PGECON

WS on Capital value estimations

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Contents

Introduction 3

Terms of Reference of the workshop on capital value estimations 3

ToR 1. Present and discuss MS experiences in approaches and results from estimating fleet capital value and calculation of capital costs through PIM and alternative methods 3

Review progress since previous workshops 3

EUMAP requirements, definitions and methodologies 4

Conceptual framework - The adaptation of the PIM method to the fisheries sector 4

Utilization of the PIM validation model - training and improvements 9

TOR 2: Comparison of price per capacity unit applied by different MS and assumptions made on the PIM method (age schedules, depreciation schemes, depreciation rates, etc.) 10

Comparison of capital valuation in Baltic Sea region 10

Comparison of capital valuation in Mediterranean region 15

TOR3 Compare Economic analysis resulting from the use of different assumptions 18

ToR 4. Practical implementation of guidelines provided by SecFish WP 4 on the evaluation of intangible assets 21

Objectives 21

Achievements 21

Conclusions 25

Annex I - List of participants 27

Annex II - Capital data in the DCF: Some thoughts and questions (JRC presentation) 28

Annex III – MS implementation of the PIM: Finland and Lithuania examples 33

Annex IV – Presentation on: Capital Evaluation in Fisheries, theoretical background (some preliminary notes) 56

Annex V: Guidelines for the utilization of the validation model 67

Annex VI – Presentation on practical implementation of guidelines provided by SecFish WP 4 on the evaluation of intangible assets 77

Annex VII - Presentation on development of methodological measures for determining the value of quotas in Lithuania 88

Introduction

The workshop on capital value estimations was held in Salerno, Italy, during the week of the 7th-10th October 2019 with 24 experts (Annex I) representing 15 Member States and JRC. The meeting was moderated by Evelina Sabatella, Jarno Virtanen and Hans Van Oostenbrugge.

PGECON 2018 and PGECON 2019 considered the need of a workshop on best practices for calibrating the price per capacity unit for each MS and suggested the TORs reported in the following paragraph.

Terms of Reference of the workshop on capital value estimations

1. Present and discuss MS experiences in approaches and results from estimating fleet capital value and calculation of capital costs through PIM and alternative methods

2. Compare price per capacity unit applied by different MS and assumptions made on the PIM method (age schedules, depreciation schemes, depreciation rates, etc.)

3. Compare Economic analysis resulting from the use of different assumptions

4. Practical implementation of guidelines provided by SecFish WP 4 on the evaluation of intangible assets

ToR 1. Present and discuss MS experiences in approaches and results from estimating fleet capital value and calculation of capital costs through PIM and alternative methods

Review progress since previous workshops

The use of the PIM method for the evaluation of capital value and capital costs was introduced by the EC study No FISH/2005/03, Evaluation of the capital value, investments and capital costs in the fisheries sector. The study illustrated the PIM method as applied by OECD and proposed an adaptation for the fisheries sector.

In 2011, a workshop was organized in Naples to present and discuss MS experiences in approaches and results from estimating fleet capital value. In that WS, it emerged that only 5 MSs were applying the method suggested under the DCF (i.e. PIM method). It also emerged a strong heterogeneity among the applied methodologies and among the reference values (i.e. replacement, historical, etc…).

In 2013, a second WS was held in Goteborg to address again the application of the PIM method considering that several MS questioned the appropriateness of this method to assess the capital value and costs in the fishing sector.

In 2018, PGECON attempted again to review and compare the capital evaluation schemes applied by MS but it was considered more appropriate to convene an ad hoc WS that finally was organized in October 2019 (thereafter referred as 2019 WS_Capital).

Participants at the 2019 WS_Capital were asked to explain if PIM method is used in the different MS and what are the outstanding issues. It emerged that: a) PIM is still not applied by several MS; b) in some cases PIM is used to estimate the Gross Capital Stock but fiscal depreciation rates and functions are then applied to derive the Net Capital, thus resulting in a “mixed” approach. This review also highlighted that in most cases the PIM method is not used because the method is still not clear. Participants considered that the original study and the subsequent WS are not always consistent in the use of economic concepts and definitions.

***Conclusion 1*_Participants at the WS_Capital recommends to reformulate the entire conceptual framework in a more consistent structure and to provide guidelines with step-by-step approach.**

EUMAP requirements, definitions and methodologies

EUMAP requires MS to provide annual estimates by fleet segments of the following variables:

- value of physical capital
- consumption of fixed capital
- investments
- *total assets*

PGECON adopted the guidelines for the collection of socio-economic data that are regularly updated and available at: https://datacollection.jrc.ec.europa.eu/guidelines. These guidelines include definition&methodologies for the EUMAP variables.

The guidelines explicitly refer to the PIM method, however they also recommend to make use of *alternative methods* for the estimation of capital value of vessels when *accounting data* are available. This statement is reported in the guidelines, but no justification is given and no reference to any WS report is given.

The guidelines are of paramount importance considering that in the present EUMAP there is no obligation to apply the PIM method, as it was explicitly requested in the previous EU Decision 93/10 (even if it has to be noticed that the DGMARE guidelines for calculation of the balance indicators requires to use the PIM method for calculation of capital value and capital costs).

***Conclusion 2*_WS_Capital considers that the definition should be better clarified. References to alternative methods should be deleted to avoid misunderstanding of the concepts and subjective estimations.**

During the WS, a presentation from JRC discussed the use of capital data and highlighted the need to use an (the most possible) harmonized methodology (see annex *II)*.

Some examples of the application of the PIM were also presented by Finland and Lithuania (see annex III).

Conceptual framework - The adaptation of the PIM method to the fisheries sector

2019_WS_Capital made a deep review of the 2005 capital study and of the best practices formulated by the 2011_Naples_WS (reviewed by STECF 11_18).

This review highlighted the following points:

A. *Various approaches to capital valuation and use of different indicators are relevant depending on specific* ***analytical needs.***

The economic performance of fisheries can be assessed in two ways, which are different by definition: economic (macro perspective) or financial analysis (micro perspective). The main difference arises from the distinct treatment of capital costs. Financial analysis is based on explicit costs paid by enterprises, whereas in economic analysis, costs are based on the opportunity costs of production factors (Pokki et al., 2018[1]).

Macro perspective reflects the productive capacity of the assets and 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. The results should allow regular replacement of capital goods beyond the current generation. Calculation of capital costs is based on replacement value. It is proposed to use digressive depreciation scheme so that the residual value never reaches zero (2005 EC Study).

	Micro approach	**Macro approach**
Scope	Individual firm level	Sector and macro / society level
Type of analysis	Application fiscal accounting	Productive capacity
Time horizon	Economic life time of the capital good or firm	Indefinite
Value used	Historical value Depreciation schedules permitted by the national tax laws (usually a linear function)	Replacement value (current prices) Digressive depreciation

B. EUMAP requests MS to collect and report data to end users on capital values, investments *and depreciation costs based* ***on economic rather than financial analysis***

This statement is based on the actual use of capital variables for: i) the assessment of the economic performance of the fleets (AER); ii) the calculation of the profitability indicators in the "fleet report" to assess the long term economic sustainability.

2019_WS_Capital considers that the "value of physical capital" that is provided now is the net value (that is the gross capital stock minus cumulated depreciation). However, even the Gross Capital Stock could be a valuable information from an economic point of view. In national account systems, the Gross Capital Stock provides a measure of the full productive capacity of the assets (vessel and equipment).

2019_WS_Capital recognizes that one of the main reasons against the application of the PIM method is the evidence that depreciation costs calculated according to the PIM, are higher than the depreciation costs estimated using the fiscal approach. This is rather obvious if we consider the different analytical frameworks. This concern could eventually be overcome if both measures would be requested by the EUMAP.

[1] Pokki, H., Marine Policy (2018), https://doi.org/10.1016/j.marpol.2018.05.022

***Conclusion 3*_Recommendations of 2019_WS_Capital are reported in the following table:**

Table 1_ Recommendations of 2019_WS_Capital

Variable	Present in the EUMAP	Analytical use	Valuation model	Recommendations
Gross capital stock (replacement current value)	NO But MS has to calculate it to derive the variable "value of physical capital"	It informs on the full productive capacity of the assets (vessel and equipment)	PIM: assets are treated as **new** until they are retired	To be added in the EUMAP OR to be asked to MS on a voluntary basis
Net capital stock (depreciated replacement value)	YES: "value of physical capital" N.B.: the EUMAP does not define it. Only PGECON guidelines specify that this is the net capital stock	Values of all the fixed assets still in use. Net capital stock reflects the market value of the stock of fixed assets in the economy and as such provides an important indication of overall wealth of the fishing sector UNIT = VESSEL	PIM: Difference between gross capital stock and consumption of fixed capital calculated through digressive scheme with economic depreciation rates.	PGECON should revise the guidelines (definition and methodology) on the basis of the outcomes of the 2019_WS_Capital Changes to be discussed and approved by the 2020 PGECON
Depreciation costs	YES: "consumption of fixed capital" N.B.: the EUMAP does not define it. PGECON guidelines are misleading. But EWG 11-18 clarifies that: depreciation should be calculated using the digressive depreciation scheme based on capital values estimated using replacement values	Used to calculate the Net profit. Net profit is defined in the Annual Economic Report and it refers to the resource rent generated by the fleet, which is the ultimate indicator of economic sustainability.	Digressive scheme with economic depreciation rates	PGECON should revise the guidelines (definition and methodology) on the basis of the outcomes of the 2019_WS_Capital Changes to be discussed and approved by the 2020 PGECON
Fiscal depreciation costs	NO BUT: several MS provide "fiscal" depreciation costs under "consumption of fixed capital" and use them to calculate the net capital stock	It could be used to calculate net profit if the objective of the analysis is a financial analysis at the "firm" level	Depreciation allowed for tax purposes or the depreciation shown in business accounts	To be added in the EUMAP This inclusion will overcome concerns by certain MS regarding the use of depreciation costs in calculating the net profit
Investments	YES Gross investment in vessel and on-board equipment minus sales of (vessel and) on-board equipment.	The analytical use of this variable even within the AER is not clear.	PGECON suggests to use variables directly from survey. In case PIM method is used investment should be estimated from PIM method in order to ensure consistency with other variables.	PGECON should revise the guidelines (definition and methodology) on the basis of the outcomes of the 2019_WS_Capital Changes to be discussed and approved by the 2020 PGECON MS should include a comment when providing data specifying if investments are estimated through the PIM or from surveys

C. PIM implies evaluating the vessel (hull, engine, equipment, others) at replacement (current) value

The basic information to apply the PIM is the Price per Capacity Unit at current price. This is **the price of new constructed vessels**.

In case this price is not known, other values can be used as a starting point, but they have to be "adjusted". 2019_WS_Capital reviewed the best practices proposed by the 2011_WS and formulated the schemes reported in **Text Box A**. These schemes explain step by step how to obtain an appropriate PCU to be used as an input in the PIM method.

D. PIM implies using a digressive depreciation scheme

In the PIM framework, consumption of fixed capital should be estimated according to "economic" depreciation rates. Fiscal rates are indeed in most cases defined on the basis of political needs and are not related to the economic concept of "residual" productivity capacity.

It is not considered a best practice to mix the PIM method with fiscal depreciation schemes.

However, 2019_WS_Capital recognizes that "economic" depreciation rates are not easily available and therefore it could be important to understand which depreciation rates should be used. 2019_WS_Capital concluded that depreciation rates suggested by EC 2005 study should be used in case no alternative is available.

2019_WS_Capital also recommends experts to make an inquiry with the national statistical institutes to know which depreciation rates they are using. Another alternative is to use OECD standard (see Eurostat-OECD survey of national practices in estimating net stocks of structures[2]).

Conclusion 4_ Economic depreciation rates are linked to the service life of an asset. For this reason, 2019_WS_Capital considers that digressive depreciation scheme is appropriate for new or rather new vessels. Linear depreciation scheme should be preferred for very old vessels or for the other assets.

Conclusion 5_ Following a deep discussion and on the basis of the analysis of some results (see presentation in annex IV), 2019_WS_Capital concludes that a threshold should be considered also for the depreciation cost (for instance a 2.5% residual value as in the case of the value of the hull).

[2] https://ec.europa.eu/eurostat/documents/24987/4253483/Eurostat-OECD-survey-of-national-practices-estimating-net-stocks-structures.pdf

TEXT BOX A Estimating the PCU (GROSS CURRENT VALUE PER UNIT OF CAPACITY)

Case 1 _ Starting from the book value 1. Depreciated historical values obtained (Book values) 2. Estimation of the cumulated depreciation costs using the actual depreciation scheme used in accounts 3. Calculation of gross historical value (book value+cumulated depreciation costs) 4. Calculation of gross current value (price index*gross historical value) 5. Calculation of PCU by vessel segment (gross current value/GT)	**Case 3_Starting from the 2nd hand market price** 1. Depreciated historical values obtained (2nd hand market price) 2. Estimation of the cumulated depreciation costs using digressive depreciation scheme 3. Calculation of gross historical value (2nd hand value+cumulated depreciation costs) 4. Calculation of gross current value (price index*gross historical value) **5.** Calculation of PCU by vessel segment (gross current value/GT)
Case 2_ Starting from the insurance value *Note: knowledge of the valuation scheme used by insurance company is needed. If insurance fully covers the loss i.e new vessel, then it is already gross current value of a vessel. If insurance covers the value of used vessel (i.e. depreciated current value of a vessel) then the applied depreciation scheme is needed as reported here*: 1. Depreciated historical values obtained (insurance value) 2. Estimation of the cumulated depreciation costs using degressive depreciation scheme 3. Calculation of gross historical value (insurance value+cumulated depreciation costs) 4. Calculation of gross current value (price index*gross historical value) 5. Calculation of PCU by vessel segment (gross current value/GT)	**Case 4_Starting from the scrapping value** *Note: the scrapping value may reflect different prices:* *- If it is a value of a new vessel then it just reflects gross current value.* *- It may also include the value of fishing right (in terms of licence or licensed capacity)* *- if it is a value of an old vessel than you get an estimate of the historical gross value and you can apply the following steps:* 1. Depreciated historical values obtained (scrapping values) 2. Estimation of the cumulated depreciation costs using digressive depreciation scheme 3. Calculation of gross historical value 4. Calculation of gross current value (price index*gross historical value) **5.** Calculation of PCU by vessel segment (gross current value/GT)

Utilization of the PIM validation model - training and improvements

During the workshop, under Tor1, half a day was dedicated to a focus on the utilization of the PIM spreadsheet. The focus was shaped as a quick training to expert attending, in order to:

- improve the understanding of the original Master file, produced under the 2005 Capital study;
- illustrate recent improvements of the spreadsheet, carried out by Italian experts (NISEA).

All the files were uploaded, before the training, on the PGECON ftp, in order to allow people to be familiar with them in advance. Some example on Italian data were presented.

Guidelines on the utilization of the master file are reported in annex V. Recent improvements of the spreadsheet, carried out by Italian experts (NISEA), are also reported in annex V. The updated version of the validation model allows to estimate gross and depreciated capital values, as well as depreciation costs, for each single vessel of the fleet.

TOR 2: Comparison of price per capacity unit applied by different MS and assumptions made on the PIM method (age schedules, depreciation schemes, depreciation rates, etc.)

The objective here is to compare the gross capital value between similar fleet segments in different MS at regional level. Workshop worked with data provided by participants on capital valuation and assumptions behind that. Participants were asked to provide information of Price per Capacity Unit (PCU) by fleet segment and assumptions behind estimation of PCU:

- Price per Capacity Unit (PCU)
- Share of capital components (hull, engine, electronics, other equipment) in total value
- Service time and depreciation rate by asset type (hull, engine, electronics, other)
- Depreciation scheme
- Depreciation rates

Data provided allowed WS to compare the capital valuation (PCU and assumptions behind them) between MS regionally similar fleet segments in Mediterranean and Baltic Sea regions.

Comparison of capital valuation in Baltic Sea region

In the Baltic Sea region comparable data was available for Trawlers (TM2440) and small scale costal fishing from Latvia, Lithuania and Finland.

Finnish replacement value for is estimated applying PIM and PCU values based on insurance value of vessels (REFERENCE TOR 1 presentation). In the small scale coastal vessels, PCU is based on book values. Degressive depreciation scheme is applied in both cases.

Latvian capital valuation is currently based on vessel book value on companies bookkeeping information. However, Latvia plan to apply PIM value based on vessel decommissioning compensation laid by EU regulation. In the analysis here the gross capital value and PCU is estimated based on planned PIM valuation.

Lithuanian replacement value is estimated using PIM. Input data is used according to a pilot study made in 2017, by which depreciation rates, hull structure, renewal rates are based on those of real fishing companies (with minor adjustments) in Lithuania. Different rates are used for different segments. Prices per capacity for PIM are those of second hand value vessel, taken from bookkeeping accounts of companies, which represent real values of vessels during a specific time period. Bookkeeping values are historic values of vessels. Linear depreciation scheme is used in calculating replacement and depreciation values.

Comparison of capital valuation in the small scale coastal fishing

Here we compare the capital valuation in Finnish, Latvian and Lithuanian PG0010 segment. Latvian capital valuation is based on planned PIM valuation.

Depreciation schemes in PG0010 in Baltic Sea

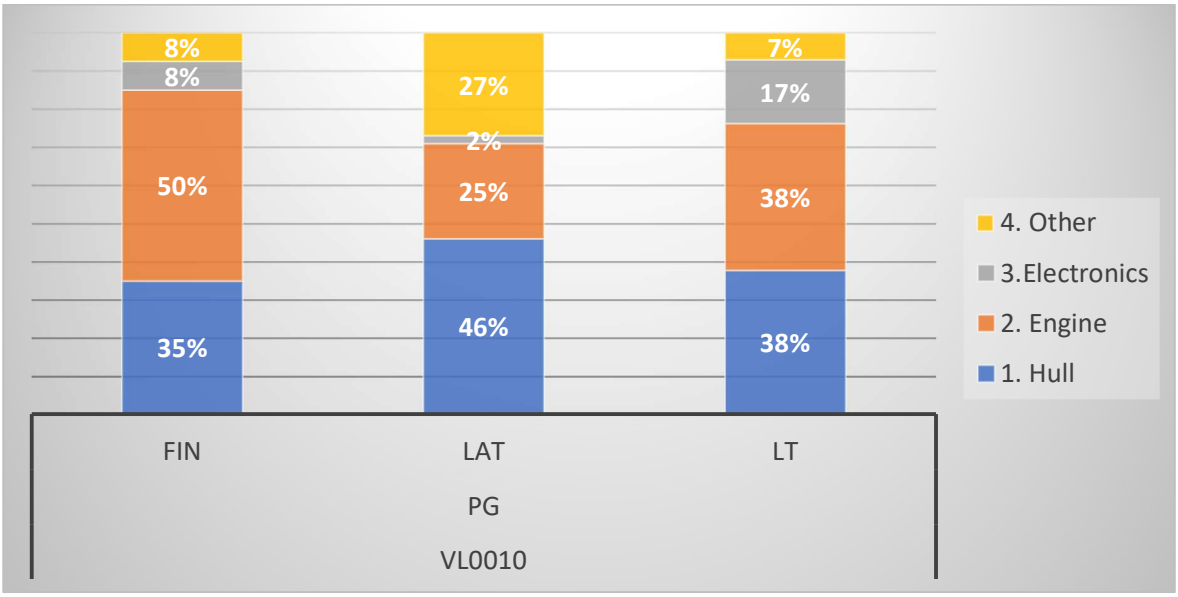


Figure 1. Share of assets of in SSCF PG0010 segments in studied countries.

Share of assets are reasonable similar in all countries (figure 1). In Finland share of engine is higher than in other MS and other asset share was higher in Latvian fleet.

		Country				
	FIN	LAT		LT		
Vessel part	Service life	Depreciation rate	Service life	Depreciation rate	Service life	Depreciation rate
Hull	Infinity	14 %	25	7 %	6	18 %
Engine	10	31 %	10	25 %	6	18 %
Electronics	5	52 %	5	50 %	0	
Other	7	41 %	7	35 %	0	

Table 1. Depreciation systems in in PG0010 in Baltic Sea.

Service life and depreciation schemes are similar in Latvia and Finland even though in Finland the hull is never replaced. Lithuanian depreciation scheme is shorter especially the hull. Lithuanian hull and engine are depreciated within 6 year service life in linear manner, electronics and other items are considered investments but costs. Because of that, vessel structure for Lithuanian PG0010 segment consists only of hull and engine, which have an equal share in total vessel value (50%). Also Lithuanian depreciation scheme is linear while Finland and Latvia has degressive scheme.

Price per Capacity Unit and Gross capital value

Finnish PCU is the highest and together with bigger vessels the replacement value (Gross capital value) of vessels significantly higher than that in Latvia and Lithuania. Lithuanian has lowest PCU.

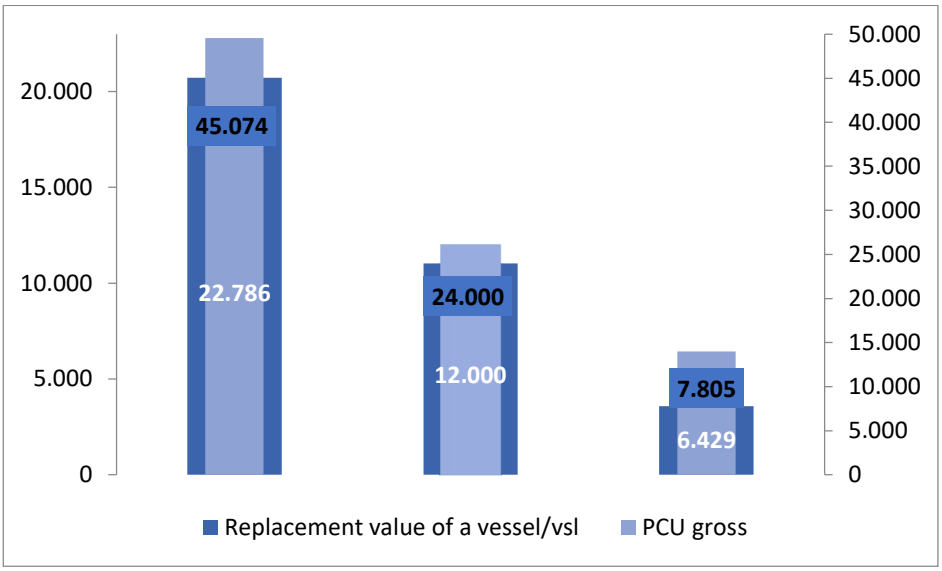


Figure 2: PCU and Replacement value of an average vessel in SSCF (PG0010) in Finland, Latvia and Lithuania.

Finnish PCU for SSCF is significantly higher than that in Latvia and Lithuania resulting higher replacement value (Gross capital value). Lithuanian and Latvian PCU are close to each other but bigger average Latvian vessels make the replacement value higher.

Conclusions on capital valuation in SSCF

The PCU are very different in the studied MS. Finland has by far highest PCU and replacement value of vessels. This may originate from the approaches in capital valuation but it may also indicate the difference in vessel armament and related prices.

