmen Sabatella, Massimo Spagnolo

IREPA Onlus

Istituto di Ricerche Economiche per la Pesca e l'Acquacoltura

Via S. Leonardo - Trav. Migliaro,

84131 Salerno, Italy

ABSTRACT

The present paper represents part of a wider study, financed by EU under contract No. FISH/2005/03 and carried out by IREPA in collaboration with IFREMER, FOI, SEAFISH, LEI and FRAMIAN.

Taking into account the need of homogeneous data among EU countries under the data Collection Regulation (DCR), the main objective of the study has been to find a proper methodology for the evaluation of the capital value and of capital costs in the fishery sector. As the Perpetual Inventory Method (PIM) has become the most important international standard for valuation of tangible capital goods, the study has focused on the application of the PIM on the EU fishery sectors.

Even if the study has also investigated methodologies to evaluate intangible capital assets, no proper and unique methodology has been agreed upon. In most cases difficulties concern lack of data on the market value of this type of capital assets. This is one of the main problem in Italy where transferability of fishing licenses is not allowed by law and there is no transparent market.

After having illustrated the methodological aspects of the application of PIM, the disaggregated estimates of capital stock for the Italian fishing fleets are compared.

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1. Introduction

The EU legislation regarding collection of data on economic performance of fishing fleets[1] obliges Member States to compile and process data on capital values, investments and capital costs.

In 2006, taking into account the need of homogeneous data among EU countries under DCR, a study was performed in order to individuate a proper methodology for the evaluation of capital and the determination of capital costs pertaining to the European fishing fleets.

These parameters are essential for the assessment of the dynamics of the sector in terms of level of investments (renovation of capital stock) and of the ability of the sector to maintain its capital value and continue operating in the future.

The Perpetual Inventory Method (PIM) has become the most important international standard for valuation of tangible capital goods, therefore the study has focused on the application of the PIM in the fishing sector.

The PIM generates an estimate of the capital stock by accumulating past purchases of assets over their estimated service lives. The standard procedure is to use the PIM to estimate the gross capital stock, to apply a depreciation function to calculate consumption of fixed capital and to obtain the net capital stock by subtracting accumulated capital consumption from the gross capital stock. The traditional application of the PIM requires the direct estimation of depreciation from which the net capital stock is obtained indirectly (OECD, 2001).

Even if the study has investigated also methodologies to evaluate intangible capital assets, no proper and unique methodology has been agreed upon. In most cases difficulties concern lack of data on the market value of this type of capital assets. Only where a market exists (i.e. Individual Transferable Quotas, ITQs) no real problems have to be faced in evaluating intangible assets.

The present paper focuses on the results coming from the application of the methodology developed within the above study on the most recent Italian fishing fleet data. After having presented the main definitions related to the capital value, we discuss some practical aspects for the application of PIM to the Italian fishery context and compare the disaggregated estimates of capital stock for the Italian fishing fleets.

2. Some definitions

Before going deeper in the study, it is important to outline some concepts used within the study.

1 Council Regulation N°1543/2000 of 29 June 2000 establishing a Community framework for the collection and management of the data, the general principles and the procedures for the content of National Programmes needed to conduct the Common Fisheries Policy (CFP). Commission Regulation N° 1639/2001 of 17 August 2001 establishing the minimum and extended Community programmes for the collection of data in the fisheries sector and laying down detailed rules for the application of Council reg. N° 1543/2000. Commission Regulation N°1581/2004 of 27 August 2004 amending Regulation (EC) N°1639/2001 establishing the minimum and extended Community programmes for the collection of data in the fisheries sector.

First of all, it should be said that the capital value is the sum of all assets (or liabilities) presented on the annual balance sheet. Bearing in mind the main difference between tangible and intangible assets[2], the capital is made up by the following components:

- Fixed tangible assets – sea-based = vessel, engine, electronics, other equipment on board.
- Fixed tangible assets – shore based = buildings, cars and other facilities on shore;
- Intangible assets = licences, quota, permits, etc..;
- Working capital = liquidity (money) required to pay regularly on-going operational expenses;
- Reserves, participations, shares, etc. = resources (money) 'invested' in assets not directly related to the fishing operations, but for example maintained to assure pension payments to the owner.

Secondly, it should be stressed that in valuing capital goods, it is necessary to distinguish between gross and net values. Gross value (or Gross Capital Stock) is the total historical value paid (or replacement value calculated). Net value (or Net Capital Stock) is the GCS minus depreciation.

Furthermore, it is important to highlight that various approaches to capital valuation and use of different indicators are relevant depending on specific analytical needs. From the perspective of the assessment of performance of fishing vessels, two main approaches should be distinguished: micro and macro.

Micro perspective reflects the context of the firm. This implies that the calculations should be as close as possible to the actual monetary flows using historic prices paid (i.e. after addition of eventual taxes and subtraction of subsidies). For micro (fiscal) approach it is recommended to use depreciation schedules permitted by the national tax laws. This will be usually a linear function, with approximate life times stated by the national statistical offices.

Macro perspective reflects the context of the society at large, with an indefinite time horizon. This means that the fishing sector should continue operating 'for ever' and its performance is evaluated accordingly. For the macro (economic) approach a 'degressive' depreciation function should be used. This function leads to relatively high depreciation when the assets are still relatively new, but the value of even very old assets never becomes zero.

The above concepts are summarised in the table below.

[2] The accepted standard in relation to capital valuation is the OECD Manual (OECD, 2001a). Based on the OECD definition, *the tangible fixed assets* are "non-financial produced assets that consist of dwellings; other buildings and structures; machinery and equipment and cultivated assets while *intangible fixed assets* are "non-financial produced fixed assets that consist of mineral exploration, computer software, entertainment, literary or artistic originals and other intangible fixed assets intended to be used for more than one year".

Table 1 – Type of approaches of the capital evaluation process

	Micro approach	Macro approach
Scope	Individual firm level	Sector and macro/ society level
Type of analysis/ application	Fiscal accounting	Economic valuation
Time horizon	Economic life time of the capital good or firm	Indefinite
Value used	Historical value	Replacement value
Preferable depreciation	Linear	Digressive

Bearing in mind the above concepts and specifications, the present paper focuses on the evaluation of tangible assets, both from a macro (replacement) and micro (historical) approach and referring to the vessel as statistical unit.

The study has also investigated methodologies to evaluate intangible capital assets, as licenses, ITQs, but no proper and a unique methodology has been agreed upon.

In theory when intangibles are freely tradable, they should be valued at market price if the market is sufficient to allow regular trade. It is assumed that these intangibles have infinite life time and consequently they are not depreciated.

On the opposite, in case of non-tradable intangibles, they are valued at estimated market prices, and because the life time is not certain they are depreciated.

Often these rights can be transferred only with the vessel to which they are attached. In this case direct observation of the price is impossible and the value has to be estimated. A possible approach to such estimation is based on the theory of hedonic approach. This method basically assumes that the price of a commodity or product is influenced by its characteristics (FAO, 1999). The assumption is that the economic agents value the product for their attributes and that the implicit or hedonic prices exist as a function of the attributes (Hulten, 1990).

One of the first applications of hedonic models to fisheries is by Kirkley and Squires (1988). They present an approach for estimating capital stock and investment in the New England fishery. In recent years, Guyader *et al*. (2003) applied the hedonic theory for the estimation of the access rights of the French fleet operating in Atlantic coast. Using a hedonic pricing model, they tested the hypothesis that the price of the exchanged vessels can be broken up into two components: a tangible value explained by the technical characteristics and the age of the fishing units, and an intangible value representing the access rights to the fisheries. These harvesting rights may to some extent capitalise the value of the rent or quasi-rent flows exhausted from the fishing activity. Their results confirmed the assumption that vessel prices do not only value tangible capital but also intangible capital. In fact, while the size of the vessels and their age significantly influence vessel prices, operation permits and licenses account for a weighty part of vessel prices on the second hand market. This share increases with vessel ageing because tangible capital depreciated with wear and tear.

In the Italian case, fishing licenses represent the main component of the intangibles and are tradable only with the vessel. For the evaluation of the intangibles two sources of data have been used:

1. 589 ship sale records from a brokerage company (leader in this sector)
2. a survey of 62 ship owners.

Even if data available and their level of desegregation were not sufficient for more sophisticated elaborations, it was possible to compare the second hand prices and the hedonic prices for different fleet segments. From these elaborations, it clearly emerges that license represents a large share in the value of a vessel.

In the second hand market, many factors seem to affect negotiations. In addition to some quantitative variable, as those related to the age of the vessels and to its dimension, there are some other qualitative variables, as the engine's mark, the hull's material and the shipyard.

As expected, the trend of prices highlights a reduction with the age of vessels (Figure 1). This also emerges by observing the second hand market prices of the old vessels that are bought (for instance by shipyards) with the only intent to use their licenses for new built vessels. Interviews with ship owners have confirmed that the scrapping premiums are considered as a minimum reference value in particular for the evaluation of old vessels (> 10 years of age).

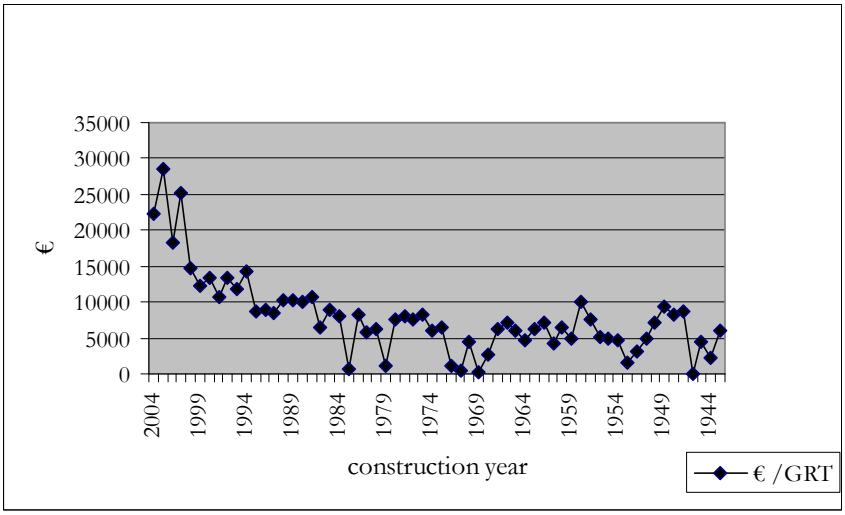

Figure 1 - Trend in second hand vessels' prices

Following the hedonic approach, 62 vessel's owners were asked to evaluate their vessels both with and without license. As for the second hand market prices, the license is predominant in the case of dredgers and larger vessels and less important for passive gears and small boats.