Comparison of capital valuation in trawler segment

Depreciation schemes in TM2440 in Baltic Sea

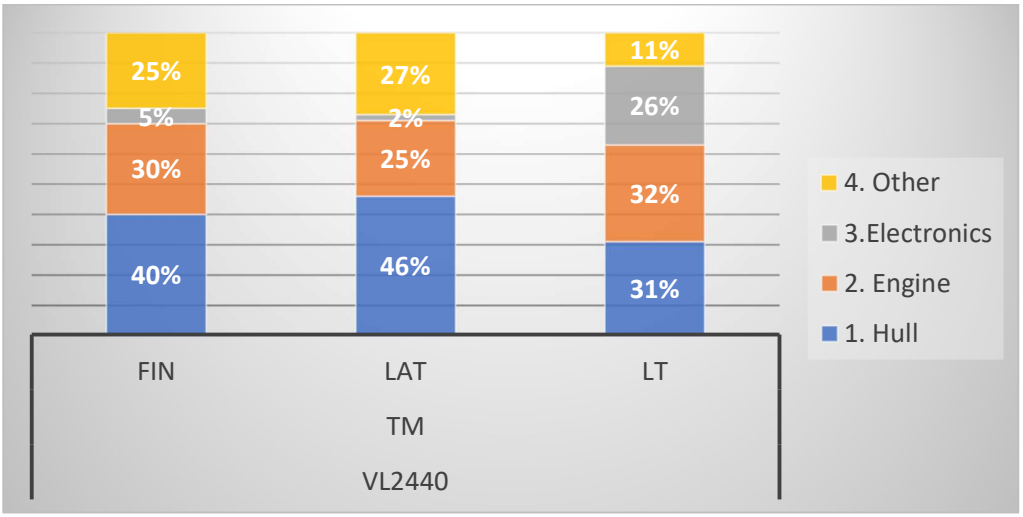


Figure 3. Share of assets of in TM 2440 in Finland, Latvia and Lithuania.

The figure 3 presents the share of different vessel parts in trawler segment. Hull accounts for a major part of replacement value of a trawler followed by engine. In Lithuania share of electronics is significantly higher than in Latvia and Finland where other equipment account for higher share.

	Country					
	FIN		LAT		LT	
Vessel part	Service life	Depreciation rate	Service life	Depreciation rate	Service life	Depreciation rate
Hull	Infinity	14 %	25	7 %	25	4 %
Engine	10	31 %	10	25 %	7	14 %
Electronics	5	52 %	5	50 %	6	17 %
Other	7	41 %	7	35 %	6	17 %

Table 2. Depreciation systems in in TM2440 in Baltic Sea.

Service life and depreciation schemes are quite similar in all countries except the hull that in Finland is depreciated for the entire lifetime. Lithuanian depreciation scheme is shorter for engine and other parts of a vessel, and is longer for electronics. Also, Lithuanian depreciation scheme is linear while Finland and Latvia apply degressive scheme.

PCU and Replacement value of trawlers

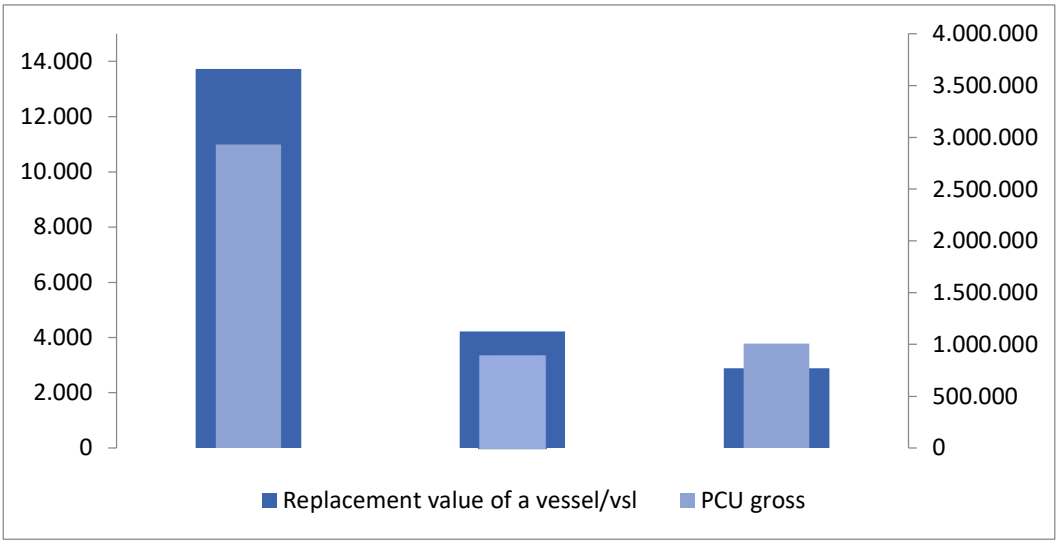


Figure 4. PCU and replacement value of an average trawler in Finland, Latvia and Lithuania.

Finnish PCU for trawlers is significantly - some three times - higher than that in Latvia and Lithuania. Together with bigger vessels the replacement value (Gross capital value) of Finnish trawlers is significantly higher than that in Latvia and Lithuania. Lithuanian and Latvian PCU are close to each other but bigger average Latvian vessels make the replacement value higher.

Conclusions on capital valuation in pelagic trawlers

Seemingly significant difference in replacement value is mostly influenced by different initial values that PCU estimates are based on; this has the biggest influence on calculating replacement value. Especially the initial value of vessel – current or historical – may affect the estimate of PCU. The differences in PCU may also indicate the difference in vessel armament and related prices. However, due to a limited participation of MS in this exercise, any substantial conclusions from comparing the results of MS are impossible.

Furthermore, despite the fact that the PCU and gross capital value varies a lot between MS the table 3 shows that depreciated replacement value of vessels per GT i.e. net capital value is more similar between studied pelagic trawler segments. It also shows that there is a large variation in net capital value per capacity unit between Baltic Sea trawler segments. However, with the information available at the workshop it was not possible to scrutinize if the variation originates from the approaches in capital valuation or differences in vessel armament and related prices. Evidently the service life and depreciation scheme influence the outcome of the gross capital value of the fleet. It should be noted that the trawler segments in the table include also other than pelagic trawler fleet segments.

country_co	fs_name	Sum of EUR/GT	Sum of totdeprep
DNK	DNK NAO DTS2440 NGI	10 001	103 608 577
POL	POL NAO TM 2440 *	5 971	41 392 110
DEU	DEU NAO DTS2440 NGI	3 635	7 895 655
DEU	DEU NAO TBB2440 NGI*	2 307	4 933 732
SWE	SWE NAO DTS2440 NGI*	3 276	48 443 635
LTU	LTU NAO DTS2440 NGI*	1 383	2 283 579
LTU	LTU NAO TM 2440 NGI*	1 864	4 173 351
FIN	FIN NAO TM 2440 NGI*	2 855	19 972 418
LVA	LVA NAO TM 2440 NGI	1 422	8 378 919

Table 3; Net capital value per capacity unit (GT) in Baltic Sea trawler fleets.

Comparison of capital valuation in Mediterranean region

Main differences and similarities among Mediterranean MS

The analysis focused on two fleet segments which were common across MS (Croatia, Cyprus, Greece, Italy and Slovenia):

- Vessels using polyvalent passive gears only (PGP) / Drift and/or fixed netters (DFN)- 06-12m.
- Demersal trawlers and/or demersal seiners - 18-24m.

Among the five MSs, only Slovenia does not use the PIM. In here, Slovenian assumptions are derived from a past attempt to apply the PIM and price per capacity unit are based on second hand market values.

All MSs except Greece use vessel tonnage for the price per capacity unit (gross register tonnage in the case of Italy). Greece uses length as capacity unit; however in here, for sake of comparison, Greek PCUs were converted from length to GT. Slovenia and Croatia PCUs were very similar. Similarly PCU of Italy and Cyprus showed similar pattern even Italian prices were higher. In all cases except Cyprus the PCU is lower for DTS compared to DFN/PGP. Indeed, the final value of the vessel shows economies of scale in the price per unit of evaluation that, generally, decreases with the increase in the overall dimensions of vessels.

Table 4: Prices per capacity unit (GT)

MS	DFN /PGP L0612	DTS VL1824	SOURCE	
HRV	8,241	5,432	Survey	average insurance costs/ market value by owner
GR	12,500	7,900	Survey	market value by owner
ITA	18,780	16,066	Survey	Ship building index
SVN	8,007	6,167	Survey	II hand market
CYP	14,380	14,380	Shipyard	price of a new vessel

For the estimation of the PCU (Price per Capacity Unit) in Croatia as reference values were taken average insurance costs (from the sample survey) per fleet segment. When insurance costs from the survey were shown as unknown data or had strange values, as the alternative was used second-hand market value which represents owner estimation.

The Greek PCU estimation is based on the survey that includes a question where fishers were asked to evaluate the price they would sell their vessel with and without the fishing license. Then, the median PCU value by fleet segment was used in applying the PIM methodology.
Italy used a price index taken form a survey of 1992 which distinguished vessels by gross tonnage and material of the hull. Finally, Cyprus got the information from national and Egyptian shipyards.

Concerning the depreciation scheme, Slovenia and Croatia used the same approach for depreciation (linear) while the other MS used the digressive. The same scheme is also applied for all assets.

Table 5: Depreciation scheme by MS and type of asset

MS	Asset	DFN /PGP VL0613	DTSVL1825
HRV	All Assets	linear	linear
GR	All Assets	digressive	digressive
ITA	All Assets	digressive	digressive
SVN	All Assets	linear	linear
CYP	All Assets	digressive	digressive

The shares of assets for the two selected segments are the same for Greece, Cyprus and Slovenia, while it differs between the segments for Italy and Croatia. When the shares are different, the hull has a larger share in the larger demersal trawlers compared to smaller vessels while the engine has higher share in the smaller fleet segment.
For Croatia the shares of assets by fleet segment are calculated on the basis averages of second hand market of hull, engine, electronics and other equipment and placed in relationship. Each variable which are under depreciation are divided with values of second hand market value.
In case of Cyprus and Italy, the information on the share of assets are derived from fishermen and also from administrative experience.

Table 6 : Share of asset of the total value of vessel by MS and type of asset

Fleet	MS	Hull	Engine	Electronics	Other
DFN /PGP VL0612	HRV	36%	21%	12%	31%
DTS VL1824	HRV	65%	16%	5%	13%
DFN /PGP VL0612	GR	36%	38%	3%	23%
DTS VL1824	GR	36%	38%	3%	23%
DFN /PGP VL0612	ITA	35%	38%	10%	17%
DTS VL1824	ITA	46%	25%	2%	27%
DFN /PGP VL0612	SVN	60%	20%	10%	10%
DTS VL1824	SVN	60%	20%	10%	10%
DFN /PGP VL0612	CYP	46%	25%	2%	27%
DTS VL1824	CYP	46%	25%	2%	27%

Finally, the general approach to depreciation rates is to apply the same assumption without distinguishing by fleet segment. For Italy and Greece, depreciation rates are the same used in the EU Study No FISH/2005/03.

Table 7 : Service life and Depreciation rate by MS and type of asset (in grey linear depreciation)

Asset	MS	DFN /PGP VL0612		DTSVL1824	
		Service life of an asset	Depreciation rate	Service life of an asset	Depreciation rate
Hull	HRV	25	4%	25	4%
Engine	HRV	10	10%	10	10%
Electronics	HRV	5	20%	5	20%
Other	HRV	7	16%	7	16%
Hull	GR	never	7%	never	7%
Engine	GR	10	25%	10	25%
Electronics	GR	5	50%	5	50%
Other	GR	7	35%	7	35%
Hull	ITA	never	7%	never	7%
Engine	ITA	10	25%	10	25%
Electronics	ITA	5	50%	5	50%
Other	ITA	7	35%	7	35%
Hull	SVN	20	5%	20	5%
Engine	SVN	4	25%	4	25%
Electronics	SVN	2	50%	2	50%
Other	SVN	3	35%	3	35%
Hull	CYP	never	7%	never	7%
Engine	CYP	25	10%	25	10%
Electronics	CYP	5	20%	5	20%
Other	CYP	7	15%	7	15%

In conclusion, although most Mediterranean MSs apply the PIM, the analysis showed that differences exist in terms of main assumption (mainly for depreciation scheme and rates). Some MSs applied the assumptions of the EU study in No FISH/2005/03 and, therefore further improvements in the validation method would be desirable. In order to improve the results of the estimations it would be also advisable to collect more information about the service life and gross value of investment of various asset classes i.e. price of new vessel and vessel parts.

TOR3 Compare Economic analysis resulting from the use of different assumptions

Introduction

Main objective here is to analyse the impact of different approaches and assumptions applied in different MS on the economic performance. First the concept of economic analysis with PIM approach was introduced presenting an article Comparison of economic analysis with financial analysis of fisheries: Application of perpetual inventory method to the Finnish fishing fleet (Pokki et al. 2018; see Appendix III). It proved that the economic and financial analyses for estimating the capital value and capital costs are different by definition leading to very different results of economic performance.

Baltic Sea

The profitability of the Baltic region trawlers TM2440 for Finland, Latvia and Lithuania are presented in the table 1. Note that the Latvian replacement value and related capital costs here are estimated based on the planned PIM valuation based on the scrapping value.

Table 8. Profitability of the trawler segments TM2440 in Finland, Latvia and Lithuania in 2017.

Country	Revenue /vsl	PCU gross	Replacement value/vsl	DepRepValue/vsl	Gross profits/vsl	%	CapCost_dep/vsl	%	Net profit/vsl	%
FIN	932 653	10 992	3 661 383	962 766	192 404	21 %	348 178	37 %	-149 185	-16 %
LAT	388 764	1 928	1 123 400	396 333	98 639	25 %	87 307	22 %	11 332	3 %
LT	287 495	3 776	769 274	427 624	-16 891	-6 %	44 994	16 %	-88 810	-31 %

Finnish trawler fleet generate highest revenue and gross profit but the high capital costs due to the high estimated capital value turns the fleet unprofitable indicating unsustainable segment in long term. Latvian fleet has highest gross profit margin and is profitable with the estimated capital costs related PIM method. Latvian capital costs related to financial statements were less than half of that with the PIM method. Regardless of low capital costs related to low capital value in Lithuania the fleet is making losses, but according to MS, reasons for negative net profits is because of bad performance of companies of that segment.

Table 10. Profitability of the SSCF PG0010 in Finland, Latvia and Lithuania in 2017.

Country	Revenue /vsl	PCU gross	Replacement value/vsl	DepRePValue /vsl	Gross profits/vsl	%	CapCost_dep/vsl	Cap costs	%	Net profit/vsl	%
FIN	6 100	22 786	45 074	11 078	2 436	40 %	3 492	3 423	56 %	-987	-16 %
LAT	6 060	12 000	16 501	16 501	624	10 %	1 507	1 512	25 %	-888	-15 %
LT	7 717	6 429	7 805	4 373	1 813	23 %	615	888	12 %	925	12 %

Also in SSCF the Finnish fleet creates highest gross profit but the high capital costs due to the high capital value turns the fleet unprofitable indicating unsustainable segment in long term (table 10). However, there are a large number of low active vessels and the active part of the small scale fleet is making good profits. Also, in Latvian fleet gross profits are not high enough to cover the capital costs. Low capital value in Lithuania result in low capital costs and the fleet is making profits.

General observations of capital costs

Outcome of comparing the impact of capital valuation to economic performance is self-evident: higher gross capital value with higher capital costs leads to reduced economic performance. However, there are also some considerations on application of PIM that impact the outcome of economic analysis. In here we present the outcome of applying degressive depreciation scheme and compare the results to a long term approach where the capital costs of assets are calculated as an annuity over the service life of the asset.

Figure 1 presents the simulated capital costs of an average Italian trawler IT DTS2440 (capital value estimated with given PCU together with the assumptions of service life and depreciation schemes) with degressive depreciation scheme and by using leasing cost approach. The leasing cost is calculated as an annuity cost of funding the assets (vessel parts) for the service life with the given opportunity cost (here 3.5%). Whereas the degressive depreciation scheme mimics the accounting approach and the real current value of the vessel, the leasing approach is more general describing the long term capital costs associated to capital invested in the fleet (over time).

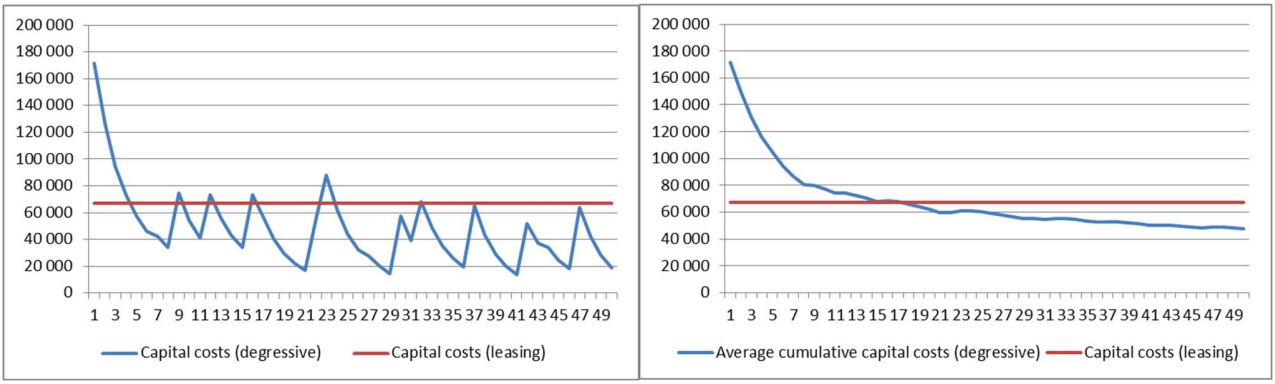


Figure 5. Annual capital costs of an average trawler (IT DTS2440) and related average cumulative capital costs (right)

The graphs illustrate the impact of depreciation scheme and the assumptions behind that. The capital costs are higher in the beginning using degressive method compared to lease costs that are same over the whole period. The hull is depreciated in longer term therefore the capital costs with degressive method decline towards to the end of service time of a vessel.

Depending on the service life and depreciation rate in time the capital costs with degressive depreciation scheme becomes lower than that with annuity of the lease cost. After 17 years the average cumulative capital costs starts to be lower than the annuity of leasing.

The depreciation rate in degressive depreciation scheme affects the speed of decline of capital costs of different assets. However, the assets other than hull with shorter service life lead to a replacement of an asset that leads to peaks in the in the capital costs. Therefore, the capital costs with degressive depreciation scheme jump up as a result of renewal of different vessel parts.

Related net profits are presented in the figure 6 below. The high capital costs with depressive method result a vessel making losses. In time the vessel starts making profits however the peaks in capital costs result dips in the profitability. In the example the vessel result show losses in 23rd year even the leasing cost indicate that the average vessel would be profitable in the long term.

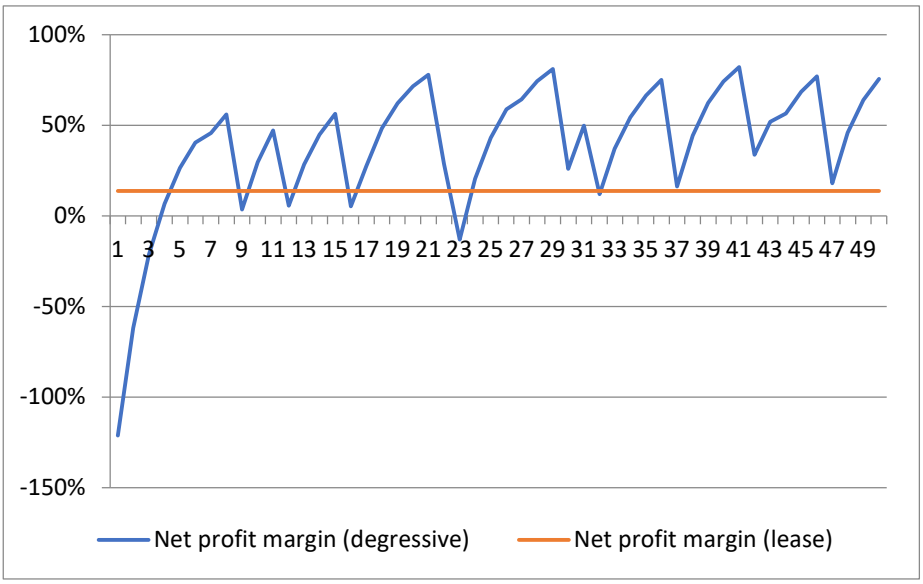


Figure 6. Annual Net profit margin with degressive and leasing capital costs

Conclusion

The recommended degressive depreciation method with different service life lead to peaks of the capital costs of a vessel that impacts the annual profitability. This could potentially lead to a situation that the economic profitability a fleet segment could fluctuate making profits and losses depending on renewal of different vessel parts e.g. engine. This fluctuation would diminish with large fleet segments where the age structure of vessels is evenly distributed. However, this may be an issue in fleet segment with few vessels with coincidence of renewal time of significant vessel parts i.e. engine. Then a fleet segment that would be economically sustainable in long term could result making losses occasionally indicating unsustainable fisheries. This possibility should be considered in analysis of long term sustainability.

ToR 4. Practical implementation of guidelines provided by SecFish WP 4 on the evaluation of intangible assets

Objectives

Fishing rights represent a valuable assets in many European fisheries, but so far, most MS do not estimate the value of the fishing rights or the valuation methods are not standardised. Therefore, the SecFish project has developed guidelines for the valuation of fishing rights under various circumstances that could be used as a basis for valuation of these rights in all MS. The aim of the workshop was to evaluate the practical applicability of these guidelines in various MS contexts and to draw conclusions on the applicability of the guidelines and advice on the use or further development needs for the guidelines.

Achievements

At the start of the meeting, the SecFish results and the guidelines were presented. In order to prepare for the discussion MS were asked before the meeting to apply and test the guidelines, but because of the short time for preparation there was little response to this request (1 MS). The results of this application were presented and discussed. Moreover, an estimation exercise was conducted at the meeting in which the experts could apply the guidelines for some specific fleet segments, based on their own data. In order to facilitate this an excel template with the calculation methods of the Discounted Cash Flow method (DisCF) was provided to the participants. This method can be used for the valuation of fishing rights in cases where these are not connected to the tangible assets. Based on this exercise and the groups expertise on economic data collection the group discussed the guidelines and their applicability in the contexts of the MS. First individual experts provided their individual views on the guidelines and their application by means of post its. There were grouped into main topics, which were discussed in subgroups. The resulted conclusions were presented to plenary.

Presentation Lithuanian case

A case study on the application of the guidelines for the Lithuanian fisheries was presented. ITQ's were introduced in Lithuania in December 2016, but so far no value of these fishing rights has been estimated. The presentation concerned a study presently undertaken to estimate the value of these rights. In order to estimate the (future) value to the fishing rights, two different approaches were used: data collection of market transactions of transferable quota, and an estimation of the rights by application of the Discounted Cash Flow method, based on modelled future economic performance of the sector. In order to do so, the costs and earnings were divided by the various species and segments and a forecasting model was developed for the economic variables. Based on this forecasting exercise, the value of the fishing rights was estimated using the Discounted Cash Flow method. Although the methodology is still under developments, provisional discussion points on the application of the DisCF were already shared:

- What are depreciation costs of quota?
- Wat is the lifetime of quota?

These issues were discussed in groups later in the meeting.

From the inventory of issues the following main topics of concern were identified:

- *Data collection versus analytic exercise*

The guidelines provide various methods to valuate fishing rights according to their characteristics. The DisCF has been tested during the WS and experts considered that it is a clear and simple method to be applied and could potentially be applied using input data available from the present DCF datasets. This raises the issue whether the valuation of the fishing rights could be carried out as an academic exercise or whether it should be part of the data collection.

The group concluded that the application of the DisCF is not a pure analytical exercise that could be implemented by any end user because:

- DCF fleet segments might not be the appropriate level for the analysis. For instance, in Italy a quota system is applied for tuna purse seiners, but these vessels are grouped in the "purse seiner" segment which also include vessel with non-quota species. Even the length class categories may not be an indicative level of aggregation for fishing rights valuation.
- Prices of quota species are very variable, and they are also linked to the vessel and the market at that moment. Input for the right expertise is therefore needed.
- Valuation of fishing rights is a sensitive exercise and estimations should be officially provided by MS and not calculated by end users.