3. The PIM in practice

The PIM proposes to determine the aggregate value of the tangible capital goods used in the current year by aggregation of the value of all vintages (year classes). Such aggregation can be based either on historical, current or constant prices.

Once the value of the capital goods in a given benchmark year has been determined (first step), the capital value of each subsequent year is calculated by adding investments of that year (gross capital formation), revaluing the existing stock and subtracting value of capital goods taken out of operation.

Then, as a second step, capital costs (i.e. depreciation and interest) are calculated using agreed depreciation schedule and interest rate.

In general terms, the basic model of the PIM is the following:

$$NK_t = GK_{t-1} + I_t - Rt - D_t \qquad \text{(eq 1)}$$

the Net capital stock (NK_t) of a single category of asset (i.e.the hull) can be estimated if are known:

- the initial Gross capital stock at the beginning of the year t, GK_{t-1}
- the Investments made during the year t, I_t
- Retirements made during the year t, R_t
- the Depreciation of the year t, D_t

3.1 Establishment of the bench-mark of Gross Capital Stock (GCS)

In the application of the PIM to the fishery sector, the determination of the benchmark of GCS requires, in order:

1. specification of the composition of the active fleet by age;
2. estimation of the price per capacity unit (price/CU), e.g. per GT;
3. relative composition of the fleet in terms of the different assets (hull, engine, electronics and other equipment, EEO);
4. calculation of the value of each vintage (year of construction) of the fleet by converting values of all vintages to replacement prices or to historic prices using price indices.

In the macro approach, the Gross Replacement value of the asset i at time t is equal to:

$$Gross\ Replacement\ Value\ Asset_{it} = Replacement\ Price/CU_t * Selected\ CUs_t * Share\ Asset_i$$

The above formula should be adjusted for the micro approach by taking into account that assets should be valued at their historical price and that the value of Engine, Electronics and Other (EEO) must be adjusted to their actual age of acquisition, e.g. engine of an 11 years old vessel is only one year and therefore its price cannot be related to historic vessel price of 11 years ago. For this reason a separate price schedule must be added should be taken into account and considered in the corresponding formula (only for EEO):

$$Gross\ Historical\ Value\ Asset_{it} = Historical\ Price/CU_t * Selected\ CUs_t * Share\ Asset_i * Price\ Index_{it}$$

From these formulas, it's clear that the determination of the price/CU is the core of the entire valuation of the Gross Capital Stock. It requires careful interpretation of the collected information on vessels' values and, if necessary, its adaptation. This phase strongly depends on data availability and the correctness of its interpretation. The procedure is presented in figure 8, at the end of paragraph 4.1, showing the path followed in the application to the Italian case (red boxes).

3.2 Determination of capital costs

Capital costs can be calculated in different ways, according to the analytical perspective. Referring to the distinction between micro and macro made above, the following differences exist.

In the micro approach the capital costs (depreciation and interest) should closely follow the national fiscal rules. Usually linear depreciation based on the historic price should be used. The linear depreciation consists in allocating the value of an asset in constant quotas, so that the total value of the investment is completely depreciated at the time of the retirement. Figure 2 shows the mortality and survival functions underlying the linear retirement patterns. The mortality patterns involve assumption about the distribution around the expected or average service life (L). With a linear retirement pattern, assets are assumed to be discarded at the same rate each year from the time of installation until twice the average service life L. The mortality function is a rectangle whose height – the rate of retirement – equals 1/2L. The corresponding survival function shows that the surviving assets are reduced by a constant amount each year, equal to 50/L per cent of the original group of assets.

Within the micro approach, it is straightforward that only interests paid on loans should be included in the costs. The interest rate must be applied to loans only, so that also information on debts or the solvability ratio (debt/total capital) is required.

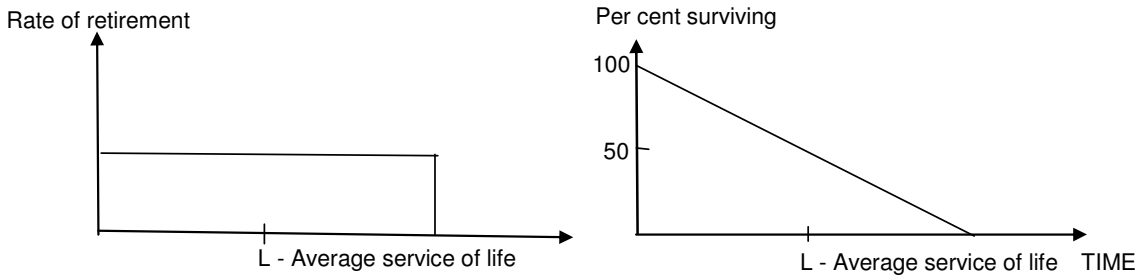

Figure 2 - Linear mortality and survival function

On the other hand, within the macro approach the calculation of capital costs should be based on replacement value. It is proposed to use digressive depreciation scheme so that the residual value never reaches zero. Interest costs should be the opportunity costs of capital. This means that the interest on government bonds (as an alternative to investment in fishing) should be applied to the net capital stock (replacement value less aggregate depreciation).

The average service life, in case the digressive depreciation is applied, can be represented as the curves represented in Figure 3.

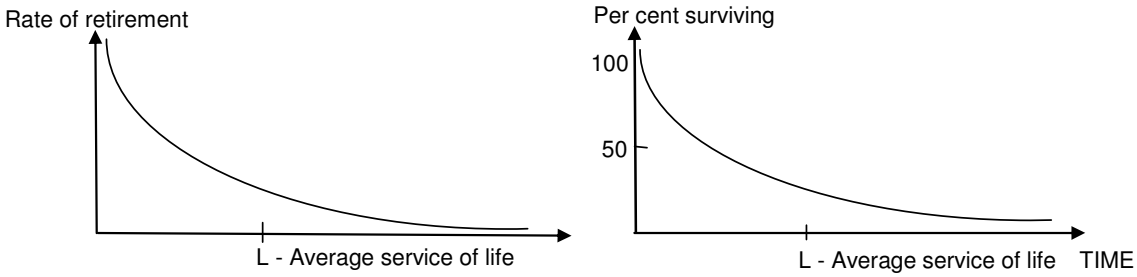

Figure 3 - Digressive mortality and survival function

The application of the digressive and linear depreciation function within, respectively, the macro and micro approach, leads to the Net Value of capital assets. That is, for the macro approach:

$$Net\ Replacement\ Value\ Asset_{it} = Gross\ Replacement\ Value\ Asset_{it} * (1- Depreciation\ rate\ Asset_{it})^{Age\ Asset\ it}$$

And for the micro approach:

$$Net\ Historical\ Value\ Asset_{it} = Gross\ Historical\ Value\ Asset_{it} * (1- Depreciation\ rate\ Asset_{it} * Age\ Asset_{it.})$$

4. Application of the methodology to the Italian fishing fleet

The above methodology has been applied to evaluate the capital value and capital costs of the Italian fishing fleets for 2006. These data will be used in order to comply with the requirements of EC Reg. 1543/2000.

4.1 Estimation of the bench-mark of GCS for the Italian fleet

As far as the first step, i.e. the estimation of the benchmark of GCS, the following inputs have been used:

- data from the Italian Fleet Register at 31/12/2005 as far as the composition of the active fleet by age;
- the Italian Naval Register (RINA) construction index for the estimation of price/CU;
- the production indexes for heavy machines as price indexes;
- estimated relative composition of the capital value.

Composition of the active fleet

The estimation of the capital value of the Italian fleet has been based on the benchmark date 31/12/2005 (assumed to be equal to 1/1/2006). At this date the Italian fleet was made up of 14,327 vessels accounting for 179,282 GRT or capacity units[3]. The average age is 27.

Figures 4 and 5 show, respectively, the vintages distribution of the number of vessels and CUs (GRT).

[3] The GRT has been chosen as capacity unit (instead of the more used GT) because the RINA indexes refer to this measure unit.

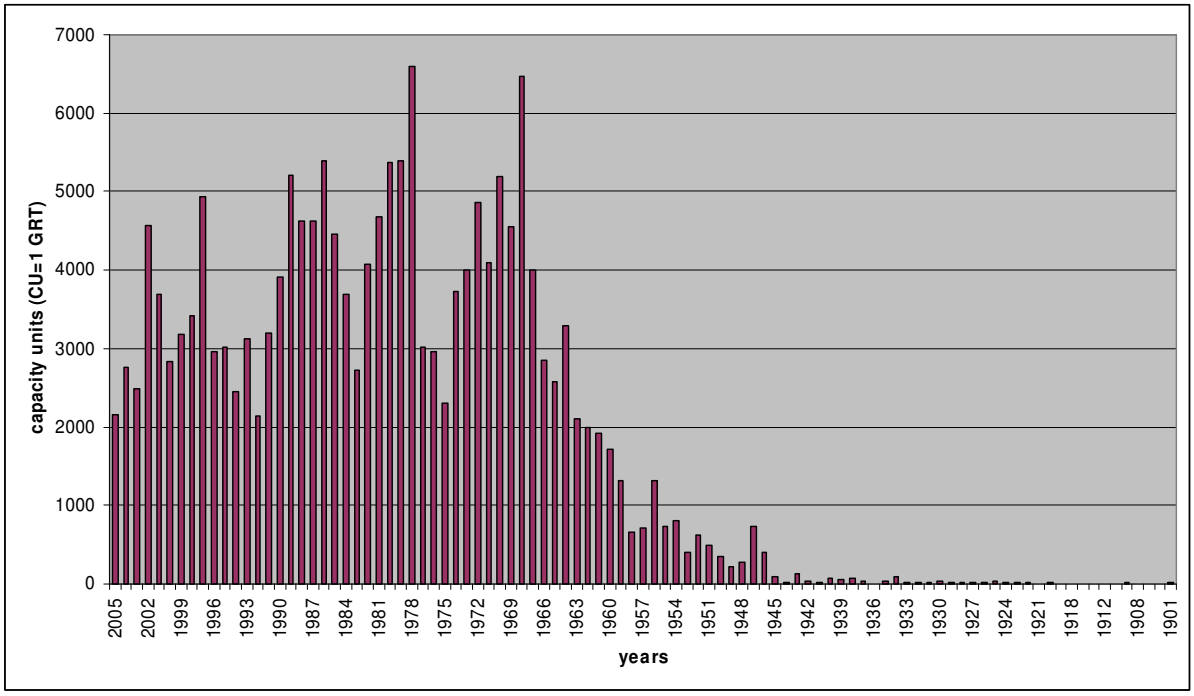

Figure 4 – Vintages distribution of the number of vessels of the Italian fishing fleet at 31/12/2005 (*Source*: Italian Fleet Register)