Regarding the actual use of the DisCF, the following points must be considered which could be taken up in the guidelines:

- It would be appropriate to base the calculation on average values of 3 years, instead of considering only one year.
- The choice of the discount rate can have a big impact on the results. Therefore, discount rates may need to be country specific.
- Life time is also an important assumption. Similarly, in this case, it is not possible to define a common reference for all fisheries and MS because the life time should be decided according to the national rules that manage the fishing rights.
- Life time should not be too long (i.e. more than 20 years) because the decision on the level of investments usually consider a definite time interval.

According to the guidelines, DisCF cannot be used if the fishing right is attached to the vessel. However, if the capital costs are calculated only on the tangible asset (as it should be according to EUMAP and PGECON guidelines) than net profit is not affected by the value of the intangibles. In this case, DisCF could eventually be used also to valuate fishing rights attached to the vessel. In case the value of the tangible assets includes the value of the fishing rights, valuation of the fishing rights using the DisCF method will result in double counting their value and ultimately biases in the estimation of net profit.

- *Current economic performance vs. future economic performance in the Discounted Cash Flow*

Although the group recognized the usefulness of the application of the DisCF in the valuation of fishing rights, the group discussed that In case of application of the DisCF and the use of the resultant values, some theoretical issues should be considered. This mainly focusses around the uncertainty in the

indicative value of the current economic performance of the fisheries for the future performance and the use of net profit as the base for the DisCF method in specific fisheries.

The DisCF uses the net profit of the current year for estimating the value of future cash flows (or the value of fishing rights), however it does not take into account that the profit changes in time. When the characteristics of the fishing rights (i.e. Exclusivity:, Flexibility, Security, Permanence/duration: Transferability) are precisely defined it is fairly straightforward to derive main assumptions to calculate net present value of fishing rights with DisCF method and NPV is easily comparable with market value of a quota. E.g. If the fishing right is temporal (like in some MS) and correct life cycle and discount rate is applied, the DisCF gives accurate results, comparable to the market prices. Otherwise, when most of the actual characteristics are not available these assumptions cannot be checked. Furthermore, it is not possible to understand how much profitability is affected by the intangible rather than other factors. In conclusion, the DisCF method seems to work well only when fishing rights can be easily identified in its main features.

In addition, the current (or historical) economic profit does not necessarily describe the future economic performance very well for several reasons:

1. The results are very sensitive and depend on the assumptions on share of profit per fish species, life time and interest rate used
2. Current performance is not with the efficient fleet. In the long term the ITQ system should result an efficient fleet, but when the ITQ system is introduced, it might take several years for the sector to adapt.
3. Also the development of stock size and total quota should be considered. This is not the case in the current DCF example.

These uncertainties can only be resolved in case of an analytical approach is taken such as explained in the Lithuanian case study, forecasting economic performance by means of an economic model. Even then, future economic performance might be highly uncertain and dependent on external factors/events so that the resulting estimates of the values of fishing rights should be used with caution.

In many cases net profit is not the most appropriate indicator of the (short term) profitability for DisCF method, because it is negative. This is especially true in the small-scale fisheries. There are several reasons why net profit might not the appropriate measure for valuing the ITQ with DisCF method:

1. Fishing being secondary activity, it does not need to be economically profitable
2. Unpaid labor costs are theoretical/calculated (fishermen do not take them into account)
3. Capital costs in EU-MAP are estimated (PIM tends to overestimate the capital costs, fishermen do not take into account the PIM capital costs)

In the small-scale fisheries in some MS there are often other sources of income (than fisheries) they are not economically profitable, they still want to stay in the sector. This is a problem for applying the DisCF method. One reason for having negative net profit in small-scale fisheries could be also accounting for the unpaid labor costs. In addition, in small-scale fisheries the active part of the fleet has high profit, but the low activity vessels are making losses (due to high capital costs from PIM). In this case, using the net profit

from EU-MAP does not make sense. Inclusion of these additional considerations could enhance the applicability of the guidelines.

- *Distinction between tangible and intangible part of the assets*

Distinction between the tangible and intangible part of assets is of vital importance for both the valuation of the intangibles and the proper estimation of the net profit. As stated above, the estimation of capital costs will be biased in case the value of the tangible assets includes the value of the fishing rights. The guidelines provide guidance for this distinction but the implementation of the preferred method (hedonic regression) has not been tested for the workshop because of time limitations and the lack of data. The EWG suggested that this issue should be investigated further before formal use of the outcomes is possible.

Conclusions

TOR 1

Participants at the 2019 WS_Capital were asked to explain if PIM method is used in the different MS and what are the outstanding issues. It emerged that: a) PIM is still not applied by several MS; b) in some cases PIM is used to estimate the Gross Capital Stock but fiscal depreciation rates and functions are then applied to derive the Net Capital, thus resulting in a "mixed" approach. This review also highlighted that in most cases the PIM method is not used because the method is still not clear. Participants considered that the original study and the subsequent WS are not always consistent in the use of economic concepts and definitions. WS_Capital recommended to reformulate the entire conceptual framework (as presented in table 1 of this report) in a more consistent structure and to provide guidelines with step-by-step approach (as reported in text box A of this report).

WS_Capital stressed that EUMAP requests MS to collect and report data to end users on capital values, investments and depreciation costs based on economic rather than financial analysis. This statement is based on the actual use of capital variables for: i) the assessment of the economic performance of the fleets (AER); ii) the calculation of the profitability indicators in the "fleet report" to assess the long term economic sustainability

WS_Capital also recalled that PIM implies using a digressive depreciation scheme. In the PIM framework, consumption of fixed capital should be estimated according to "economic" depreciation rates. Fiscal rates are indeed in most cases defined on the basis of political needs and are not related to the economic concept of "residual" productivity capacity.

Finally, guidelines on the utilization of the master file are reported in annex V as weel as recent improvements of the spreadsheet. The updated version of the validation model allows to estimate gross and depreciated capital values, as well as depreciation costs, for each single vessel of the fleet.

TOR2

The PCU and value of gross capital value varies significantly between the studied fleet segments. This may originate from the approaches in capital valuation but it may also indicate the difference in vessel armament and related prices, but also the different concepts of initial vessel value (fiscal vs market value). By definition if the capital value relate to real capital costs in financial statements they differ from the PIM approach used in long term economic analysis of fisheries. Also the reference values for estimation of gross capital value affect the reliability of the estimate. Evidently the price of a new vessel would be ideal but as it is the case in most MS there are only a few if any new vessels that compel estimate the value of a new vessel based on alternative sources. However an effort should be made to acquire information of a new vessel including different vessel components.

In conclusion further investigations should be done in improving the valuation of gross capital value and service life of assets, and MS should put greater effort in trying to compare data at least by regional level. This is essential as reliable gross capital value and related service times of different assets would improve the transparency and comparability of capital costs and the results of the economic analysis of EU fishing fleets.

TOR 3

The recommended degressive depreciation method with different service life lead to peaks of the capital costs of a vessel that impacts the annual profitability. This could potentially lead to a situation that the economic profitability a fleet segment could fluctuate making profits and losses depending on renewal of different vessel parts e.g. engine. This fluctuation would diminish with large fleet segments where the age structure of vessels is evenly distributed. However, this may be an issue in fleet segment with few vessels with coincidence of renewal time of significant vessel parts i.e. engine. Then a fleet segment that would be economically sustainable in long term could result making losses occasionally indicating unsustainable fisheries. This possibility should be considered in analysis of long term sustainability.

TOR 4

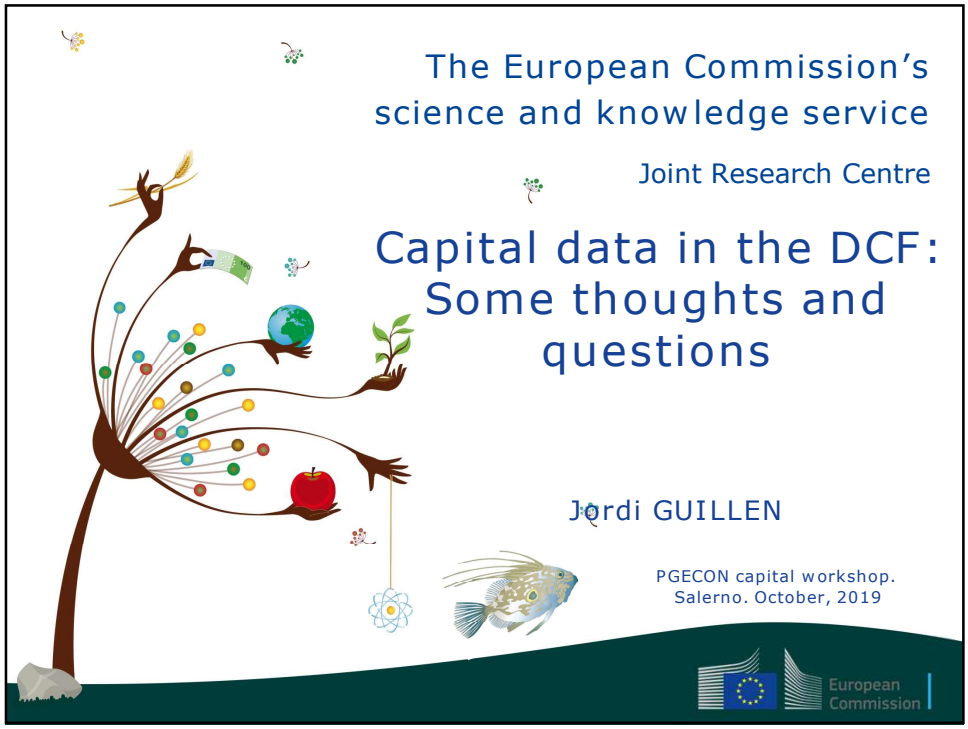
With regards to the implementation of the guidelines for the valuation of the fishing rights the WG concludes that:

- In general, the guidelines from the SECFISH project are understandable and clear enough to be implemented. However, The implementation of the guidelines would benefit from a few additions on:
    - It would be appropriate to base the calculation on average values of 3 years, instead of considering only one year.
    - The choice of the discount rate can have a big impact on the results. Therefore, discount rates may need to be country specific.
    - Life time is also an important assumption. Similarly, in this case, it is not possible to define a common reference for all fisheries and MS because the life time should be decided according to the national rules that manage the fishing rights.
    - Life time should not be too long (i.e. more than 20 years) because the decision on the level of investments usually consider a definite time interval.
    - The use of alternative economic indicators for the application of the DisCF method in case of SSF.
- MS should use the guidelines in the coming period, adapt them to the specific fisheries (in terms of the basic assumptions to be used) and provide estimation of fishing rights.
- Because some methods (like the hedonic model) require additional data collection, the MS WP should be adapted to include additional data collection, implement the actual additional data collection and apply the methods. This means that there would be a period of 2/3 years in order to get the final estimations on the basis of the methods proposed by the guidelines.
- After an implementation period of 2/3 years the outcomes of the exercise should be evaluated both at national scale (checked with vessels' owners to assess their reliability) and these experiences should be collected on a EU scale to possibly adjust the guidelines and progress on harmonization of the methods.

Annex I - List of participants

First Name	Surname	Institution
Edo	Avdic Mravlje	Fisheries research institute of Slovenia
Brian	Burke	Bord Iascaigh Mhara, Ireland
Suzana	Cano	DGRM (Portugal)
Elvira	Ciociano	Department of Economics and Statistics - University of Salerno (Italy)
Gianluigi	Coppola	Department of Economics and Statistics - University of Salerno (Italy)
Irina	Davidjuka	Institute BIOR, Latvia
Sergio	Destefanis	Department of Economics and Statistics - University of Salerno (Italy)
Monica	Gambino	NISEA
Jordi	Guillen	JRC
Myrto	Ioannou	Department of Fisheries and Marine Research (Cyprus)
Emmet	Jackson	BIM, Ireland
Emil	Kuzebski	National Marine Fisheries Research Institute, Poland
Janek	Lees	Estonian Marine Institute
Andrius	Linauskas	State enterprise Agricultural Information and Rural Business Center (AIRBC)
Angelos	Liontakis	Agricultural Economics Research Institute (Greece)
Loretta	Malvarosa	NISEA
Myrto	Miltiadou	Department of Fisheries and Marine Research (Cyprus)
Marie-Dominique	Minne	Ministry of agriculture and food, France
Heidi	Pokki	Natural Resources Institute Finland
Hans	Van Oostenbrugge	WECR, The Netherlands
Katrien	Verle	ILVO, Belgium
Jarno	Virtanen	Luke, Finland
Sabatella	Evelina	NISEA
Sabatella	Rosaria	NISEA
Svjetlana	Visnic	Ministry of Agriculture, Directorate of Fisheries, Croatia

Annex II - Capital data in the DCF: Some thoughts and questions (JRC presentation)



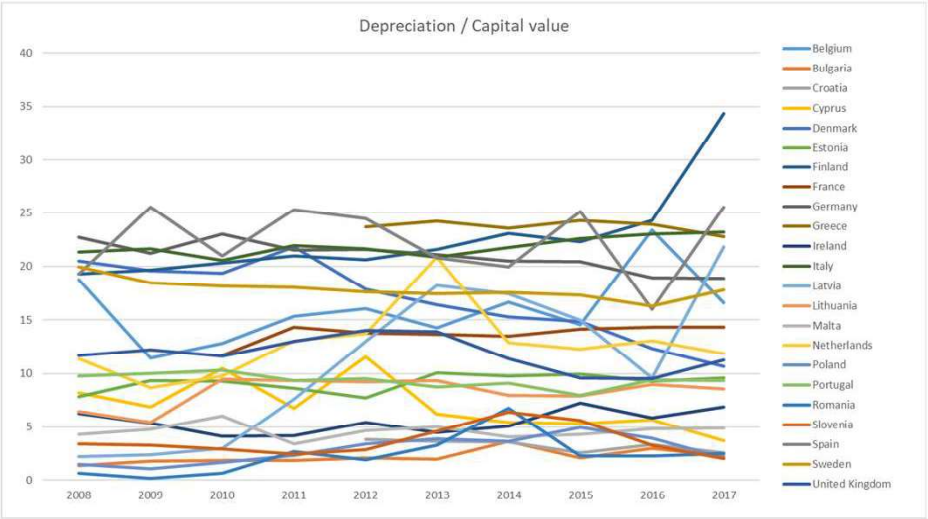
Why do we care about capital data?

- ✓ It appears in the AER! Better to have it right!?
- ✓ For policy purposes: harmonization is needed!
- ✓ Net vs Gross estimations: why is important to deduct the capital costs (depreciation + opportunity cost of capital)? Can and should opportunity cost of capital be negative (so increase profits)?
- ✓ Intangible assets value are important? How to get them right?

2

European Commission

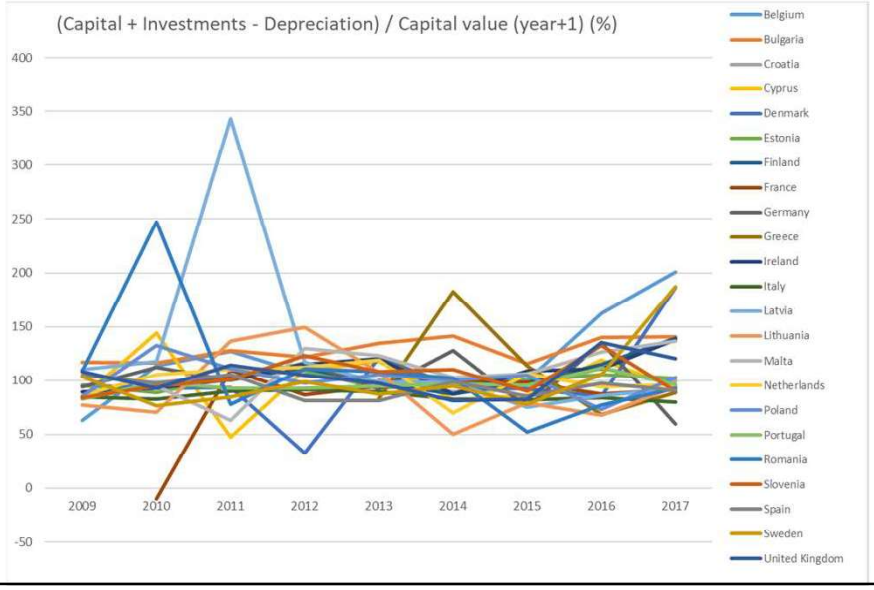
Depreciation / capital value (%)



3

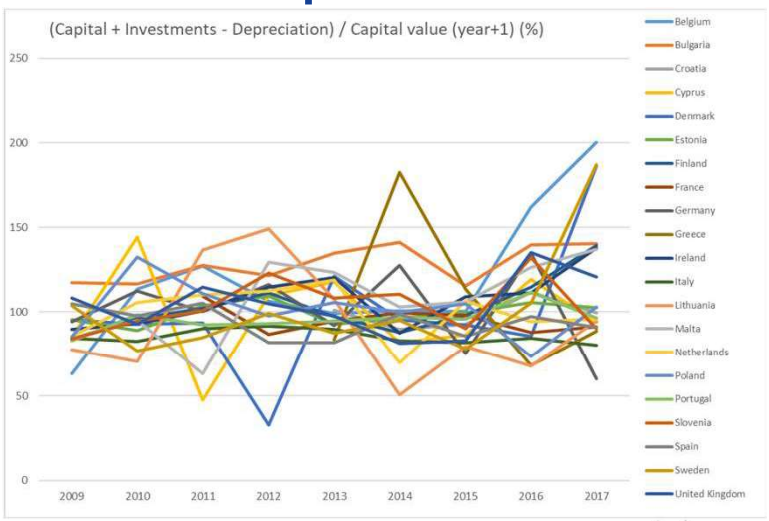
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(Capital + Investments - Depreciation) / Capital value (year+1)



4

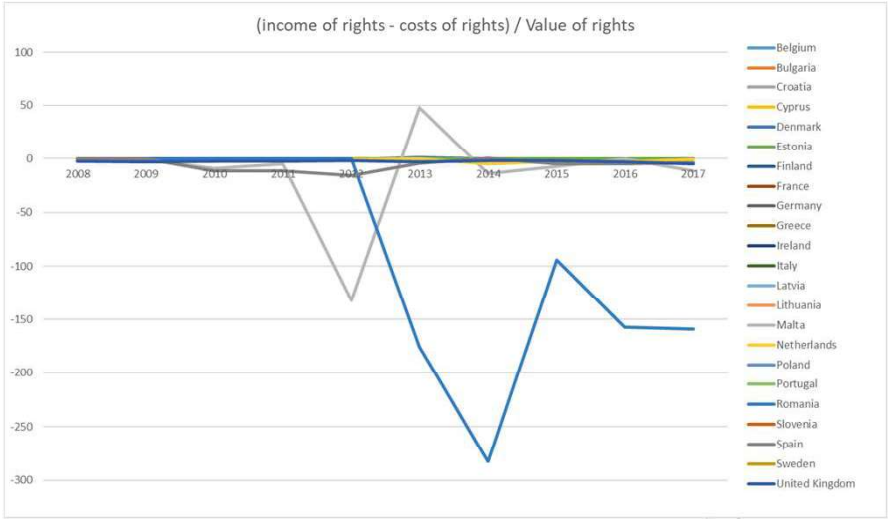
After deleting main outliers, variability persists



5

European Commission

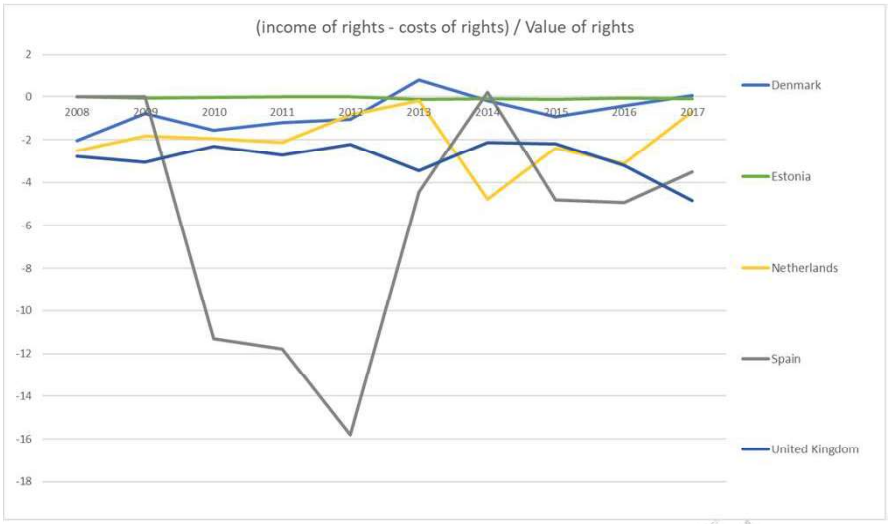
(income rights – costs rights) / Value rights



6

European Commission

After deleting two main country outliers, some variability persists with few countries



European Commission

Conclusions

- ✓ Few countries are reporting data on rights. Need of homogenous approach on the definitions too.
- ✓ Important to use an (the most possible) harmonized methodology.
- ✓ It is not for the AER per se. Is for policy purposes.
- ✓ Every time, economic advice is more considered.
- ✓ We can not get economic advice underused because of "wrong" data.
- ✓ AER is part of the image. If it is wrong, the economic advice becomes (it is perceived as) non-sense.
- ✓ "Outliers" may not be bad, if justified. Just maybe.

European Commission



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Application of the PIM in Finland

Natural Resources Institute Finland
Heidi Pokki

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Commercial fisheries in Finland profitable or not??

Gross profit 9.2 MEUR

Financial approach	Perpetual Inventory Method
Capital costs 5.5 MEUR	Capital costs 13.9 MEUR
Net profit 3.7 MEUR	Net profit -4.7 MEUR

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Composition of the Finnish fleet

- 1,850 vessels in the active fleet in 2013
- Mostly vessels under 12 meters using passive gears (97%)
- Average age of a vessel is 24 years

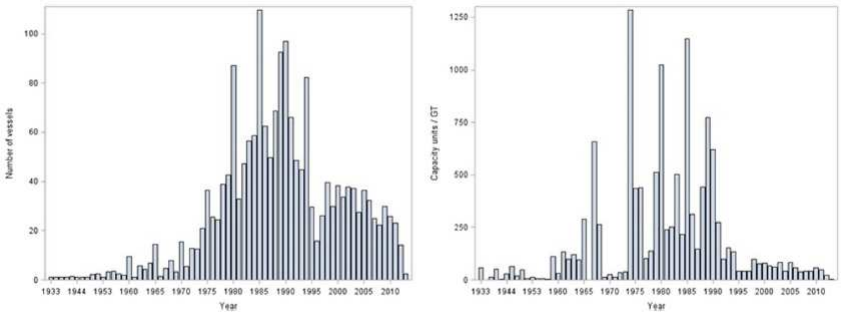


Fig. 1. Vintage distribution of the number of vessels and the capacity units (GT) of the Finnish fishing fleet (both active and inactive) in 2013.