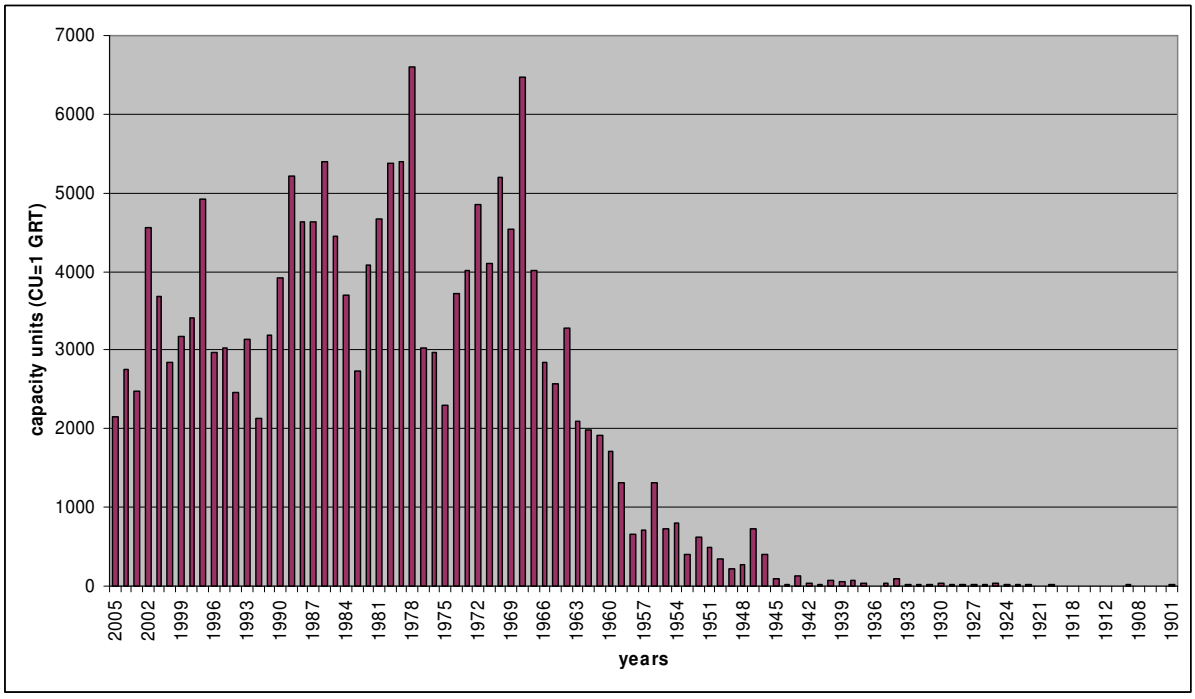

Figure 5 – Vintages distribution of the capacity units or GRT of the Italian fishing fleet at 31/12/2005 (*Source*: Italian Fleet Register)

Vessels built before 1934 have not been taken into account in the evaluation considering both the exiguous numbers of vessels (and, of course, of the relative capacity units) and, due to their old ages, their irrelevant economic value.

Estimation of the price/CU

The estimation of the price/CU has been based on the Italian Naval Register (RINA) construction indexes. The RINA indexes are based on a survey undertaken in 1992.

Table 2 shows the RINA indexes. They express the value of a GRT unit for different GRT classes and hull material . Values refer to year 1992 and have been converted into Euro.

Table 2 - RINA indexes: price per GRT unit, 1992 (€)

GRT classes	Wood	Steel	Fibreglass
less than 5 GRT	13,428	-	11,362
from 6 to 10 GRT	12,395	13,428	9,296
from 11 to 20 GRT	10,846	8,263	7,747
from 21 to 50 GRT	8,263	9,296	-
from 51 to 100 GRT	7,230	8,263	-
over 100 GRT	6,714	9,296	-

Source: RINA, 1992

The above values have been used to obtain the price/CU for vessels built in 1992 by fishing segments (following the requirements of the EC Reg. 1543/2000 and subsequent amendments).

The price/CU by fishing segments obtained from the estimation are showed in table 3.

Table 3 – Price/CU by fishing segments, 1992 (€)

Fishing segments	Price/CU 1992 (€)
Bottom trawlers	10,641
Purse seines	10,226
Pelagic pair trawlers	9,648
Dredges	12,690
Small scale	12,404
Polyvalent passive gears	12,474
Combining mobile and polyvalent passive gears	7,747
Long-lines	10,501
TOTAL FLEET	**11,769**

Source: IREPA elaboration on RINA and Italian Fleet Register data.

Price indexes

In order to obtain historical prices and the replacement values at 31.12.2005, the Italian producer indexes for heavy machines, which also includes boat constructions (source: EUROSTAT), have been used. In order to estimate a price per GRT for the other years included in the data set, the RINA price 1992 has been multiplied by the percentage change 1935-2005 of the Producer Price Index for Heavy Machinery.