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Estimating the price per capacity unit

- Difficult to obtain any price information!
- Practically no fishing vessels built in Finland
- only few vessels sold annually and no records

Data sources for vessel value:

1. **Book values** from account survey for vessels under 12 m (taking only vessels that are max 5 years old)

2. **Insurance values** for trawlers 12-24 m and 24-40 m (based on data from two fishing insurance associations)

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Assumptions used in PIM

	Service life (years)	Depreciation rates
Hull	Age of the vessel	14 %
Engine	10	31 %
Electronics	5	52 %
Other equipment	5	52 %

- Degressive depreciation scheme

Fleet segment	Hull	Engine	Electronics	Other Equipment
Vessels using passive gears, 0-12 meters	35 %	50 %	7.5%	7.5%
Pelagic trawlers, 12-24 meters	40 %	30 %	25 %	5 %
Pelagic trawlers, over 24 meters	40 %	30 %	25 %	5 %

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Estimating the PCU

1. Depreciated historical values obtained (Book values)
2. Estimation of the cumulated depreciation costs using degressive depreciation scheme
3. Calculation of gross historical value (book value+cumulated depreciation costs)
4. Calculation of gross current value (price index*gross historical value)
5. Calculation of PCU by vessel segment (gross current value/GT)

Fleet segment	PCU from insurance values (2013 €)	PCU from book values (2013 €)
Vessels using passive gears, 0-12 meters	28 446	21 588
Pelagic trawlers, 12-24 meters	14 161	
Pelagic trawlers, over 24 meters	10 592	

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Annual PIM estimation

1. Update the PCU with price index
2. Take active and inactive vessels from the vessel register (vessel segment, age of the vessel and capacity (GT))
3. Calculate the Depreciated Replacement value of each asset in a vintage

Dep. Rep. Value of asset=PCU*GT*(1-depreciation%)^age of asset

3. Calculate the total value of a vintage

Dep. Rep. value of vintage= sum of value of hull, engine, electronics and other equipment

4. Calculate capital value of the fleet by vessel segment (sum the value of vintages)

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Luke
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Thank you!

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State enterprise Agricultural Information and Rural Business Center (AIRBC)

Calculating capital value using yearly book-keeping values of vessel and comparing it to capital value calculated by using PIM

2018

Andrius Linauskas
Edvardas Kazlauskas

Calculating capital value using yearly book-keeping values of vessel and comparing it to capital value calculated by using PIM

The aim of the study:

1. **To calculate capital value using yearly book-keeping values of vessels collected from companies accounting books;**
2. **Tailor the existing PIM to Lithuania capital value calculation by:**
   - Collecting actual depreciation rates, used in Lithuania fleet companies;
   - Revising the calculation of PCU;
3. **Comparing the results.**

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

1.	Įmonėje taikomas laivų nusidėvėjimo skaičiavimo metodas[1]	☐ Tiesinis		☐ Dvigubo balanso (degresinis)		☐ Kitas			
Pakomentuoti, kodėl taikomas pasirinktasis turto nusidėvėjimo skaičiavimo metodas:									
2.	2.1. Nusidėvėjimo skaičiavimo parametrų[2] taikymas įmonėje / 2.2. Nusidėvėjimo skaičiavimo parametrų taikymas:	☐ Visiems įmonės laivams taikomi vienodi nusidėvėjimo skaičiavimo parametrai		☐ Atskiriems įmonės laivams, žvejojantiems skirtingais įrankiais (pelaginis tralas, dugninis tralas, statomasis / dreifuojantis tinklas), taikomi skirtingi nusidėvėjimo apskaičiavimo parametrai					
				Įmonei priklausančių laivų, žvejojančių skirtingais įrankiais, pavadinimai:					
		Nustatytas nusidėvėjimo laikotarpis metais	Metinė nusidėvėjimo norma %	Nustatytas nusidėvėjimo laikotarpis metais	Metinė nusidėvėjimo norma %	Nustatytas nusidėvėjimo laikotarpis metais	Metinė nusidėvėjimo norma %	Nustatytas nusidėvėjimo laikotarpis metais	Metinė nusidėvėjimo norma %
	☐ Visam laivui								
	Korpusui								
	Varikliui (įskaitant transmisiją ir sraigtą)								
	☐ Elektroninei daliai								
	Kitai denio įrangai (žvejybos įrankiams, kitai įrangai)								

1. Method of depreciation and reasoning behind it
2. Depreciation rates and age schedule

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

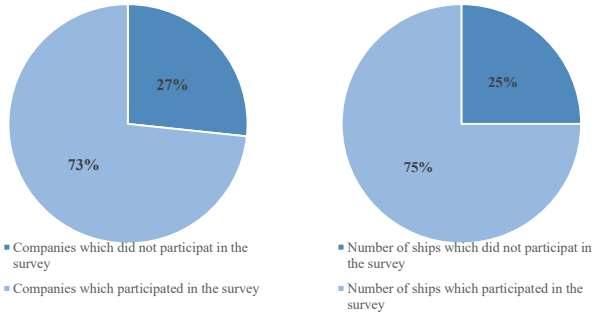
3.	Likvidacinės vertės nustatymas įmonėje: / Taikomi likvidacinės[3] laivo (-ų) vertės nustatymo būdai	☐ Visiems įmonės laivams likvidacinė vertė apskaičiuojama vienodai	☐ Atskiriems įmonės laivams, žvejojantiems skirtingais įrankiais (pelaginis tralas, dugninis tralas, statomasis / dreifuojantis tinklas), likvidacinė vertė apskaičiuojama skirtingai			
			Įmonei priklausančių laivų, žvejojančių skirtingais įrankiais, pavadinimai:			
	☐ fiksuota vertė, Eur					
	☐ dalis nuo įsigijimo vertės, proc.					
Pakomentuoti, kodėl taikomas pasirinktas likvidacinės vertės nustatymo būdas:						
4.	Buhalterinė vertė[4] 2016 m. pabaigoje, Eur. / Visas laivas ir (arba) atskiros jo dalys:		*Įmonei priklausančių laivų pavadinimai*			
	Viso laivo:					
	Korpusas					
	Variklis (įskaitant transmisiją ir sraigtą)					
	Elektroninė dalis					
	Kita denio įranga (žvejybos įrankiai, kita įranga)					
5.	Nuo laivo eksploatavimo pradžios atliktų kapitalinių remontų[4] pagal atskiras laivo dalis datos (nurodyti metus)	Korpusas				
		Variklis (įskaitant transmisiją ir sraigtą)				
		Elektroninė dalis				
		Kita denio įranga (žvejybos įrankiai, kita įranga)				

3. Residual value of depreciated vessel;
4. Yearly value of depreciated vessel at the end of the year;
5. Number of major repairs.

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

Survey results: size of the survey

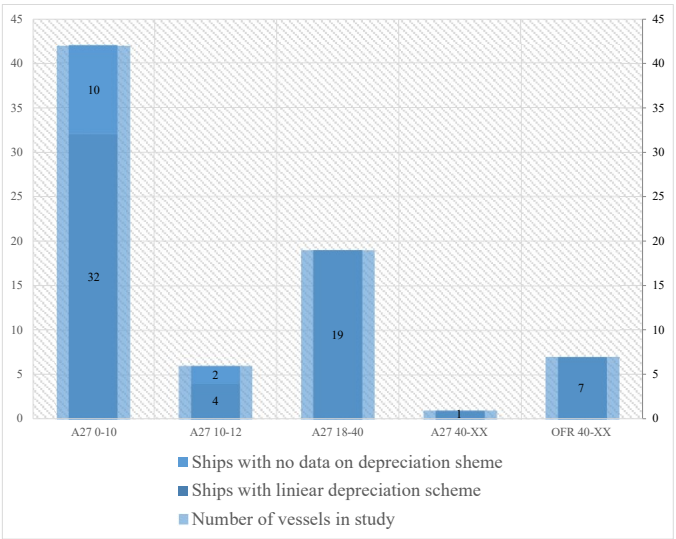


- Total number of companies in Lithuanian fleet – 75
- Total number of ships in Lithuanian fleet – 100

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

Survey results: 1. Method of depreciation

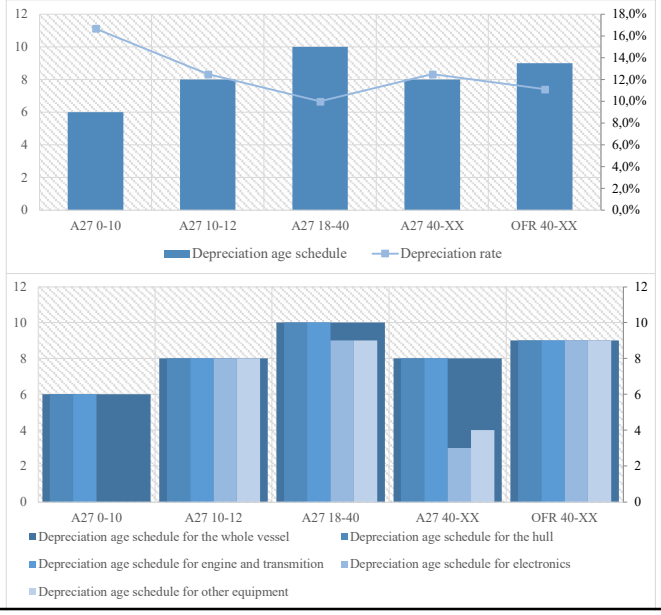


- 84 % vessels in the study use linear depreciation;
- 16 % vessels – no data on depreciation scheme;
- All vessels above 18 m. use linear depreciation scheme;
- 75 % of vessels below 18 m. use linear depreciation scheme;

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

Survey results: 2. Depreciation rates and age schedule

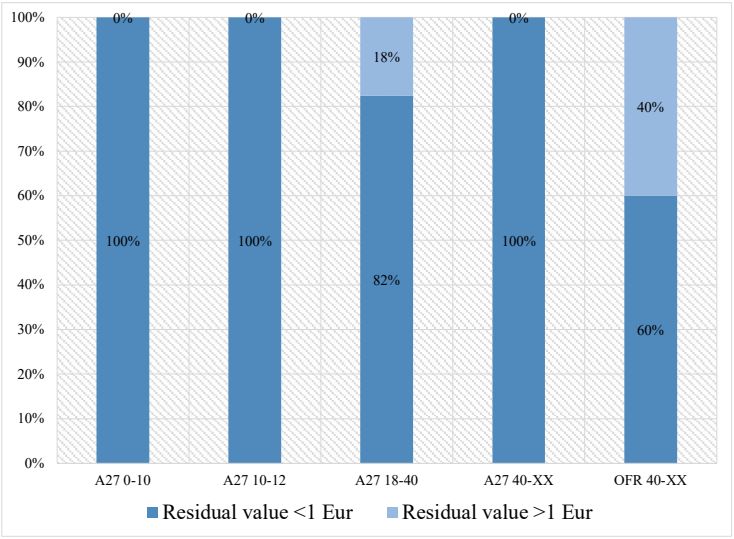


- % vessels with different detailed depreciation schemes:
  - A27 0-10 – 17%;
  - A27 18-40 – 32%;
  - A27 40-XX – 100%;
- In all cases, depreciation age of the whole vessel is equal to depreciation age of hull and engine;

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

Survey results: 3. Residual scrap value of depreciated vessel

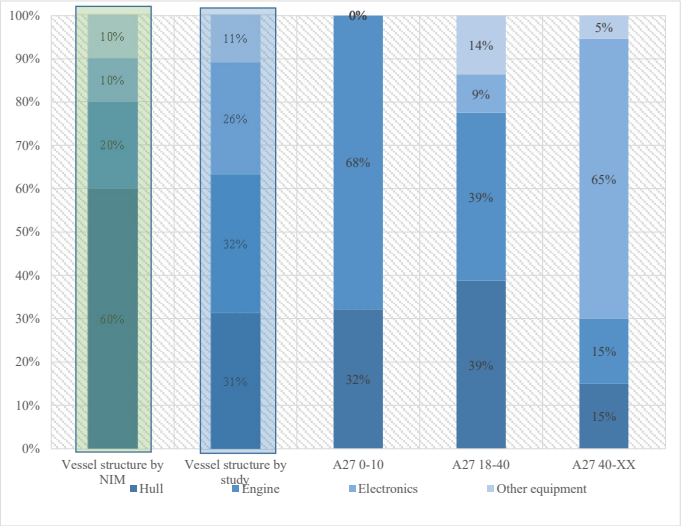


- 7 % of all vessels had a residual depreciated value of more then 1 Eur.

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

Survey results: 4. Residual value of depreciated vessel at the end of the year

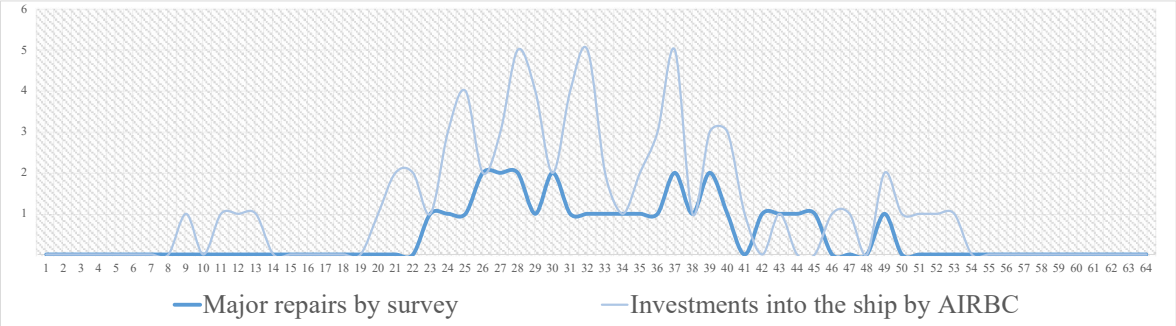


- 16% companies provided data on ship structure;
- Engine value is equal or greater then the hull values;
- Vessel`s electronics value is more than twofold greater than PIM;
- Further analysis is needed

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

Survey results: 5. Number of major repairs



- 10% of vessels have given data on major repairs by the study;
- 44% of vessels have given data on investments into the ships by AIRBC;
- 51 % Pearson correlation of data between AIRBC and the study;

Capital value calculation in Lithuania

0. Depreciation accounting methods in Lithuania fishing fleet companies.

Survey results: outcome

Segments	Vessel structure				Depreciation age				Residual value	
	Hull	Engine	Electronics	Other eq.	Hull	Engine	Electronics	Other eq.	Residual value%	Residualt value EUR
Proposed	60	20	10	10	25	10	5	7	2,5	
Vessel register	-	-	-	-	25	5	25	-	-	
A27 0-10	50	50			6	6		0		1
A27 10-12	31	32	26	11	8	8	8	8		1
A27 18-40	31	32	26	11	10	10	9	9	10	
A27 40-XX	31	32	26	11	25	8	8	8	10	
OFR 40-XX	31	32	26	11	25	9	9	9	10	

- Renewable vessel hull after the period;

Capital value calculation in Lithuania

1. Capital value calculation using yearly book-keeping values of vessels

CAPITAL VALUE using PIM = Book keeping end of the year values

PIM subtracts from new vessels accumulated depreciation and adds up investments throughout the life of the fleet to get capital value of fleet;

Depreciated book-keeping values represent the capital value of depreciated (including investments) fleet;

If there is a possibility to collect this kind of data, it should be perfect and easy way acquire capital value of the whole fleet.

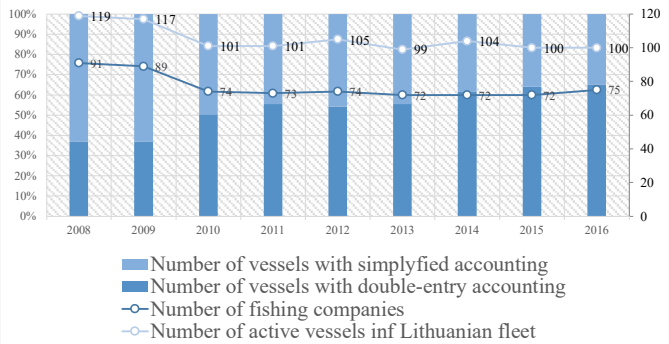
Capital value calculation in Lithuania

1. Capital value calculation using yearly book-keeping values of vessels

*** Not all companies are legally bound to gather data on vessel values**

Accounting practices in Lithuania differ for companies based on their size, legal structure and the aim of the company.

- Companies are required to apply a double-entry accounting and have to apply EU accounting practices (65% - 2016).
- Unlimited civil liability companies, residents who engage in individual activities that are not VAT payers, can choose simplified accounting.



Segments	Percentage of ships using double-entry accounting
A27 0-10	45%
A27 10-12	83%
A27 18-40	96%
A27 40-XX	100%
OFR 40-XX	100%
Total	65%

Capital value calculation in Lithuania

1. Capital value calculation using yearly book-keeping values of vessels

*** Not all companies are legally bound to gather data on vessel values**

*** Book-keepings are bound to the company, not the vessel** (MOD)

Average number of vessels per company:

2008	2009	2010	2011	2012	2013	2014	2015	2016
1,31	1,31	1,36	1,38	1,42	1,38	1,44	1,39	1,33

Recalculating companies end of the year values of all ships to separate values (MOD)

$$V_{B_i} = \left(V_{B_h} \times \frac{m_i}{M_h}\right) \times X_1 + \left(\frac{V_{B_h}}{T_h} \times (2 \times \bar{T}_h - T_i)\right) \times X_2$$

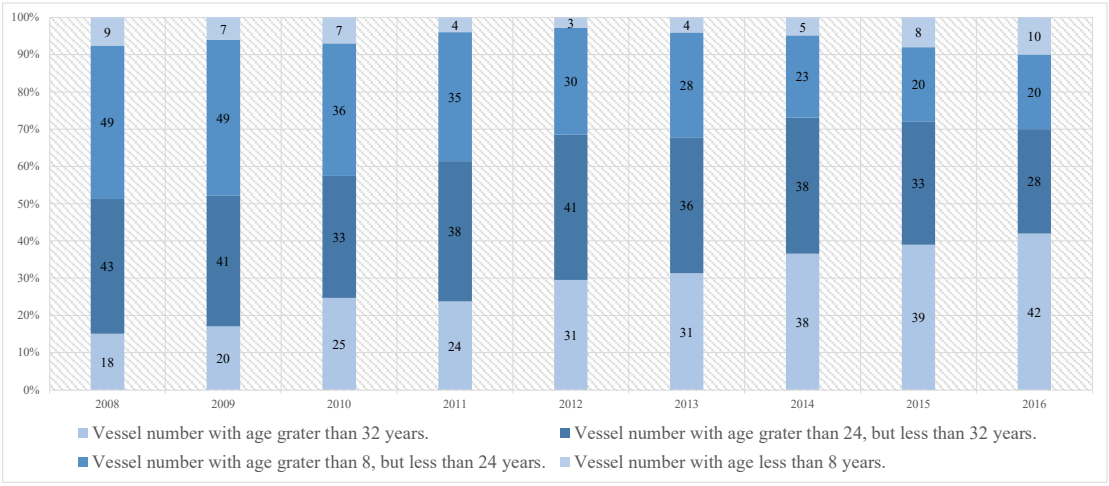
Capital value calculation in Lithuania

1. Capital value calculation using yearly book-keeping values of vessels

*** Not all companies are legally bound to gather data on vessel values**

*** Book-keepings are bound to the company, not the vessel** (MOD)

*** Vessel age – the newer the vessel, the better representation of value by accounts**



Capital value calculation in Lithuania

1. Capital value calculation using yearly book-keeping values of vessels

*** Not all companies are legally bound to gather data on vessel values**

*** Book-keepings are bound to the company, not the vessel** (MOD)

*** Vessel age – the newer the vessel, the better representation of value by accounts**

*** Depreciation age used not always represents the usage age of a vessel**

- To simplify accounting, one depreciation rate is chosen for the whole ship
- To manage taxes and money flows

Capital value calculation in Lithuania

1. Capital value calculation using yearly book-keeping values of vessels

*** Not all companies are legally bound to gather data on vessel values**

*** Book-keepings are bound to the company, not the vessel** (MOD)

*** Vessel age – the newer the vessel, the better representation of value by accounts**

*** Depreciation age used not always represents the usage age of a vessel**

*** Difficult modeling ways for unknown values of vessels** (MOD)

- Modeling unknown values includes reproducing the whole depreciation cycle, which requires:
  - Initial vessel purchasing price and date;
  - Depreciation rates for the vessel;
  - Investments into the vessel;

Gross vessel value − Gross depreciation + Gross investmens = NET vessel value

Capital value calculation in Lithuania

1. Capital value calculation using yearly book-keeping values of vessels

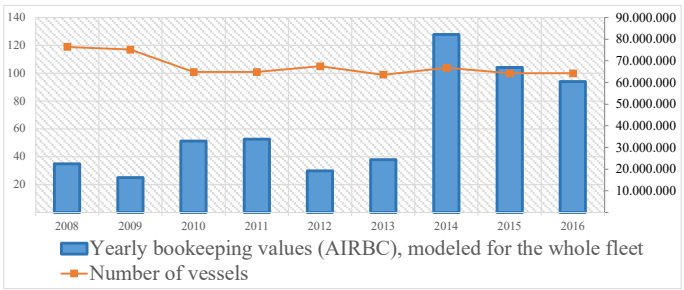
*** Not all companies are legally bound to gather data on vessel values**

*** Book-keepings are bound to the company, not the vessel** (MOD)

*** Vessel age – the newer the vessel, the better representation of value by accounts**

*** Depreciation age used not always represents the usage age of a vessel**

*** Difficult modeling ways for unknown values of vessels** (MOD)



- No possibility to gather all data on vessels in short term;
- Data may not represent true capital value;
- Requires extensive data modeling in short term;

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

1. Revising initial data for the calculation of PCU;
2. Collecting actual depreciation rates, used in Lithuania fleet companies;
3. Calculating capital value using modified PIM;

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

1. Revising initial data for the calculation of PCU

Data type	Data sources	Data availability	PCU data calculation
New vessel prices	Surveys, shipyards	Difficult to obtain	Medium (Modeling for current fleet)

- Most accurate data on new vessel values;
- Not biased by any kind of assumptions

- Data difficult to obtain;
- Observing's count low;
- Data should be recalculated for current fleet;

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

1. Revising initial data for the calculation of PCU

Data type	Data sources	Data availability	PCU data calculation
New vessel prices	Surveys, shipyards	Difficult to obtain	Medium (Modeling for current fleet)
Scrap value	Shipyards, metal purchasing places	- Average per tone	Easy (Modeling for current fleet)

- Only if there is no other possibility;
- Data easy to obtain;
- Easy to recalculate for current fleet;

- Least accurate data;
- Data should be recalculated for current fleet;

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

1. Revising initial data for the calculation of PCU

Data type	Data sources	Data availability	PCU data calculation
New vessel prices	Surveys, shipyards	Difficult to obtain	Medium (Modeling for current fleet)
Scrap value	Shipyards, metal purchasing places	- Average per tone	Easy (Modeling for current fleet)
Second hand selling prices	Surveys, shipyards, retail analysts	Possible to obtain (119 vessels.)	Medium (Modeling for current fleet)

- Reasonably easy to obtain;

- Could include intangibles, market conditions, revenue for the seller;
- Data should be recalculated for current fleet;
- Estimation of new vessel price

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

1. Revising initial data for the calculation of PCU

Data type	Data sources	Data availability	PCU data calculation
New vessel prices	Surveys, shipyards	Difficult to obtain	Medium (Modeling for current fleet)
Scrap value	Shipyards, metal purchasing places	- Average per tone	Easy (Modeling for current fleet)
Second hand selling prices	Surveys, shipyards, retail analysts	Possible to obtain (119 vessels.)	Medium (Modeling for current fleet)
Second hand or new purchasing prices	AIRBC	63%	Medium (modeling only for missing vessels)

- Easy to obtain;
- Represents actual vessel price without revenue for the seller;

- Could include market conditions;
- Data should be recalculated only for the unknown values of vessels;
- Estimation of new vessel price;
- Historic prices;

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

1. Revising initial data for the calculation of PCU

Data type	Data sources	Data availability	PCU data calculation
New vessel prices	Surveys, shipyards	Difficult to obtain	Medium (Modeling for current fleet)
Scrap value	Shipyards, metal purchasing places	- Average per tone	Easy (Modeling for current fleet)
Second hand selling prices	Surveys, shipyards, retail analysts	Possible to obtain (119 vessels.)	Medium (Modeling for current fleet)
Second hand or new purchasing prices	AIRBC	53%	Medium (modeling only for missing vessels)