The price indexes estimated lie between 0.1 and 1.3 per annum, with an average of 0.5% (figure 6).

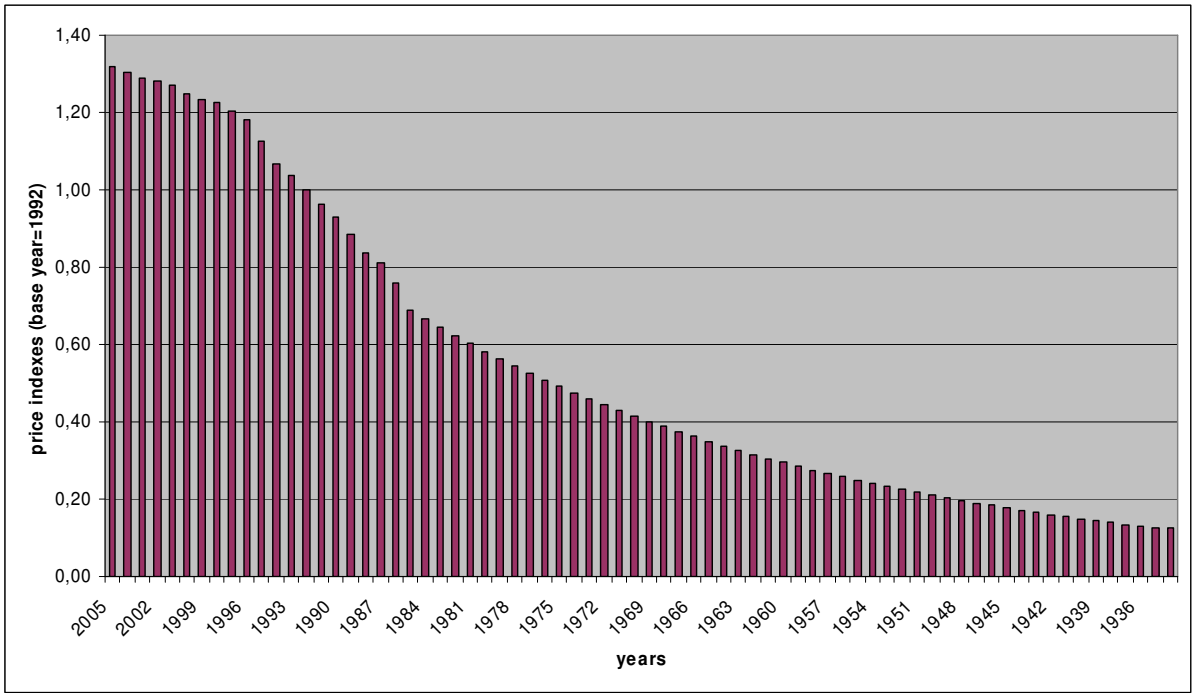

Figure 6 – Producer heavy machinery indexes, 1934-2005. (*Source*: EUROSTAT)

Relative composition of the capital value

The share in total investments of hull, engine, electronics and other equipment has been estimated on the basis of a survey carried out by IREPA. Information obtained has also been endorsed by experts (i.e. shipbrokers[4]). Single items are illustrated in the table below by type of vessels.

Table 4 - Percentage composition of investments by main sub-segment and group of assets

%	Hull	Engine	Other equipment	Electronics	Total
LFT>=12	36%	38%	24%	2%	100%
LFT<12	35%	38%	17%	10%	100%
Trawlers	46%	25%	27%	2%	100%
Passive gears	33%	39%	16%	12%	100%
Total	36%	38%	23%	3%	100%

Source: IREPA elaboration on survey data

As expected, the share of EEO assets (Engine, Electronics and Other) tends to decrease with the increasing of the hull's dimension.

Figure 7 is based on the experience got during the study. It shows that different approaches can be followed to arrive at conceptually same results. In the Italian case study, the method proposed for the estimation of price per capacity unit and valuation of tangible asset was based on historic prices of new vessels built in 1992, taken from the Italian Naval Register. This was the only available information in absence of other relevant prices as those related to insurance values and book values.

In fact according to the Italian Law, the hull insurance is mandatory only if the vessel's owner asks for a loan. In this case, lenders require mortgaged vessels to be insured at least to the amount owed by the lender. The hull policy is based on the market value as determined by a technical estimate usually made by the same experts who make the second hand market evaluation. In practice, very few vessel-owners stipulate an insurance policy and no more than two or three insurance companies accept to insure fishing vessels.

Also historic acquisition values are not available because in most cases vessels are received by inheritance. In addition in the Italian legislation, the most part of fishing firms are not required to draw up book records. Hence, book data are not available too.

For the other years included in the data sets (prior and following to 1992), the prices per capacity unit have been extrapolated from 1992 on the basis of the annual price change of Italian producer index for heavy machines. Nevertheless, the prices per GRT units here estimated are quite similar with those calculated by other countries for homogenous fleet segments.

[4] Authors wish to thank the "Aldo Palmisano International" ships brokering company which made available its databank.