Length segment	Vessel buying information			Vessel selling information			Difference, proc.	
	PCU, Eur/t	Vessel number	Average age	PCU, Eur/t	Vessel number	Average age	PCU	Vessel number
A27 0-10	2264	29	24	9763	6,00	13	331%	-79%
A27 10-12	3024	4	33	9247	2,00	17	206%	-50%
A27 18-40	1763	20	37	3260	60,00	29	85%	200%
A27 ir OFR 40-XX	2903	10	29	2770	44,00	29	-5%	340%
TOTAL	2819	63	28	2877	119,00	28	2%	89%

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

1. Revising initial data for the calculation of PCU

Data type	Data sources	Data availability	PCU data calculation
New vessel prices	Surveys, shipyards	Difficult to obtain	Medium (Modeling for current fleet)
Scrap value	Shipyards, metal purchasing places	- Average per tone	Easy (Modeling for current fleet)
Second hand selling prices	Surveys, shipyards, retail analysts	Possible to obtain (119 vessels.)	Medium (Modeling for current fleet)
Second hand or new purchasing prices	AIRBC	63%	Medium (modeling only for missing vessels)
Book-keeping end of the year prices	AIRBC	65%	Hard (modeling only for missing vessels)

- Easy to obtain;
- Represents actual vessel depreciated value at current time;

- Data should be modeled for the unknown values of vessels;
- Modeling process is difficult and requires additional data;
- Does not represent market value;

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

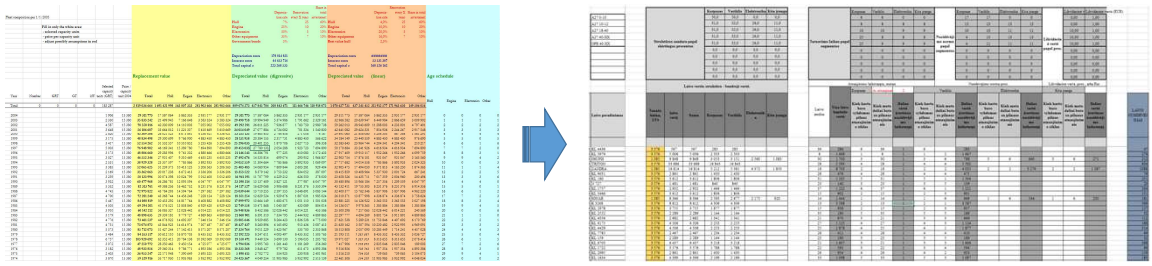
2. Collecting actual depreciation rates, used in Lithuania fleet companies

Segments	Vessel structure				Depreciation age				Residual value	
	Hull	Engine	Electronics	Other eq.	Hull	Engine	Electronics	Other eq.	Residual value%	Residualt value EUR
A27 0-10	50	50			6	6				1
A27 10-12	31	32	26	11	8	8	8	8		1
A27 18-40	31	32	26	11	10	10	9	9	10	
A27 40-XX	31	32	26	11	25	8	8	8	10	
OFR 40-XX	31	32	26	11	25	9	9	9	10	

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

3. Calculating capital value using PIM

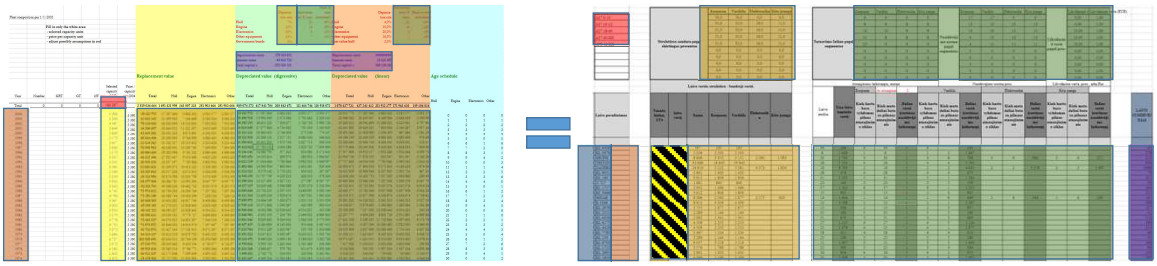


- Segments by length;
- Different depreciation schemes for different segments;
- Different initial values (PCU or vessel value) for different vessels within a segment;
- Capital value is still calculated by length/gear segments;
- Removing confidentiality issues;
- Possibility to change segments without recalculating for the whole fleet;

Capital value calculation in Lithuania

2. Tailor the existing PIM to Lithuania capital value calculation

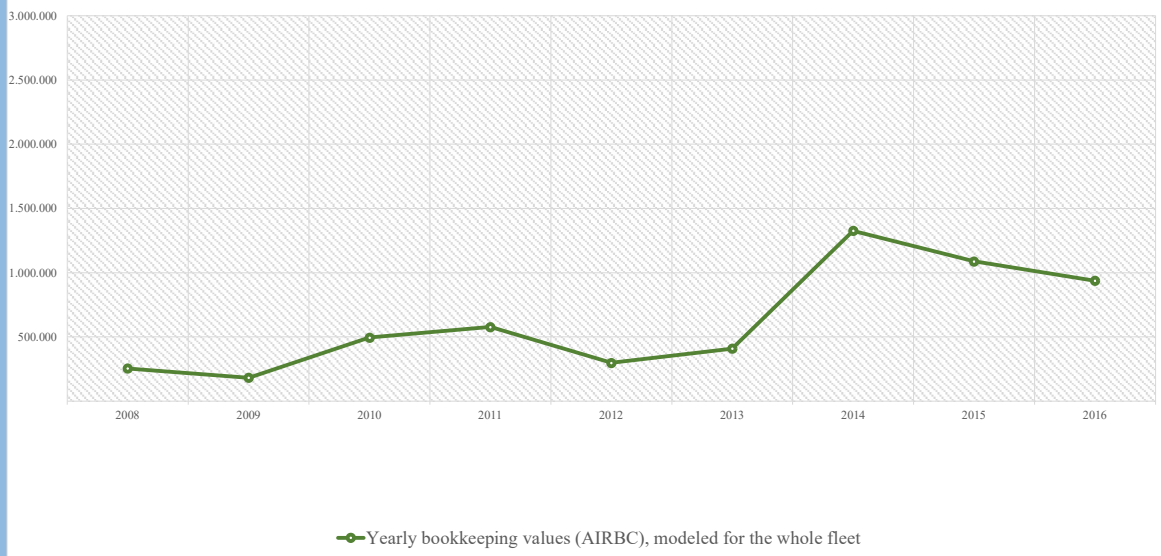
3. Calculating capital value using PIM



- Capital value calculated for one segments **VS.** Capital value calculated for the whole fleet per segment;
- PCU is for one segment **VS.** PCU is for all segments;
- Segment's by age **VS.** separate vessels with age information;
- PCU per segment **VS.** PCU per ship;
- Capital value by segment **VS.** Capital value by vessel by segment;
- Depreciation by segment **VS.** Depreciation by vessel by segment;

Capital value calculation in Lithuania

3. Comparing the results



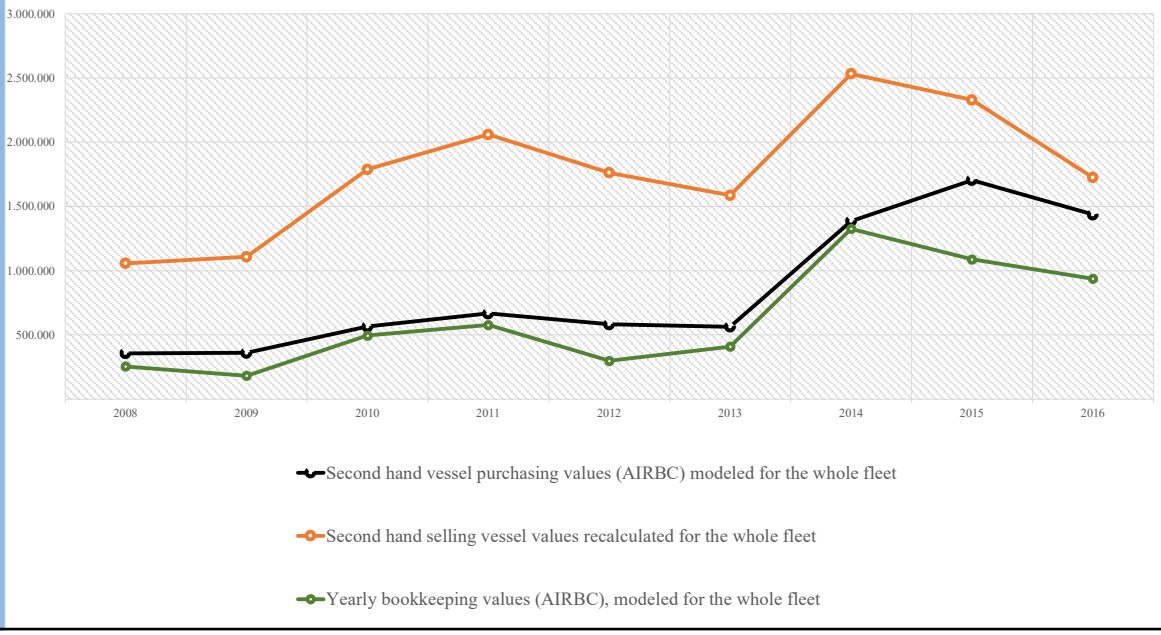
Capital value calculation in Lithuania

3. Comparing the results



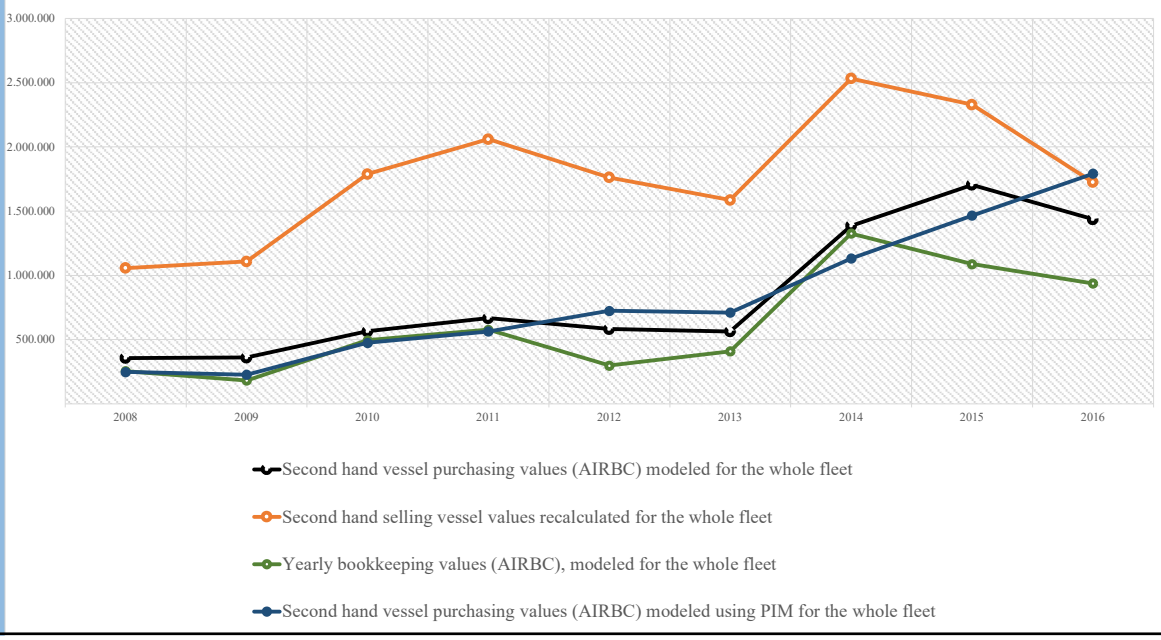
Capital value calculation in Lithuania

3. Comparing the results



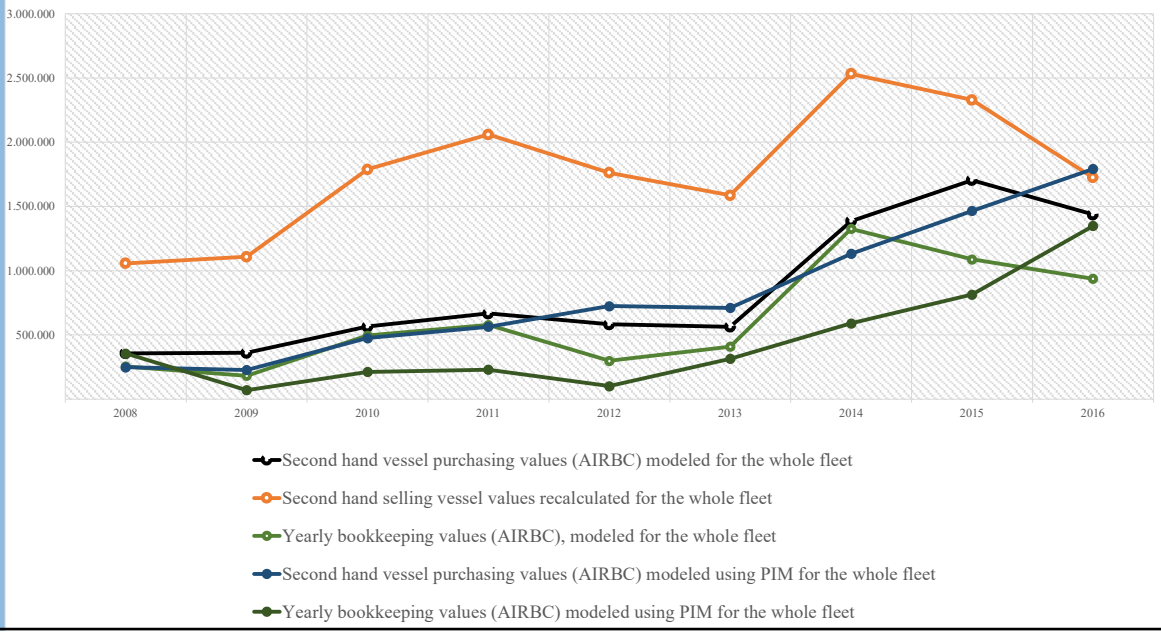
Capital value calculation in Lithuania

3. Comparing the results



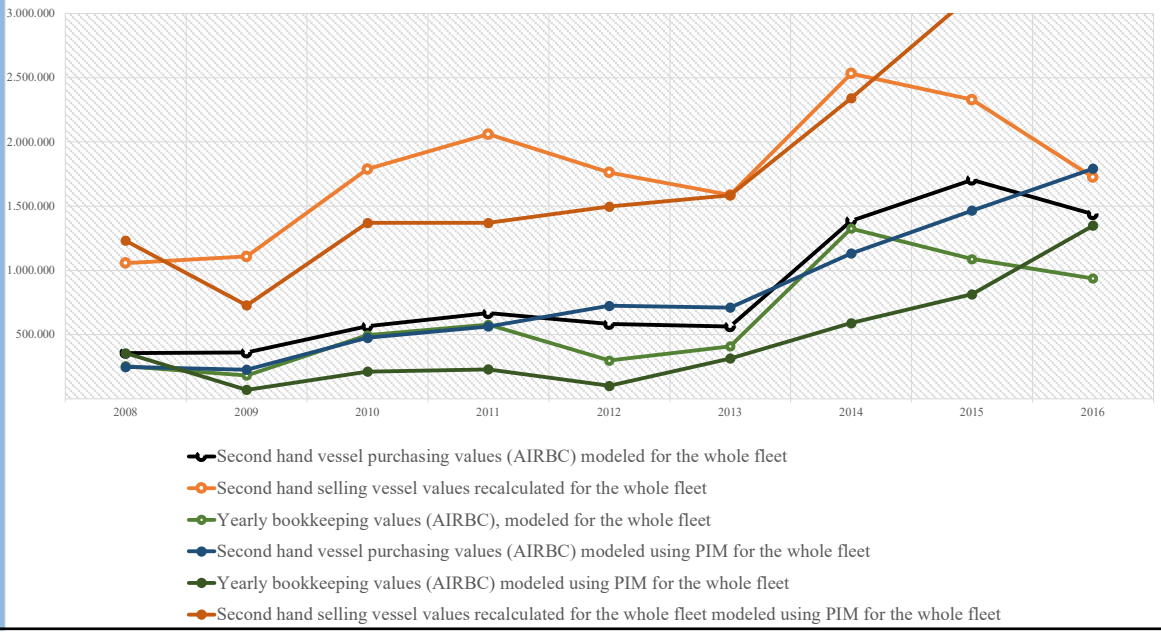
Capital value calculation in Lithuania

3. Comparing the results



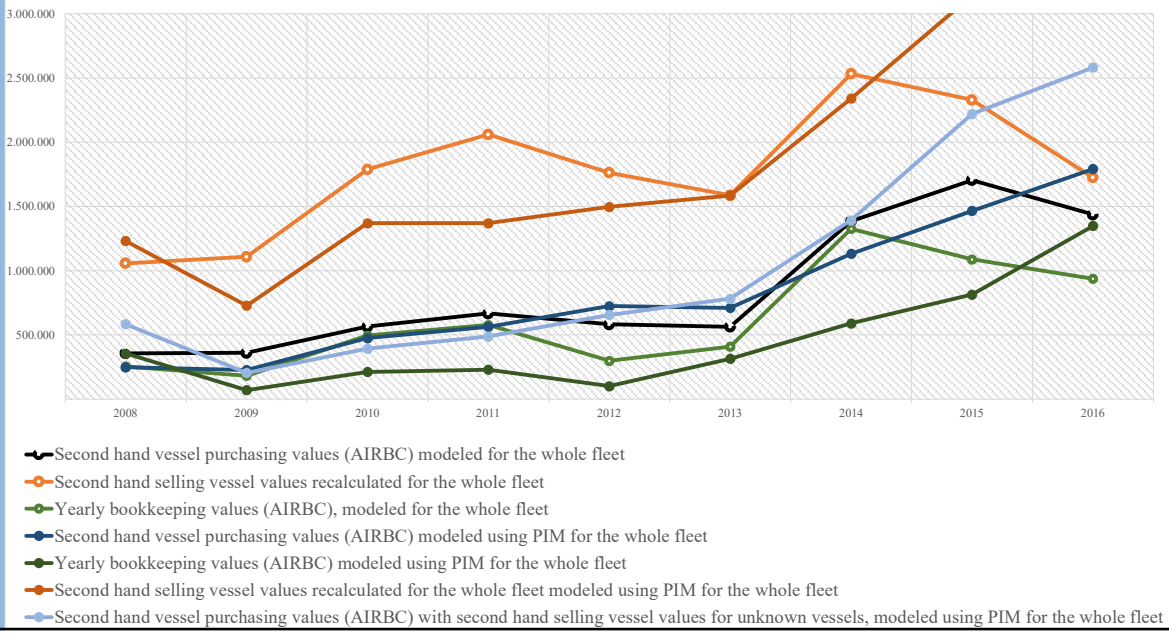
Capital value calculation in Lithuania

3. Comparing the results



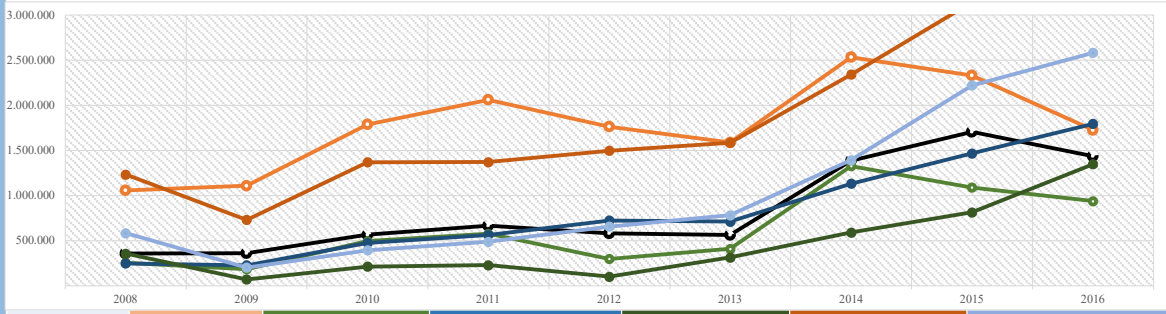
Capital value calculation in Lithuania

3. Comparing the results



Capital value calculation in Lithuania

3. Comparing the results



Segments	Second hand selling vessel values recalculated for the whole fleet	Yearly bookkeeping values (AIRBC), modeled for the whole fleet	Second hand vessel purchasing values (AIRBC) modeled using PIM for the whole fleet	Yearly bookkeeping values (AIRBC) modeled using PIM for the whole fleet	Second hand selling vessel values recalculated for the whole fleet modeled using PIM for the whole fleet	Second hand vessel purchasing values (AIRBC) with second hand selling vessel values for unknown vessels, modeled using PIM for the whole fleet
A27 0-10	1039%	93%	44%	154%	868%	168%
A27 10-12	1316%	47%	213%	71%	806%	264%
A27 18-40	249%	72%	58%	83%	402%	89%
A27 40-XX	86%	54%	31%	68%	99%	27%
OFR 40-XX	608%	50%	38%	65%	706%	60%
Viso:	**823%**	**80%**	**58%**	**123%**	**733%**	**142%**

Capital value calculation in Lithuania

3. Comparing the results

Capital value calculation

Second hand purchasing vessel values		Yearly bookkeeping vessel values		Second hand selling vessel values	
Whole fleet	PIM	Whole fleet	PIM	Whole fleet	PIM
62% of LT fleet		53% of LT fleet		0% of LT fleet	
Continuous data		Yearly data		Needs a survey	
0,83 correlation		0,89 correlation (autocorrelation)		0,79 correlation	
• May be less then market value; • Old values – recalculate with price index;		• Company based; • Not always represents market value; • Not all companies have data • Market influenced;		• Small number of vessels representing current fleet; • Different country's data is not always usable;	
3 step modeling	4 step modeling; Research needed 1	4 step modeling Research needed 1	4 step modeling Research needed 1	3 step modeling Research needed 1	4 step modeling Research needed 2
Possibly underrated	Possibly underrated	Underrated	Underrated	Overrated	Overrated
-	58%	80%	123%	823%	733%

Capital value calculation in Lithuania

Thank You for Your attention.

Annex IV – Presentation on: Capital Evaluation in Fisheries, theoretical background (some preliminary notes)

Capital Evaluation in Fisheries
Some Notes
(very preliminary)

Gianluigi Coppola, Sergio Destefanis,
Elvira Ciociano

Department of Economics and Statistics
University of Salerno

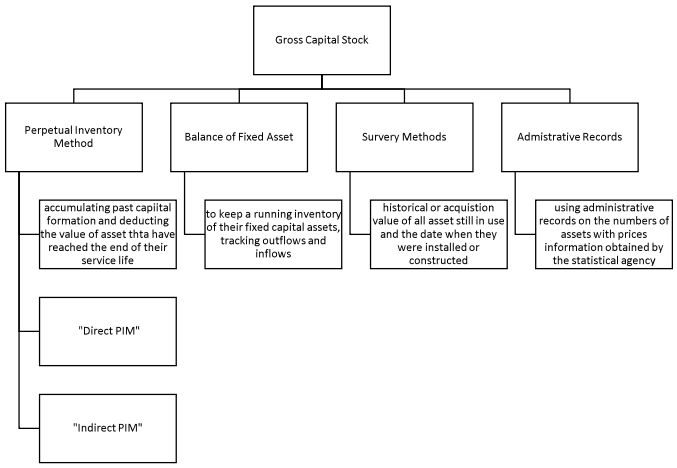
Capital Evaluation in Fisheries

- Estimation Methods
- Dataset

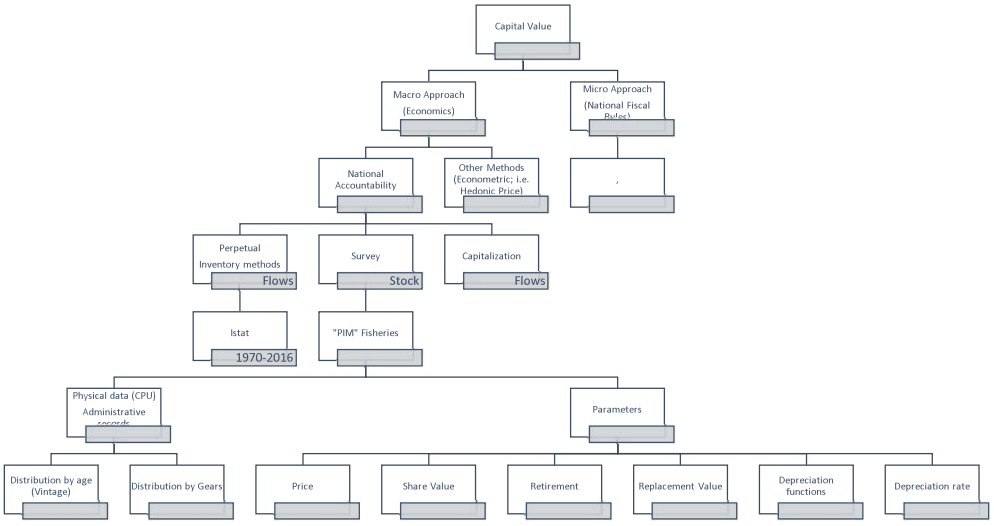
3 Methods for Capital Valuation

- Previous Flows (Investments – Perpetual Inventory Methods)
- Stock (General Inventory)
- Future Flows (Capitalization Method)

4 Methods (Ocse,2004)



Another Scheme



3 Dataset

- Historical Series of Investment, Istat (*National Institute of Statistics*)
- Survey (PIM), Nisea
- Survey Investment, 2014-2018, Nisea

Methods + Dataset

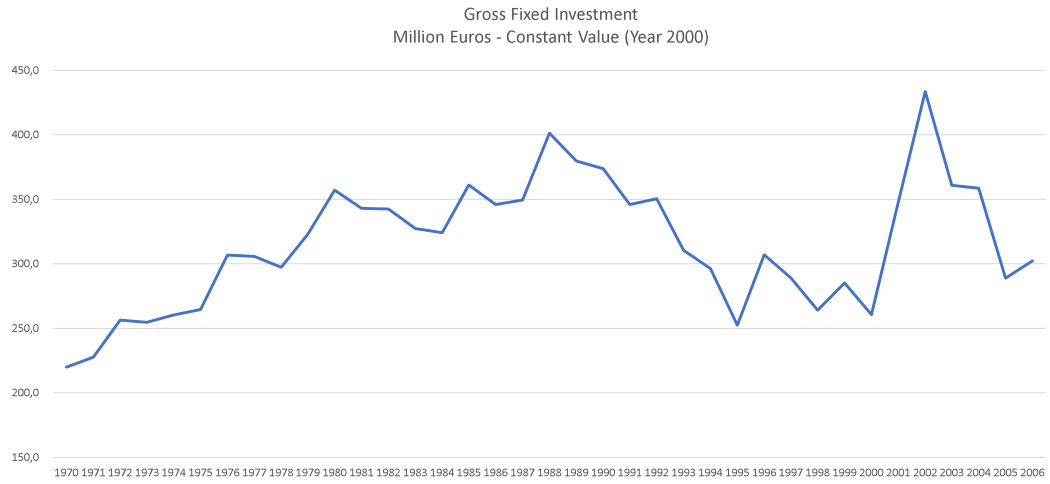
	Perpetual Inventory	Survey
Istat	X	
Nisea1		X
Nisea 2	X	

Gross Fixed Investment

(Istat –National Institute of Statistics)

- Gross fixed Investment in Fisheries and Aquaculture
  - Constant Value
  - Current Value
- 1970-2016 (46 years)
- For the period 2007 – 2016, the data has not published

Gross Fixed Investment – Million Euros, Constant Value



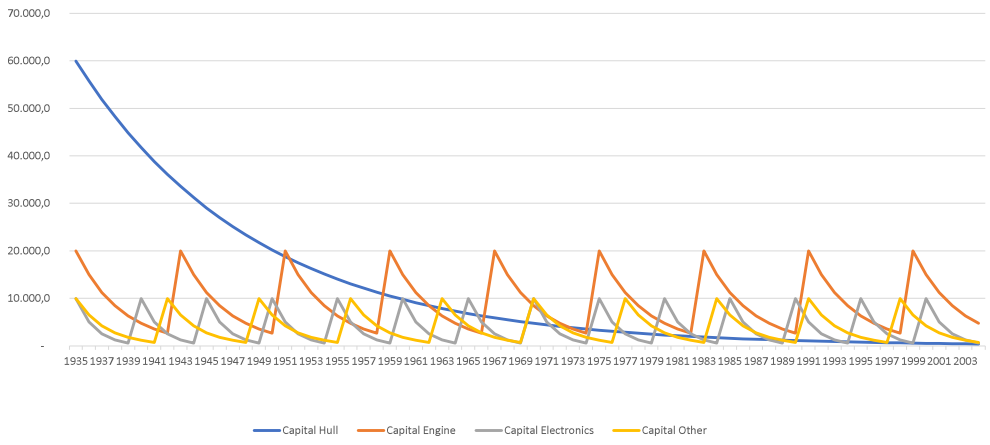
Further Possible Developments

- Estimation
  - Capital Valuation of Fisheries
  - Investment of the single asset
  - Retirement
- Simulations

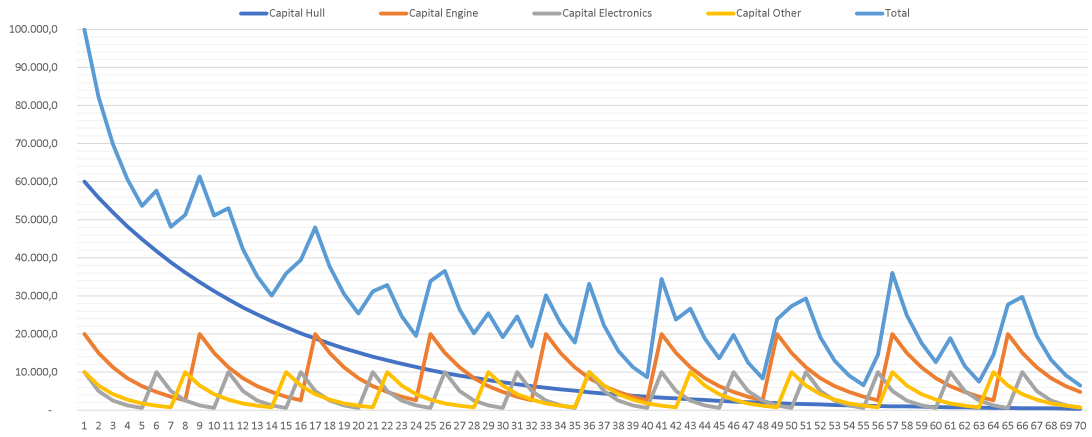
Fisheries PIM

- Stock (number of Vessels)
- CPU's price
- Estimation of the single asset Percentage value (Hull, Engine, Electronics, Others)
- Replacement Value
- Cross Section Depreciation Profiles, functions of:
    1. Cross Section Depreciation(that may be different from time series Depreciation)

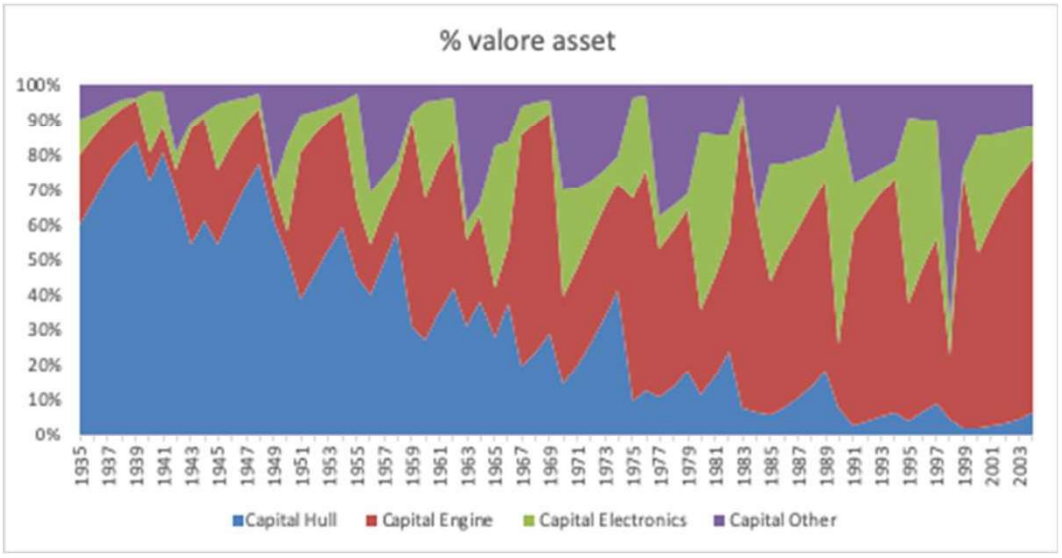
PIM (A 70 years Old Vessel)



PIM (A 70 years Old Vessel)



PIM: fleet, 2004 (% Asset Value)

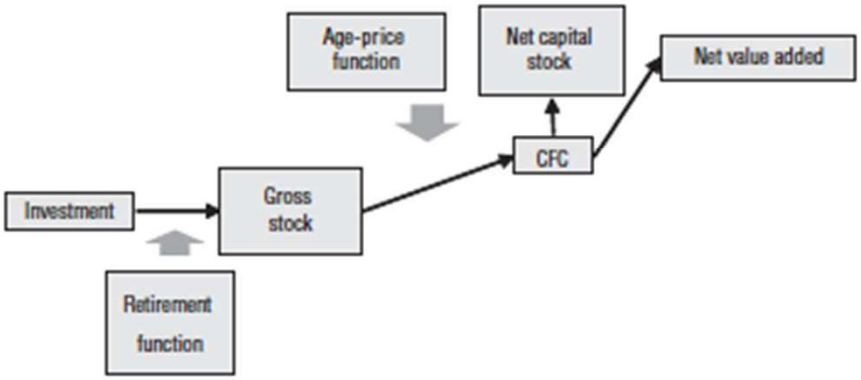


Two alternative Approaches

- New simulations with the different value of the parameters
- To follow a different approach

Capital Measures

Figure 2.1. **Capital measures in the 1993 SNA**



Fisheries PIM Sequences



Example: The Net Value of 1935's Vessel

- In the year 2005 the Net Value of 1935's Vessel is equal to the sum of:

- The Discount Value of the 1935's Hull
- The Discount Value of the 1995's Engine
- The Discount Value of the 2000's Electronics
- The Discount Value of the 1998's Other

New Simulation

- Main Question:
  - How to choose the parameter?

A ”New” Cross Section Depreciation Formula

- $K_t = K_0 \left\{ (1-q) \left[1 - \frac{d}{1-q} \right]^n + q \right\}$
  - Where Kt is the asset value of year, K0, is the asset value of year *0*, *d* è the initial Cross Section Depreciation and *q* is the minimum value of the asset. For q=0 the Cross-Section Depreciation is standard
- Where:
- $d = 1 - e^{\frac{1}{n}\log\left(\frac{K_n}{K_0}\right)}$

Cross Section Estimation for the Price

Dependent Variable: Price for vessel

Variable	logm1	logm2	logm3	logm4
llft	1.8268191***	1.7419715***	1.7582758***	1.7739148***
llarg	.03781063**	.04560311***	.03772306**	.0455797***
lcv2	.35653102***	.33706859***	.3572182***	.33691416***
lage	-.10509666***	-.22017314***	-.10673647***	-.21834493***
PGP	.18316392**	-.52299354***	.17576967**	-.51438107***
ltslpgp	-.05169294	-.05103828		
letapgp		.19125416***		.1894362***
N	1216	1216	1216	1216
r2_a	.86173019	.86813602	.86174955	.86822449
ll	-482.29175	-453.45067	-482.70974	-453.54572

Annex V: Guidelines for the utilization of the validation model

The Master file produced in 2005 during the capital study and made available to the data collection team since its endorsement by the Economic group was again presented with the aim to let people aware how it works, which input data are needed and which output it allows to produce.

The Master file consists of an Excel file (Capital value 2005 – master file.xls) with 2 (two) sheets, both allowing to produce estimates of the gross and depreciated capital value as well as capital costs (depreciation cost and interest rates) of a certain fleet for a certain reporting year (in the example 2005, the year of the Capital study), following two different approaches (figure 1 and figure 2):

- "***Depreciation - replacement val.***", allowing to produce estimates of the capital value study, under the macro-approach;
- "***Depreciation - historical val.***", allowing to produce estimates of the capital value using the *historical value*, suggested to be used, in the study, under the micro-approach.

The two sheets work in the same way, in terms of input and output columns and cells. Data by vintage classes are entered, in case of inputs, or produced, in case of estimation, below row 18. Row 16 reports the sum of the figures entered or estimated in each column.

In both sheets, **inputs should be entered** in:

Columns or cells	**Input description**	
	"Depreciation - replacement val." sheet	***"Depreciation - historical val." sheet***
Column A to E	Inputs refer to the year of construction, number and dimensional characteristics (tonnage, power and length) of a group of vessels.	
Column F	The selected capacity units should be recalled from columns C to E (in the sheets, for simplification, there is no value recalled).	
Column G	The PCU (price per capacity unit) equal for all the vintage classes	The PCU (price per capacity unit) adjusted for inflation, using price indices (to be done in advance or applying formulas linked to years)
Columns W to Z	Age schedule, reporting the lifetime of each asset, depending on the age (year of construction) – synthesised in cells P2-P6 or U2-U6	
Columns AA to AC	None	Price indices to adjust for inflation the PCU in the estimation of the gross value of engine, electronics and other equipment (the hull, indeed, is assumed to be never renovated)

Cell O2-O5 and T2-T5	Assumptions on ***depreciation*** rates, according, respectively, to the digressive and linear approach	Assumptions on ***fiscal*** rates, according, respectively, to the digressive and linear approach
Cell P2-P5 and U2-U5	Assumptions on the lifetime of assets (renovation years) according respectively, to the digressive and linear approach (*could* be the same, not recalled by any formula as they are specified in the age schedule);	
Cell Q2-Q5 and V2-V5	Assumptions on the share of each asset on the overall value of the vessel (*usually* same shares in both approaches)	
Cell O6	Government bonds' rate for the calculation of Interest costs/opportunity costs) according to the ***macro***-approach	Loans as % of total capital' for the calculation of Interest costs/real according to the ***micro***-approach;
Cell T6	Rest value of the hull: the value that is assumed to be still attached to the hull after its complete depreciation under the linear depreciation scheme	

In both sheets, **outputs** are produced in:

Columns or cells	Output description	
	"Depreciation - replacement val." sheet	***"Depreciation - historical val." sheet***
Columns H to L (yellow section)	Estimates of the ***gross*** value, by type of asset. • Column H: *total* gross value of the vessels belonging to a certain to the vintage class *x* (sum of column I to L) • Column I: gross value of the *hull* of the vessels belonging to the vintage class *x* (PCU*selected CU*share of hull) • Column J: gross value of the *engine* of the vessels belonging to the vintage class *x* (PCU*selected CU*share of engine) • Column K: gross value of the *electronics* equipment of the vessels belonging to the vintage class *x* (PCU*selected CU*share of electronics) • Column L: gross value of the *other equipment* of the vessels belonging to the vintage class *x* (PCU*selected CU*share of other equipment)	
Columns M to Q (green section)	Estimates of the ***depreciated*** capital value, by asset type and according to the ***digressive*** depreciation scheme • Column M: *total* digressive depreciated value of the vessels belonging to the vintage class *x* (sum of column N to Q) • Column N: digressive depreciated value of the *hull* of the vessels belonging to the vintage class *x* = gross value of the hull*(1-depreciation rate for the hull)^(age of the hull for the vessels of the vintage class *x*) • Column O: digressive depreciated value of the *engine* of the vessels belonging to the vintage class *x* = gross value of the engine*(1-depreciation rate for the engine)^(age of the engine for the vessels of the vintage class *x*) • Column P: digressive depreciated value of *electronics* of the vessels belonging to the vintage class *x* = gross value of electronics*(1-depreciation rate for electronics)^(age of the electronics for the vessels of the vintage class *x*) • Column Q: digressive depreciated value of *other equipment* of the vessels belonging to the vintage class *x* = gross value of other equipment*(1-depreciation rate for other equipment)^(age of the other equipment for the vessels of the vintage class *x*)	

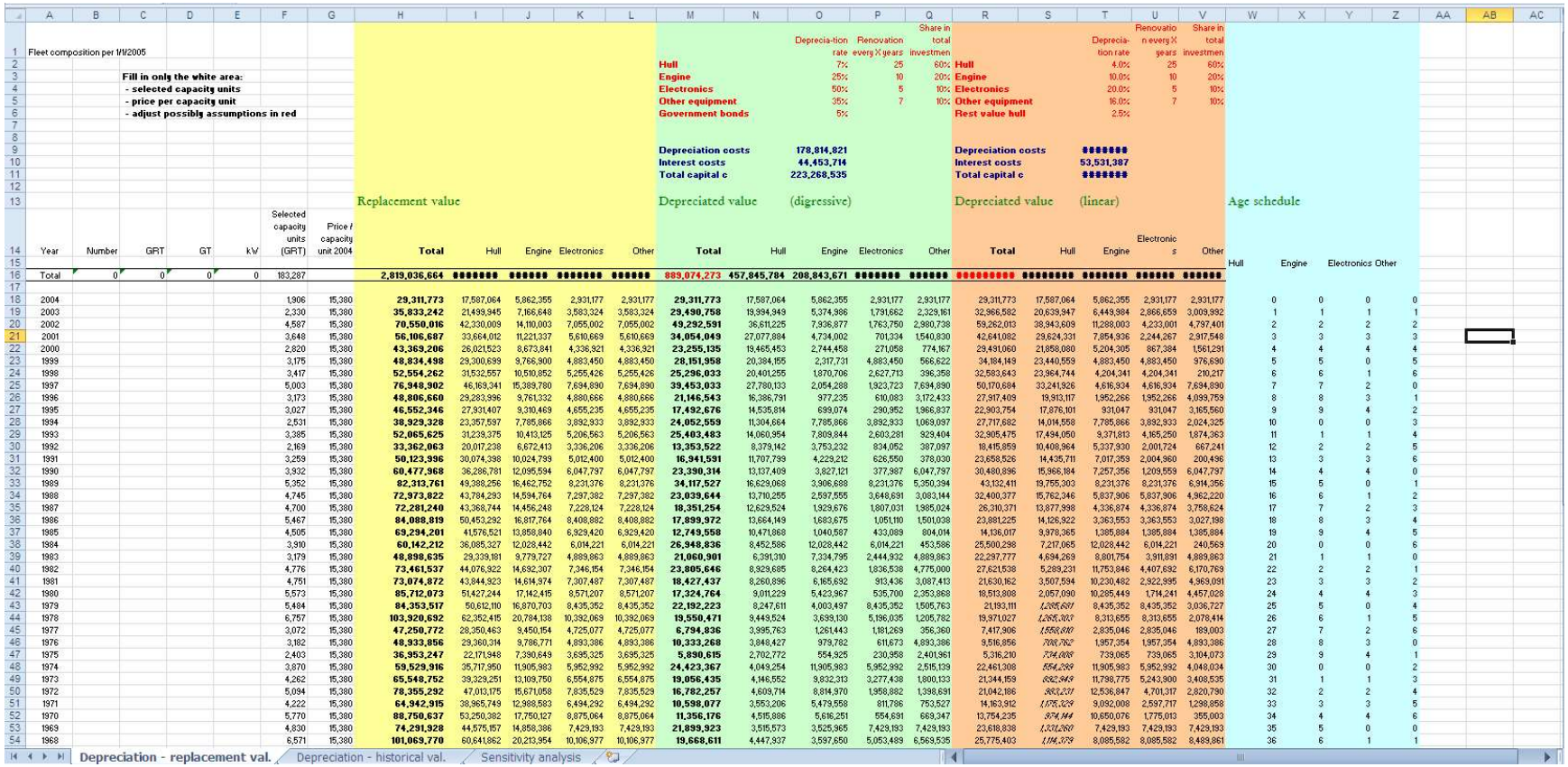
Columns R to V (orange section)	Estimates of the ***depreciated*** capital value, by asset type, according to the ***linear*** depreciation scheme • Column R: *total* linear depreciated value of the vessels belonging to the vintage class *x* (sum of column S to V) • Column S: linear depreciated value of the *hull* of the vessels belonging to the vintage class *x* = gross value of the hull*(1-depreciation rate for the hull *age of the hull for the vessels of the vintage class *x*) • Column T: linear depreciated value of the *engine* of the vessels belonging to the vintage class *x* = gross value of the engine*(1-depreciation rate for the engine*age of the engine for the vessels of the vintage class *x*) • Column U: linear depreciated value of *electronics* of the vessels belonging to the vintage class *x* = gross value of electronics*(1-depreciation rate for electronics*age of the electronics for the vessels of the vintage class *x*) • Column V: linear depreciated value of *other equipment* of the vessels belonging to the vintage class *x* = gross value of other equipment*(1-depreciation rate for other equipment*age of the other equipment for the vessels of the vintage class *x*)	
Cell M16	***Total depreciated capital value*** according to the *digressive* scheme (sum of the depreciated capital value of all the assets of all the vintage classes of the fleet in a certain year)	
Cell O9	***Depreciation costs for the reporting year*** according to the *digressive* scheme (consumption of fixed capital for the current year, calculated by depreciating for one more year, according to the digressive scheme, the total depreciated capital value)	
Cell R16	Total depreciated capital value according to the *linear* scheme (sum of the depreciated capital value of all the assets of all the vintage classes of the fleet in a certain year)	
Cell T9	***Depreciation costs for the reporting year*** according to the *linear* scheme (consumption of fixed capital for the current year, calculated by depreciating for one more year, according to the linear scheme, the total depreciated capital value)	
Cell O10 and T10	Interest costs/opportunity costs for the reporting year	Interest costs/real for the reporting year
Cell O11 and T11	Total capital costs= Depreciation costs + interest costs	

Cell S43 (vintage corresponding to 25 aged vessels)	Residual depreciated value of the hull after complete depreciation. According to the depreciation rates and to the service life of assets (no renovation for the hull) under the linear depreciation scheme the depreciated value of the hull becomes 0 after a certain number of year (in the master file 25 years, corresponding to a depreciation rate of 4%). The methodology assumes that a marginal residual value (2.5% of the gross value of the previous year) remains "attached" to the hull after its complete depreciation.

It is important to outline that the sheet assume that the evaluation of the capital is done at 1 January of the reporting year. This is why the depreciation costs are calculated depreciating, for one year more, the depreciated value of the fleet estimated according to the main template (value reported in cells M16 and R16 of the two sheets, according to the two different depreciation scheme).

The estimates current required by EUMAP are the total depreciated replacement value and the depreciation costs (in italics, bold and subtitled in the above table)

The Master file also includes a sheet for running a sensitivity analysis at the time of the study, comparing the different economic performance of a fleet segment, taking into account the different figures coming out from the application of the different approaches (macro/economic, digressive and linear and micro/fiscal, digressive and linear).