Obviously, the proposed method is just a 'road map'. In fact, many evaluation methods can be used to arrive at an estimation of the price/CU and subsequently to the national capital value.[5]

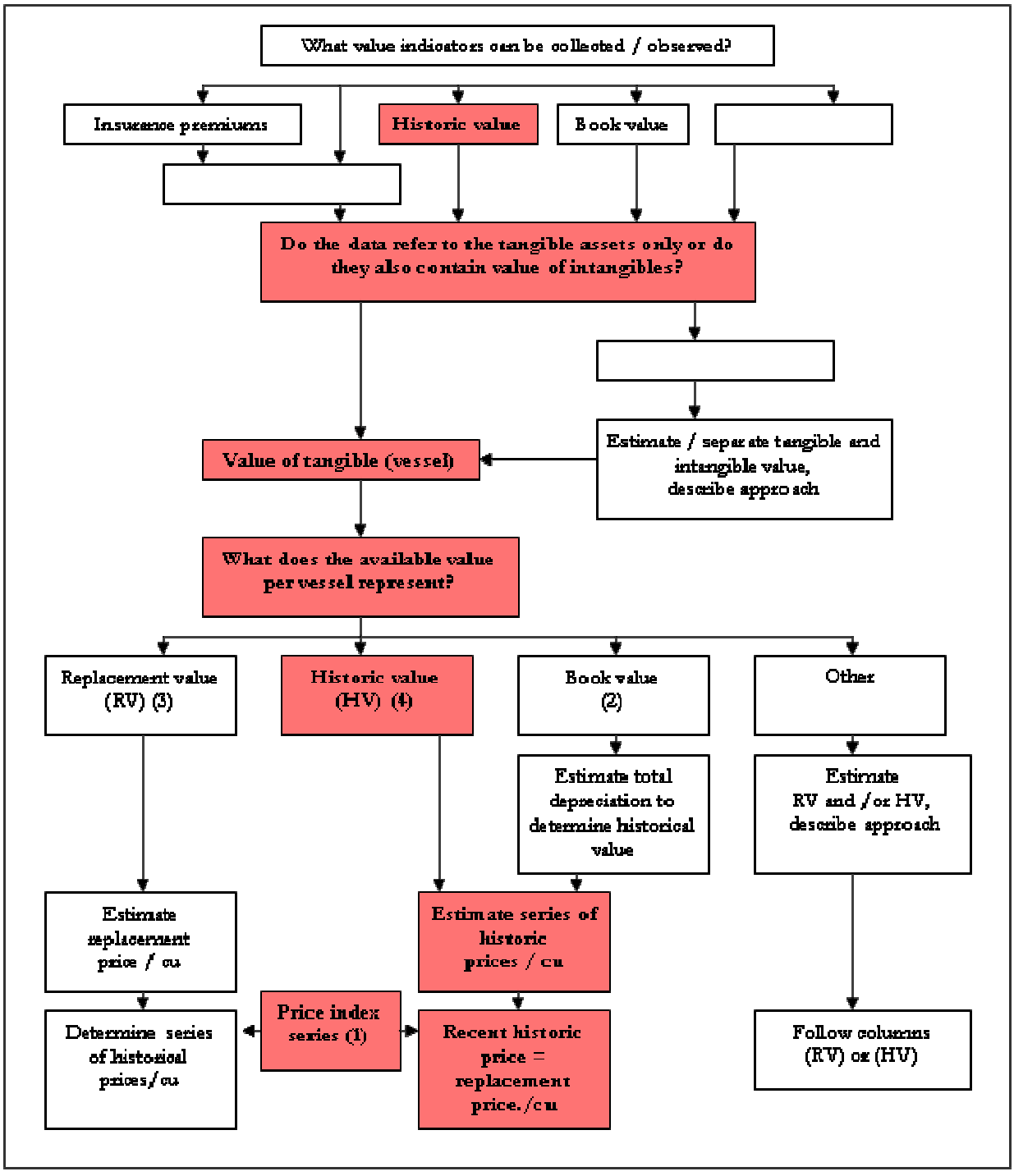

Figure 7 - Procedure for interpretation and estimation of price/CU. The Italian case.

[5] STECF/SGECA has recommended, in the Salerno meeting held I on 15-19 January, 2007, to organize a workshop to discuss specific national issues mainly concerning the estimation of price/CU.

4.2 Estimation of capital costs of Italian fleet

As for the second step, i.e. the estimation of the capital costs (depreciation and interests), taking into account what has been previously said concerning the micro and macro approach, the following inputs have been used:

- Age schedule and depreciation rates for each asset for both the macro (replacement) and the micro (historical) approach;
- Interest rates: government bonds;
- Interest paid: commercial rate.

Estimation of depreciation costs for the Italian fleet

In order to calculate consumption of fixed capital, i.e. depreciation, two different depreciation scheme and age schedules have been used: one for the macro approach and another for the micro approach.

The depreciation rates and the age schedule (or renovation time) for the macro approach are showed in table 5:

Table 5 – Depreciation rates and age schedule used within the macro approach

	Depreciation rates	Age schedule (renovation time)
Hull	7%	never
Engine	25%	10
Electronics	50%	5
Other equipment	35%	7

As far as the type of depreciation (i.e. the function), within the macro (economic) approach a digressive depreciation function has been used. This function leads to relatively high depreciation when the assets are still relatively new, but the value (also of very old assets) never becomes zero.