Fleet composition per 1/1/2005

Fill in only the white area:
- **selected capacity units**
- **price per capacity unit**
- **adjust possibly assumptions in red**

	Depreciation rate	Renovation every X years	Share in total investmen
Hull	7%	25	60%
Engine	25%	10	20%
Electronics	50%	5	10%
Other equipment	35%	7	10%
Government bonds	5%		

Depreciation costs	**178,814,821**
Interest costs	**44,453,714**
Total capital c	**223,268,535**

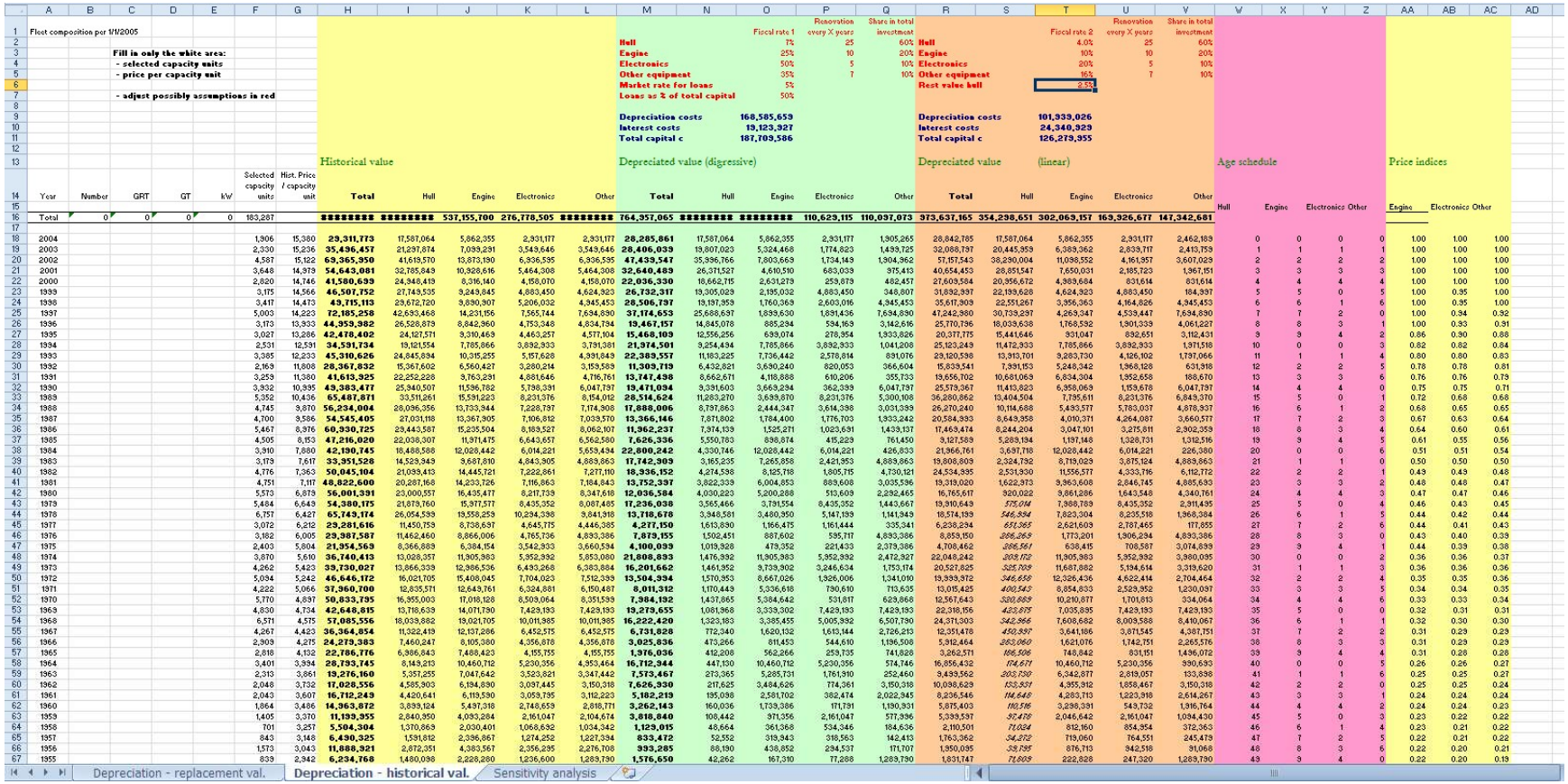
	Depreciation rate	Renovation every X years	Share in total investmen
Hull	4.0%	25	60%
Engine	10.0%	10	20%
Electronics	20.0%	5	10%
Other equipment	16.0%	7	10%
Rest value hull	2.5%		

Depreciation costs	**#######**
Interest costs	**53,531,387**
Total capital c	**#######**

Year	Number	GRT	GT	kW	Selected capacity units (GRT)	Price / capacity unit 2004	Replacement value Total	Hull	Engine	Electronics	Other	Depreciated value (digressive) Total	Hull	Engine	Electronics	Other	Depreciated value (linear) Total	Hull	Engine	Electronics	Other	Age schedule Hull	Engine	Electronics	Other
Total	0	0	0	0	183,287		**2,819,036,664**	#######	######	#######	######	**889,074,273**	**457,845,784**	**208,843,671**	#######	######	#########	########	#######	######	######				
2004					1,906	15,380	**29,311,773**	17,587,064	5,862,355	2,931,177	2,931,177	**29,311,773**	17,587,064	5,862,355	2,931,177	2,931,177	29,311,773	17,587,064	5,862,355	2,931,177	2,931,177	0	0	0	0
2003					2,330	15,380	**35,833,242**	21,499,945	7,166,648	3,583,324	3,583,324	**29,490,758**	19,994,949	5,374,986	1,791,662	2,329,161	32,966,582	20,639,947	6,449,984	2,866,659	3,009,992	1	1	1	1
2002					4,587	15,380	**70,550,016**	42,330,009	14,110,003	7,055,002	7,055,002	**49,292,591**	36,611,225	7,936,877	1,763,750	2,980,738	59,262,013	38,943,609	11,288,003	4,233,001	4,797,401	2	2	2	2
2001					3,648	15,380	**56,106,687**	33,664,012	11,221,337	5,610,669	5,610,669	**34,054,049**	27,077,884	4,734,002	701,334	1,540,830	42,641,082	29,624,331	7,854,936	2,244,267	2,917,548	3	3	3	3
2000					2,820	15,380	**43,369,206**	26,021,523	8,673,841	4,336,921	4,336,921	**23,255,135**	19,465,453	2,744,458	271,058	774,167	29,491,060	21,858,080	5,204,305	867,384	1,561,291	4	4	4	4
1999					3,175	15,380	**48,834,498**	29,300,699	9,766,900	4,883,450	4,883,450	**28,151,958**	20,384,155	2,317,731	4,883,450	566,622	34,184,149	23,440,559	4,883,450	4,883,450	976,690	5	5	0	5
1998					3,417	15,380	**52,554,262**	31,532,557	10,510,852	5,255,426	5,255,426	**25,296,033**	20,401,255	1,870,706	2,627,713	396,358	32,583,643	23,964,744	4,204,341	4,204,341	210,217	6	6	1	6
1997					5,003	15,380	**76,948,902**	46,169,341	15,389,780	7,694,890	7,694,890	**39,453,033**	27,780,133	2,054,288	1,923,723	7,694,890	50,170,684	33,241,926	4,616,934	4,616,934	7,694,890	7	7	2	0
1996					3,173	15,380	**48,806,660**	29,283,996	9,761,332	4,880,666	4,880,666	**21,146,543**	16,386,791	977,235	610,083	3,172,433	27,917,409	19,913,117	1,952,266	1,952,266	4,099,759	8	8	3	1
1995					3,027	15,380	**46,552,346**	27,931,407	9,310,469	4,655,235	4,655,235	**17,492,676**	14,535,814	699,074	290,952	1,966,837	22,903,754	17,876,101	931,047	931,047	3,165,560	9	9	4	2
1994					2,531	15,380	**38,929,328**	23,357,597	7,785,866	3,892,933	3,892,933	**24,052,559**	11,304,664	7,785,866	3,892,933	1,069,097	27,717,682	14,014,558	7,785,866	3,892,933	2,024,325	10	0	0	3
1993					3,385	15,380	**52,065,625**	31,239,375	10,413,125	5,206,563	5,206,563	**25,403,483**	14,060,954	7,809,844	2,603,281	929,404	32,905,475	17,494,050	9,371,813	4,165,250	1,874,363	11	1	1	4
1992					2,169	15,380	**33,362,063**	20,017,238	6,672,413	3,336,206	3,336,206	**13,353,522**	8,379,142	3,753,232	834,052	387,097	18,415,859	10,408,964	5,337,930	2,001,724	667,241	12	2	2	5
1991					3,259	15,380	**50,123,996**	30,074,398	10,024,799	5,012,400	5,012,400	**16,941,591**	11,707,799	4,229,212	626,550	378,030	23,658,526	14,435,711	7,017,359	2,004,960	200,496	13	3	3	6
1990					3,932	15,380	**60,477,968**	36,286,781	12,095,594	6,047,797	6,047,797	**23,390,314**	13,137,409	3,827,121	377,987	6,047,797	30,480,896	15,966,184	7,257,356	1,209,559	6,047,797	14	4	4	0
1989					5,352	15,380	**82,313,761**	49,388,256	16,462,752	8,231,376	8,231,376	**34,117,527**	16,629,068	3,906,688	8,231,376	5,350,394	43,132,411	19,755,303	8,231,376	8,231,376	6,914,356	15	5	0	1
1988					4,745	15,380	**72,973,822**	43,784,293	14,594,764	7,297,382	7,297,382	**23,039,644**	13,710,255	2,597,555	3,648,691	3,083,144	32,400,377	15,762,346	5,837,906	5,837,906	4,962,220	16	6	1	2
1987					4,700	15,380	**72,281,240**	43,368,744	14,456,248	7,228,124	7,228,124	**18,351,254**	12,629,524	1,929,676	1,807,031	1,985,024	26,310,371	13,877,998	4,336,874	4,336,874	3,758,624	17	7	2	3
1986					5,467	15,380	**84,088,819**	50,453,292	16,817,764	8,408,882	8,408,882	**17,899,972**	13,664,149	1,683,675	1,051,110	1,501,038	23,881,225	14,126,922	3,363,553	3,363,553	3,027,198	18	8	3	4
1985					4,505	15,380	**69,294,201**	41,576,521	13,858,840	6,929,420	6,929,420	**12,749,558**	10,471,868	1,040,587	433,089	804,014	14,136,017	9,978,365	1,385,884	1,385,884	1,385,884	19	9	4	5
1984					3,910	15,380	**60,142,212**	36,085,327	12,028,442	6,014,221	6,014,221	**26,949,836**	8,452,586	12,028,442	6,014,221	453,586	25,500,298	7,217,065	12,028,442	6,014,221	240,569	20	0	0	6
1983					3,179	15,380	**48,898,635**	29,339,181	9,779,727	4,889,863	4,889,863	**21,060,901**	6,391,310	7,334,795	2,444,932	4,889,863	22,297,777	4,694,269	8,801,754	3,911,891	4,889,863	21	1	1	0
1982					4,776	15,380	**73,461,537**	44,076,922	14,692,307	7,346,154	7,346,154	**23,805,646**	8,929,685	8,264,423	1,836,538	4,775,000	27,621,538	5,283,231	11,753,846	4,407,692	6,170,769	22	2	2	1
1981					4,751	15,380	**73,074,872**	43,844,923	14,614,974	7,307,487	7,307,487	**18,427,437**	8,260,896	6,165,692	913,436	3,087,413	21,630,162	3,507,594	10,230,482	2,922,995	4,969,091	23	3	3	2
1980					5,573	15,380	**85,712,073**	51,427,244	17,142,415	8,571,207	8,571,207	**17,324,764**	9,011,229	5,423,967	535,700	2,353,868	18,513,808	2,057,090	10,285,449	1,714,241	4,457,028	24	4	4	3
1979					5,484	15,380	**84,353,517**	50,612,110	16,870,703	8,435,352	8,435,352	**22,192,223**	8,247,611	4,003,497	8,435,352	1,505,763	21,193,111	*1,265,697*	8,435,352	8,435,352	3,056,727	25	5	0	4
1978					6,757	15,380	**103,920,692**	62,352,415	20,784,138	10,392,069	10,392,069	**19,550,471**	9,449,524	3,699,130	5,196,035	1,205,782	19,971,027	*1,265,697*	8,313,655	8,313,655	2,078,414	26	6	1	5
1977					3,072	15,380	**47,250,772**	28,350,463	9,450,154	4,725,077	4,725,077	**6,794,836**	3,995,763	1,261,443	1,181,269	356,360	7,417,906	*1,556,610*	2,835,046	2,835,046	189,003	27	7	2	6
1976					3,182	15,380	**48,933,856**	29,360,314	9,786,771	4,893,386	4,893,386	**10,333,268**	3,848,427	979,782	611,673	4,893,386	9,516,856	*708,762*	1,957,354	1,957,354	4,893,386	28	8	3	0
1975					2,403	15,380	**36,953,247**	22,171,948	7,390,649	3,695,325	3,695,325	**5,890,615**	2,702,772	554,925	230,958	2,401,961	5,316,210	*574,068*	739,065	739,065	3,104,073	29	9	4	1
1974					3,870	15,380	**59,529,916**	35,717,950	11,905,983	5,952,992	5,952,992	**24,423,367**	4,049,254	11,905,983	5,952,992	2,515,139	22,461,308	*554,268*	11,905,983	5,952,992	4,048,034	30	0	0	2
1973					4,262	15,380	**65,548,752**	39,329,251	13,109,750	6,554,875	6,554,875	**19,056,435**	4,146,552	9,832,313	3,277,438	1,800,133	21,344,159	*682,949*	11,798,775	5,243,900	3,408,535	31	1	1	3
1972					5,094	15,380	**78,355,292**	47,013,175	15,671,058	7,835,529	7,835,529	**16,782,257**	4,609,714	8,814,970	1,958,882	1,398,691	21,042,186	*803,230*	12,536,847	4,701,317	2,820,790	32	2	2	4
1971					4,222	15,380	**64,942,915**	38,965,749	12,988,583	6,494,292	6,494,292	**10,598,077**	3,553,206	5,479,558	811,786	753,527	14,163,912	*1,075,329*	9,092,008	2,597,717	1,298,858	33	3	3	5
1970					5,770	15,380	**88,750,637**	53,250,382	17,750,127	8,875,064	8,875,064	**11,356,176**	4,515,886	5,616,251	554,691	669,347	13,754,235	*874,144*	10,650,076	1,775,013	355,003	34	4	4	6
1969					4,830	15,380	**74,291,928**	44,575,157	14,858,386	7,429,193	7,429,193	**21,899,923**	3,515,573	3,525,965	7,429,193	7,429,193	23,618,838	*1,201,360*	7,429,193	7,429,193	7,429,193	35	5	0	0
1968					6,571	15,380	**101,069,770**	60,641,862	20,213,954	10,106,977	10,106,977	**19,668,611**	4,447,937	3,597,650	5,053,489	6,569,535	25,775,403	*1,114,378*	8,085,582	8,085,582	8,489,861	36	6	1	1

Depreciation - replacement val. | Depreciation - historical val. | Sensitivity analysis

Figure 1 - "Depreciation - replacement val." Sheet. Source: Capital value 2005 – master file.xls.



Fleet composition per 1/1/2005

Fill in only the white area:
- selected capacity units
- price per capacity unit

- adjust possibly assumptions in red

	Fiscal rate 1	Renovation every X years	Share in total investment
Hull	7%	25	60%
Engine	25%	10	20%
Electronics	50%	5	10%
Other equipment	35%	7	10%
Market rate for loans	5%		
Loans as % of total capital	50%		
Depreciation costs	168,585,659		
Interest costs	19,123,927		
Total capital c	187,709,586		

	Fiscal rate 2	Renovation every X years	Share in total investment
Hull	4.0%	25	60%
Engine	10%	10	20%
Electronics	20%	5	10%
Other equipment	16%	7	10%
Rest value hull	2.5%		
Depreciation costs	101,939,026		
Interest costs	24,340,929		
Total capital c	126,279,955		

Year	Number	GRT	GT	kW	Selected capacity units	Hist. Price / capacity unit	Historical value: Total	Hull	Engine	Electronics	Other	Depreciated value (digressive): Total	Hull	Engine	Electronics	Other	Depreciated value (linear): Total	Hull	Engine	Electronics	Other	Age schedule: Hull	Engine	Electronics	Other	Price indices: Engine	Electronics	Other
Total	0	0	0	0	183,287		537,155,700	276,778,505				764,957,065			110,623,115	110,037,073	373,637,165	354,298,651	302,069,157	163,926,677	147,342,681							
2004					1,906	15,380	29,311,773	17,587,064	5,862,355	2,931,177	2,931,177	28,285,861	17,587,064	5,862,355	2,931,177	1,905,265	28,842,785	17,587,064	5,862,355	2,931,177	2,462,189	0	0	0	0	1.00	1.00	1.00
2003					2,330	15,236	35,496,457	21,297,874	7,099,291	3,549,646	3,549,646	28,406,039	19,907,023	5,324,468	1,774,823	1,439,725	32,068,797	20,445,959	6,383,362	2,838,717	2,413,759	1	1	1	1	1.00	1.00	1.00
2002					4,587	15,122	69,365,350	41,619,570	13,873,190	6,936,595	6,936,595	47,439,547	35,396,766	7,803,663	1,734,148	1,504,962	57,157,543	38,230,004	11,088,552	4,161,957	3,677,029	2	2	2	2	1.00	1.00	1.00
2001					3,648	14,978	54,643,081	32,785,849	10,928,616	5,464,308	5,464,308	32,640,489	26,371,527	4,610,510	683,039	975,413	40,654,453	28,851,547	7,650,031	2,185,723	1,967,151	3	3	3	3	1.00	1.00	1.00
2000					2,820	14,746	41,580,699	24,948,419	8,316,140	4,158,070	4,158,070	22,036,330	18,662,715	2,631,279	259,879	482,457	27,609,584	20,956,672	4,389,684	831,614	831,614	4	4	4	4	1.00	1.00	1.00
1999					3,175	14,566	46,507,752	27,749,535	9,249,845	4,883,450	4,624,923	26,732,317	19,305,029	2,195,032	4,883,450	348,807	31,892,997	22,193,628	4,624,923	4,883,450	184,997	5	5	0	5	1.00	0.95	1.00
1998					3,417	14,473	49,715,113	29,672,720	9,890,907	5,206,032	4,945,453	28,506,797	19,197,959	1,760,369	2,603,016	4,945,453	35,617,909	22,551,267	3,956,363	4,164,826	4,945,453	6	6	1	6	1.00	0.95	1.00
1997					5,003	14,223	72,185,258	42,683,468	14,231,156	7,565,744	7,684,890	37,174,653	25,668,697	1,899,630	1,891,436	7,684,890	47,242,980	30,739,297	4,263,347	4,539,447	7,684,890	7	7	2	0	1.00	0.94	0.92
1996					3,173	13,933	44,359,382	26,528,673	8,842,960	4,753,346	4,834,734	19,467,157	14,845,076	885,294	534,169	3,142,616	25,770,796	18,033,638	1,766,592	1,901,333	4,069,227	8	8	3	1	1.00	0.93	0.91
1995					3,027	13,286	42,478,402	24,127,571	9,310,469	4,463,257	4,577,104	15,468,109	12,556,256	693,074	278,954	1,939,826	20,377,775	15,441,646	931,047	892,651	3,112,431	9	9	4	2	0.86	0.90	0.88
1994					2,531	12,591	34,591,734	19,121,554	7,785,866	3,892,933	3,791,381	21,974,501	9,254,494	7,785,866	3,892,933	1,041,208	25,123,249	11,472,393	7,785,866	3,892,933	1,971,518	10	0	0	3	0.62	0.82	0.84
1993					3,385	12,233	45,310,626	24,845,894	10,315,255	5,157,628	4,991,849	22,383,557	11,183,225	7,736,442	2,576,814	891,076	29,120,536	13,313,701	9,283,730	4,126,102	1,797,066	11	1	1	4	0.80	0.80	0.83
1992					2,169	11,808	28,367,832	15,367,602	6,560,427	3,280,214	3,159,589	11,309,719	6,432,821	3,630,240	820,053	366,604	15,833,541	7,391,153	5,248,342	1,968,128	631,918	12	2	2	5	0.78	0.78	0.81
1991					3,259	11,380	41,613,925	22,252,228	9,763,291	4,881,646	4,716,761	13,747,498	8,662,671	4,118,888	610,206	355,733	19,656,702	10,681,069	6,834,304	1,952,658	188,670	13	3	3	6	0.76	0.76	0.79
1990					3,932	10,995	43,383,471	25,940,507	11,536,782	5,780,391	5,047,797	19,471,034	9,391,603	3,663,234	362,399	5,047,797	25,573,367	11,413,823	6,958,069	1,159,678	6,047,797	14	4	4	0	0.75	0.75	0.71
1989					5,352	10,436	65,487,871	33,511,261	15,591,223	8,231,376	8,154,012	28,514,624	11,283,270	3,639,870	8,231,376	5,300,108	36,280,862	13,404,504	7,795,611	8,231,376	6,849,370	15	5	0	1	0.72	0.68	0.68
1988					4,745	9,870	56,234,004	28,096,356	13,733,944	7,228,797	7,174,908	17,888,006	8,797,863	2,444,347	3,614,398	3,031,399	26,270,240	10,114,688	5,433,577	5,783,037	4,878,937	16	6	1	2	0.68	0.65	0.65
1987					4,700	9,586	54,545,405	27,031,118	13,367,905	7,106,612	7,039,570	13,366,146	7,871,802	1,784,400	1,776,703	1,933,242	20,584,933	8,643,358	4,010,371	4,264,087	3,660,577	17	7	2	3	0.67	0.63	0.64
1986					5,467	8,976	60,930,725	29,443,587	15,235,504	8,189,527	8,062,107	11,962,237	7,974,139	1,525,271	1,023,691	1,439,137	17,463,474	8,244,204	3,047,101	3,275,811	2,902,359	18	8	3	4	0.64	0.60	0.61
1985					4,505	8,153	47,216,020	22,038,307	11,971,475	6,643,657	6,562,580	7,626,336	5,550,783	836,874	415,229	761,450	9,121,589	5,269,194	1,197,148	1,328,731	1,312,516	19	9	4	5	0.61	0.55	0.56
1984					3,910	7,880	42,190,745	18,488,586	12,028,442	6,014,221	5,659,494	22,800,242	4,330,746	12,028,442	6,014,221	426,833	21,966,761	3,697,718	12,028,442	6,014,221	226,380	20	0	0	6	0.51	0.51	0.54
1983					3,179	7,617	33,351,528	14,529,349	9,687,810	4,843,905	4,889,863	17,742,909	3,165,235	7,265,858	2,421,953	4,889,863	19,808,809	2,324,792	8,719,029	3,875,124	4,889,863	21	1	1	0	0.50	0.50	0.50
1982					4,776	7,363	50,045,104	21,039,413	14,445,721	7,222,861	7,277,110	18,936,152	4,274,538	8,125,718	1,805,715	4,730,121	24,554,935	2,531,930	11,556,577	4,333,716	6,112,712	22	2	2	1	0.49	0.49	0.48
1981					4,751	7,117	48,822,600	20,287,168	14,233,726	7,116,863	7,184,843	13,752,337	3,822,339	6,004,853	889,608	3,035,536	19,313,020	1,622,373	9,363,608	2,846,745	4,885,693	23	3	3	2	0.48	0.48	0.47
1980					5,573	6,879	56,001,391	23,000,557	16,435,477	8,217,739	8,347,618	12,036,584	4,030,223	5,200,288	513,609	2,292,465	16,765,617	920,022	9,861,286	1,643,548	4,340,761	24	4	4	3	0.47	0.47	0.46
1979					5,484	6,649	54,380,175	21,879,760	15,977,577	8,435,352	8,087,485	17,236,038	3,565,466	3,791,554	8,435,352	1,443,667	19,910,649	575,014	7,966,789	8,435,352	2,911,495	25	5	0	4	0.46	0.43	0.45
1978					6,757	6,427	65,749,174	26,054,539	19,558,253	10,234,338	9,841,918	13,718,678	3,348,581	3,480,950	5,147,199	1,141,949	18,574,193	546,594	7,823,304	8,235,518	1,968,384	26	6	1	5	0.44	0.42	0.44
1977					3,072	6,212	29,281,616	11,450,753	8,738,697	4,645,715	4,446,385	4,271,150	1,613,830	1,166,475	1,161,444	335,341	6,238,294	521,365	2,621,609	2,187,465	117,855	27	7	2	6	0.44	0.41	0.43
1976					3,182	6,005	29,387,587	11,462,460	8,866,006	4,765,736	4,893,386	7,873,155	1,502,451	887,602	595,717	4,893,386	8,853,150	386,264	1,773,201	1,306,284	4,893,386	28	8	3	0	0.43	0.40	0.39
1975					2,403	5,804	21,954,569	8,366,889	6,384,154	3,542,933	3,660,594	4,100,093	1,019,328	479,352	221,433	2,379,386	4,708,462	386,561	638,415	708,587	3,074,899	29	9	4	1	0.44	0.39	0.38
1974					3,870	5,610	36,740,413	13,028,357	11,305,983	5,952,992	5,853,080	21,808,893	1,476,392	11,305,983	5,952,992	2,472,927	22,048,242	289,112	11,305,983	5,952,992	3,980,095	30	0	0	2	0.36	0.36	0.37
1973					4,262	5,423	39,730,027	13,866,339	12,986,536	6,493,268	6,383,884	16,201,662	1,461,952	9,739,902	3,246,634	1,753,174	20,527,825	325,359	11,687,882	5,194,614	3,319,620	31	1	1	3	0.36	0.36	0.36
1972					5,034	5,242	46,646,172	16,021,705	15,408,045	7,704,023	7,512,399	13,504,394	1,570,953	8,667,026	1,926,006	1,341,010	19,393,372	346,658	12,326,436	4,622,414	2,704,464	32	2	2	4	0.35	0.35	0.36
1971					4,222	5,066	37,960,700	12,835,571	12,643,761	6,324,881	6,156,487	8,011,312	1,170,443	5,336,618	790,610	713,635	13,015,425	400,543	8,854,833	2,529,952	1,230,097	33	3	3	5	0.34	0.34	0.35
1970					5,770	4,897	50,833,795	16,955,003	17,018,128	8,509,064	8,351,599	7,984,192	1,437,865	5,384,642	531,817	629,868	12,567,643	320,869	10,210,877	1,701,813	334,064	34	4	4	6	0.33	0.33	0.34
1969					4,830	4,734	42,648,815	13,718,639	14,071,790	7,429,193	7,429,193	13,279,655	1,081,968	3,339,302	7,429,193	7,429,193	22,318,156	433,615	7,035,895	7,429,193	7,429,193	35	5	0	0	0.32	0.31	0.31
1968					6,571	4,575	57,085,556	18,039,882	19,021,705	10,011,985	10,011,985	16,222,420	1,323,183	3,385,455	5,005,892	6,507,790	24,371,303	342,966	7,608,682	8,009,588	8,410,057	36	6	1	1	0.32	0.30	0.30
1967					4,267	4,423	36,364,854	11,322,419	12,137,286	6,452,575	6,452,575	6,731,828	772,340	1,620,132	1,615,144	2,726,213	12,351,478	450,397	3,641,186	3,871,545	4,387,751	37	7	2	2	0.31	0.29	0.29
1966					2,909	4,215	24,279,383	7,460,247	8,105,380	4,356,878	4,356,878	3,025,836	473,266	611,453	544,610	1,196,508	5,912,464	262,060	1,621,076	1,742,751	2,265,576	38	8	3	3	0.31	0.29	0.29
1965					2,818	4,132	22,786,776	6,986,843	7,468,423	4,155,755	4,155,755	1,976,036	412,208	562,266	253,735	741,828	3,262,571	186,506	748,842	831,151	1,496,072	39	9	4	4	0.31	0.28	0.28
1964					3,401	3,994	28,793,745	8,143,213	10,460,712	5,230,356	4,959,464	16,712,944	447,130	10,460,712	5,230,356	574,746	16,856,432	174,671	10,460,712	5,230,356	990,693	40	0	0	5	0.26	0.26	0.27
1963					2,313	3,861	19,276,160	5,357,255	7,047,642	3,523,821	3,347,442	7,573,467	273,365	5,285,731	1,761,910	252,460	9,493,562	303,730	6,342,877	2,819,057	133,898	41	1	1	6	0.25	0.25	0.27
1962					2,048	3,732	17,028,556	4,585,903	6,194,830	3,097,445	3,150,378	7,626,330	217,625	3,484,626	774,361	3,150,318	10,038,629	133,931	4,355,312	1,858,467	3,150,318	42	2	2	0	0.25	0.25	0.24
1961					2,043	3,607	16,712,249	4,420,641	6,119,590	3,059,795	3,112,223	5,182,219	195,098	2,561,702	382,474	2,022,945	8,236,546	114,648	4,283,713	1,223,918	2,614,267	43	3	3	1	0.24	0.24	0.24
1960					1,864	3,486	14,963,872	3,893,124	5,497,316	2,748,659	2,816,771	3,262,143	160,036	1,739,386	171,791	1,190,931	5,875,403	110,516	3,298,391	549,732	1,916,764	44	4	4	2	0.24	0.24	0.23
1959					1,405	3,370	11,199,955	2,840,950	4,093,284	2,161,047	2,104,674	3,818,840	108,442	371,356	2,161,047	577,996	5,339,537	57,476	2,046,642	2,161,047	1,094,430	45	5	0	3	0.23	0.22	0.22
1958					701	3,257	5,504,304	1,370,869	2,030,401	1,068,632	1,034,342	1,123,015	48,664	361,368	534,346	178,636	2,110,501	71,024	812,160	854,954	372,363	46	6	1	4	0.23	0.21	0.22
1957					843	3,148	6,490,325	1,591,812	2,396,867	1,274,252	1,227,394	833,472	52,552	319,943	316,563	142,413	1,763,362	54,272	719,060	764,551	245,479	47	7	2	5	0.22	0.21	0.22
1956					1,573	3,043	11,888,921	2,872,351	4,383,567	2,356,295	2,276,708	993,285	88,190	438,852	294,537	171,707	1,950,095	38,795	876,713	942,518	91,068	48	8	3	6	0.22	0.20	0.21
1955					839	2,942	6,234,768	1,480,096	2,228,260	1,236,600	1,289,790	1,576,650	42,262	167,310	77,288	1,289,790	1,831,747	71,869	222,828	247,320	1,289,790	49	9	4	0	0.22	0.20	0.19