On the other hand, within the micro (fiscal) approach, it is recommended to use depreciation schedules set by the national tax laws. National laws usually follow a linear function.

The depreciation rates and the age schedule used for the micro approach are illustrated in the table 6.

Table 6 – Depreciation rates and age schedule used within the micro approach

	Depreciation rates	Age schedule (renovation time)
Hull	12.5%	never
Engine	31.5%	3
Electronics	20%	5
Other equipment	31.5%	3

Source: Italian fiscal laws. Ministerial Decree No. 31, January 1998.

The model has been conceived so that applying these schemes it generates the net fixed capital formation of each vintage. The sum of the vintage generates the total net capital stock and value of net capital stock by asset type.

On the other hand applying the depreciation rates to the gross capital stock by asset type it generates the depreciation costs of the current year.

Estimation of interest costs for the Italian fleet

The distinction between different analytical perspective has also been considered when estimating interest costs. As already said, while in the macro approach the interest costs should be considered as the opportunity costs of capital, within the micro approach interest costs are represented only by interest paid on loans. In case that data on paid interest are not available this would have to be calculated, using market interest rates for medium term loans (5-10 years). The interest rate must be applied to loans only, so that also information on debts or the solvability ratio (debt/total capital) is required.

In the estimation of interest cost for the Italian fishing fleet the following inputs have been used:

- Within the macro approach, interests have been estimated by using the 10 years government bond yields (as a measure for long-term interest rates). In 2005, this rate was equal to 3.56% for Italy (EUROSTAT).
- Within the micro approach, interests have been calculated by taking into account the rate of loan of fishermen (obtained by survey) and the commercial interest rate (medium term loans 3-5 years) applied to Agriculture, Fishery and Aquaculture customers. In December 2005 it was equal to 4.01% (Banca d'Italia).

5. Results

The output of the application of the PIM to the Italian data for 2006 (fleet situation at the end of year 2005) is showed in table 7. Figures are expressed in million €.

Table 7 – Capital value and capital costs for the Italian fishing fleet at 31/12/2005.

Fishing segments	Number of vessels	Tonnage (GT)	Macro approach			Micro approach		
			Net capital stock	Depreciation costs	Interest costs	Net capital stock	Depreciation costs	Interest costs
Beam trawlers	85	5.893	20.425.209	4.648.412	749.605	23.515.949	7.007.914	120.949
Bottom trawlers	2.874	121.027	422.687.947	94.267.207	15.512.648	532.994.035	156.341.080	2.741.340
Purse seiners	307	18.466	52.789.714	11.755.091	1.937.383	81.842.132	23.516.649	653.533
Pelagic pair trawlers	143	10.440	31.957.929	6.513.418	1.172.856	38.393.383	10.941.913	197.468
Dredges	706	9.326	40.575.303	9.347.124	1.489.114	53.959.830	16.492.922	8.409
Small scale	9.229	17.980	136.091.224	34.881.634	4.994.548	187.330.690	54.545.466	2.039.186
Polyvalent passive gears	331	4.242	21.805.345	5.157.474	800.256	27.343.824	7.729.833	297.651
Combining mobile and polyvalent passive gears	93	1.277	3.828.145	815.391	140.493	4.195.400	1.199.913	22.943
Long-lines	391	10.092	36.588.858	9.016.205	1.342.811	50.250.921	14.561.017	155.441
Oceanic fleet	23	12.502	58.300.413	10.865.909	2.139.625	65.304.739	18.614.680	357.122
TOTAL FLEET	**14.182**	**211.245**	**825.050.088**	**187.267.865**	**30.279.338**	**1.065.130.902**	**310.951.387**	**6.594.041**

Source: IREPA elaboration on different sources.

6. Conclusions

The methodology developed within the study represents a first step and a great advance in the fishery data collection for EU MSs. By mean of a standard procedure, it allows for a good comparability of data on the capital value of fishing fleets. In particular, the procedure developed within the study shows that conceptually equal results can be obtained through different approaches. In this respect, the proposed method can be considered a 'road map'. In fact, many evaluation methods can be used to estimate the price per capacity unit and subsequently the national capital value.

In the Italian context, the valuation of the Gross Capital Stock has been exclusively based on the construction indexes originally estimated in 1992. Therefore, a first step to improve the estimates of the capital values requires the updating of the construction indexes to the current year. In addition, these indexes do not distinguish by fleet's segments and vessel's age. Accordingly, a second step should consider these differences and estimate real investments and depreciations made by each vessel in the period considered. When possible other types of information, as those related to insurance premiums or to initial acquisition prices, should be collected.

Furthermore, other assumptions as those made on the composition of investments, on depreciation and interest calculation are determinant for the overall calculation of capital value. For this reason further estimates would greatly benefit from the collection of these relevant information from a larger sample of units, as well as from a test of the sensitivity of the estimates to variations in the assumptions.

Finally, even if the study has also investigated methodologies to evaluate intangible capital assets, no proper and unique methodology has been agreed upon. This is due, substantially, to the large variety of intangible assets existing in the fishery sector (from fishing license to ITQ, from permits to access rights, etc…) and also to the great lack of data on the market value of this type of capital assets. However, the comparison between the second hand market prices and the interviews to vessel owners proved to be a good starting point for the evaluation of non tradable fishing rights.

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