Depreciation - replacement val. | Depreciation - historical val. | Sensitivity analysis

Figure 2 - "Depreciation - historical val." Sheet. Source: Capital value 2005 – master file.xls.

Update of the validation model (single vessel approach)

The original Master file above described runs, as specified, by vintage classes or group of vessels with the same age.

The use of the templates to produce estimates for different fleet segments (commonly AER fleet segments) means organising original data (fleet data with dimensional information and year of construction) by fleet segments and by vintage classes. In case fleet segments requires different assumptions (e.g. different PCU) this would imply a not marginal increase in the number of sheets. This would also mean that, more disaggregated estimates, if needed, e.g. geographically, should be produced time by time, making the work more complex and long.

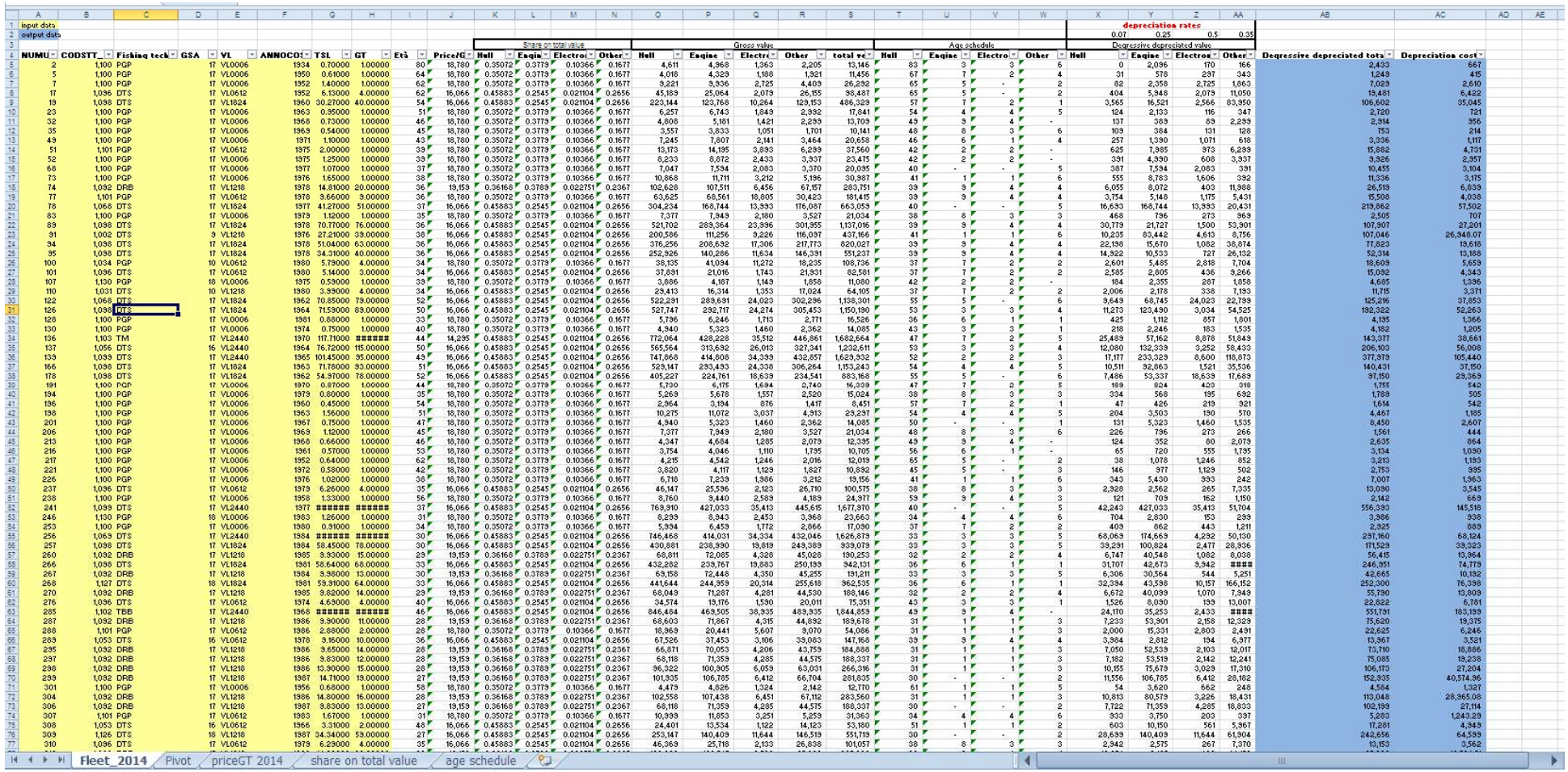
For all these reasons, the Italian team (NISEA) has developed a new Excel template, working on single vessels. Gross and depreciated capital values, as well as depreciation costs, for each single vessel of the fleet are produced, allowing all the aggregation needed for different use, including, of course, the AER segmentations.

The main sheet (Figure 3), where estimates are produced, is linked to other sheets were the main assumptions needed for the estimates (i.e. age schedule, depreciation rate, PCU, share of assets) are reported.

In the main sheets, the following inputs and outputs are, respectively entered and produced:

Columns or cells	Input or output description
Columns A to H (inputs)	Vessels' details: from UE registration number, to stratification (if used by MS), to fleet segmentation, to the year of construction and dimensional characteristics (tonnage, power and length). The columns could be adjusted according to specific (MS) needs.
Column I (calculation)	Age calculation, by subtracting the vessel year of construction to the current year.
Column J (input, recalling price sheet)	Imputation, for each vessel, of the PCU, according to its characteristics (for the Italian case, according to fishing technique). PCU entered in "PriceYear"sheet.
Columns K to N (input, recalling share of assets on total value)	Imputation, for each vessel, of the share of assets on the overall value of the vessels according to its characteristics (for the Italian case, according to fishing technique). Shares entered in the "share on total value" sheet.
Columns O to S (output)	Estimates of the ***gross*** value of each vessel, by type of asset. • Column O: gross value of the *hull* of each vessel (PCU*selected CU*share of hull) • Column P: gross value of the *engine* of each vessel (PCU*selected CU*share of engine) • Column Q: gross value of the *electronics* equipment of each vessel (PCU*selected CU*share of electronics) • Column R: gross value of the *other equipment* of each vessel (PCU*selected CU*share of other equipment)

	• Column S: *total* gross value of each vessel
Columns T to W (input, recalling the age schedule of assets)	Imputation, for each vessel, of the age schedule of each assets according to vessel's age, calculated in column I. Service life of each assets are entered in the "age schedule" sheet.
Cells X2, Y2, Z2 and AA2	Depreciation rates for each assets
Columns X to AA (output)	Estimates of the ***depreciated*** capital value, by asset type, and according to the ***digressive*** depreciation scheme: • Column X: digressive depreciated value of the *hull* of each vessel= gross value of the hull*(1-depreciation rate for the hull)^(age of the hull) • Column Y: digressive depreciated value of the *engine* of each vessel = gross value of the engine*(1-depreciation rate for the engine)^(age of the engine) • Column Z: digressive depreciated value of *electronics* of each vessel = gross value of electronics*(1-depreciation rate for electronics)^(age of the electronics) • Column AA: digressive depreciated value of *other equipment* of each vessel= gross value of other equipment*(1-depreciation rate for other equipment)^(age of the other equipment)
Column AB (output)	Total digressive depreciated value of each vessel (sum of column X to AA)
Column AC (output)	Depreciation costs for each vessel, calculated according to the digressive scheme (consumption of fixed capital for the current year, calculated by depreciating for one more year, according to the digressive scheme, the total depreciated capital value)



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
1	input data																								depreciation rates						
2	output data																								0.07	0.25	0.5	0.35			
3											Share on total value				Gross value					Age schedule				Degressive depreciated value						
4	NUMU	CODSTT	Fishing tech	GSA	VL	ANNOCOS	TSL	GT	Età	PriceJG	Hull	Eaqua	Electro	Other	Hull	Eaqua	Electro	Other	total ve	Hull	Eaqua	Electro	Other	Hull	Eaqua	Electro	Other	Degressive depreciated tota	Depreciation cost		
5	2	1,100	PGP		17 VL0006	1934	0.70000	1.00000	80	18,780	0.35072	0.3779	0.10366	0.1677	4,611	4,968	1,363	2,205	13,146	83	3	3	6	0	2,096	170	166	2,433	667		
6	5	1,100	PGP		17 VL0006	1950	0.61000	1.00000	64	18,780	0.35072	0.3779	0.10366	0.1677	4,018	4,329	1,188	1,921	11,456	67	7	2	4	31	578	297	343	1,249	415		
7	7	1,100	PGP		17 VL0006	1952	1.40000	1.00000	62	18,780	0.35072	0.3779	0.10366	0.1677	9,221	9,936	2,725	4,409	26,292	65	5	-	2	82	2,358	2,725	1,863	7,029	2,610		
8	17	1,036	DTS		17 VL0612	1952	6.13000	4.00000	62	16,066	0.45883	0.2545	0.021104	0.2656	45,183	25,064	2,079	26,155	98,487	65	5	-	2	404	5,948	2,079	11,050	19,481	6,422		
9	19	1,038	DTS		17 VL1824	1960	30.27000	40.00000	54	16,066	0.45883	0.2545	0.021104	0.2656	223,144	123,768	10,264	129,153	486,329	57	7	2	1	3,565	16,521	2,566	83,350	106,602	35,045		
10	23	1,100	PGP		17 VL0006	1963	0.95000	1.00000	51	18,780	0.35072	0.3779	0.10366	0.1677	6,257	6,743	1,849	2,992	17,841	54	4	4	5	124	2,133	116	347	2,720	721		
11	32	1,100	PGP		17 VL0006	1968	0.73000	1.00000	46	18,780	0.35072	0.3779	0.10366	0.1677	4,808	5,181	1,421	2,299	13,709	49	9	4	-	137	389	89	2,299	2,914	956		
12	35	1,100	PGP		17 VL0006	1969	0.54000	1.00000	45	18,780	0.35072	0.3779	0.10366	0.1677	3,557	3,833	1,051	1,701	10,141	48	8	3	6	103	384	131	128	753	214		
13	49	1,100	PGP		17 VL0006	1971	1.10000	1.00000	43	18,780	0.35072	0.3779	0.10366	0.1677	7,245	7,807	2,141	3,464	20,658	46	6	1	4	257	1,390	1,071	618	3,336	1,117		
14	51	1,101	PGP		17 VL0612	1975	2.00000	1.00000	39	18,780	0.35072	0.3779	0.10366	0.1677	13,173	14,195	3,893	6,299	37,560	42	2	2	-	625	7,385	973	6,299	15,882	4,731		
15	52	1,100	PGP		17 VL0006	1975	1.25000	1.00000	39	18,780	0.35072	0.3779	0.10366	0.1677	8,233	8,872	2,433	3,937	23,475	42	2	2	-	331	4,930	608	3,937	9,926	2,957		
16	68	1,100	PGP		17 VL0006	1977	1.07000	1.00000	37	18,780	0.35072	0.3779	0.10366	0.1677	7,047	7,594	2,083	3,370	20,095	40	-	-	5	387	7,594	2,083	331	10,455	3,104		
17	73	1,100	PGP		17 VL0006	1976	1.65000	1.00000	38	18,780	0.35072	0.3779	0.10366	0.1677	10,868	11,711	3,212	5,196	30,987	41	1	1	6	555	8,783	1,606	332	11,336	3,175		
18	74	1,032	DRB		17 VL1218	1978	14.81000	20.00000	36	19,153	0.36168	0.3789	0.022751	0.2367	102,628	107,511	6,456	67,157	283,751	39	9	4	4	6,055	8,072	403	11,988	26,518	6,633		
19	77	1,101	PGP		17 VL0612	1978	3.66000	3.00000	36	18,780	0.35072	0.3779	0.10366	0.1677	63,625	68,561	18,805	30,423	181,415	39	9	4	4	3,754	5,148	1,175	5,431	15,508	4,038		
20	78	1,068	DTS		17 VL1824	1977	41.27000	51.00000	37	16,066	0.45883	0.2545	0.021104	0.2656	304,234	168,744	13,393	176,087	663,053	40	-	-	5	16,693	168,744	13,393	20,431	219,862	57,502		
21	83	1,100	PGP		17 VL0006	1979	1.12000	1.00000	35	18,780	0.35072	0.3779	0.10366	0.1677	7,377	7,943	2,180	3,527	21,034	38	8	3	3	468	736	273	363	2,505	707		
22	89	1,038	DTS		17 VL1824	1978	70.77000	76.00000	36	16,066	0.45883	0.2545	0.021104	0.2656	521,702	289,364	23,396	301,955	1,137,016	39	9	4	4	30,779	21,727	1,500	53,901	107,907	27,201		
23	91	1,002	DTS		9 VL1218	1976	27.21000	33.00000	38	16,066	0.45883	0.2545	0.021104	0.2656	200,586	111,256	9,226	116,097	437,166	41	1	1	6	10,235	83,442	4,613	8,756	107,046	26,948.07		
24	94	1,036	DTS		17 VL1824	1978	51.04000	63.00000	36	16,066	0.45883	0.2545	0.021104	0.2656	376,256	208,632	17,306	217,773	820,027	39	9	4	4	22,138	15,670	1,082	38,674	77,823	19,618		
25	95	1,036	DTS		17 VL1824	1978	34.31000	40.00000	36	16,066	0.45883	0.2545	0.021104	0.2656	252,926	140,286	11,634	146,331	551,237	39	9	4	4	14,922	10,533	727	26,132	52,314	13,188		
26	100	1,034	PGP		10 VL0612	1980	5.79000	4.00000	34	18,780	0.35072	0.3779	0.10366	0.1677	38,135	41,094	11,272	18,235	108,736	37	7	2	2	2,601	5,485	2,818	1,704	18,609	5,659		
27	101	1,036	DTS		17 VL0612	1980	5.14000	3.00000	34	16,066	0.45883	0.2545	0.021104	0.2656	37,831	21,016	1,743	21,931	82,581	37	7	2	2	2,585	2,805	436	3,266	15,092	4,343		
28	107	1,130	PGP		18 VL0006	1975	0.59000	1.00000	39	18,780	0.35072	0.3779	0.10366	0.1677	3,886	4,187	1,149	1,858	11,080	42	2	2	-	184	2,355	287	1,858	4,685	1,396		
29	110	1,031	DTS		10 VL1218	1980	3.39000	4.00000	34	16,066	0.45883	0.2545	0.021104	0.2656	29,413	16,314	1,353	17,024	64,105	37	7	2	2	2,006	2,178	338	7,193	11,715	3,371		
30	122	1,068	DTS		17 VL1824	1962	70.85000	79.00000	52	16,066	0.45883	0.2545	0.021104	0.2656	522,291	289,631	24,023	302,296	1,138,301	55	5	-	6	9,643	68,745	24,023	22,799	125,216	37,853		
31	126	1,038	DTS		17 VL1824	1964	71.59000	89.00000	50	16,066	0.45883	0.2545	0.021104	0.2656	527,747	292,717	24,274	305,453	1,150,190	53	3	3	4	11,273	123,490	3,034	54,525	192,322	52,263		
32	128	1,100	PGP		17 VL0006	1981	0.88000	1.00000	33	18,780	0.35072	0.3779	0.10366	0.1677	5,796	6,246	1,713	2,771	16,526	36	6	1	1	425	1,112	857	1,801	4,195	1,366		
33	130	1,100	PGP		17 VL0006	1974	0.75000	1.00000	40	18,780	0.35072	0.3779	0.10366	0.1677	4,940	5,323	1,460	2,362	14,085	43	3	3	1	218	2,246	161	1,535	4,162	1,205		
34	136	1,103	TM		17 VL2440	1970	117.71000	######	44	14,235	0.45883	0.2545	0.021104	0.2656	772,064	428,228	35,512	446,861	1,682,664	47	7	2	5	25,489	57,162	8,878	51,849	143,377	38,661		
35	137	1,056	DTS		16 VL2440	1964	76.72000	115.00000	50	16,066	0.45883	0.2545	0.021104	0.2656	565,564	313,632	26,013	327,341	1,232,611	53	3	3	4	12,080	132,339	3,252	58,433	206,103	56,008		
36	139	1,039	DTS		17 VL2440	1965	101.45000	35.00000	49	16,066	0.45883	0.2545	0.021104	0.2656	747,868	414,808	34,399	432,857	1,629,932	52	2	2	3	17,177	233,329	8,600	118,373	377,979	105,440		
37	166	1,036	DTS		17 VL1824	1963	71.76000	93.00000	51	16,066	0.45883	0.2545	0.021104	0.2656	529,147	293,493	24,338	306,264	1,153,243	54	4	4	5	10,511	92,863	1,521	35,536	140,431	37,150		
38	178	1,038	DTS		17 VL1824	1962	54.97000	78.00000	52	16,066	0.45883	0.2545	0.021104	0.2656	405,227	224,761	18,639	234,541	883,168	55	5	-	6	7,486	53,337	18,639	17,689	97,150	29,369		
39	181	1,100	PGP		17 VL0006	1970	0.87000	1.00000	44	18,780	0.35072	0.3779	0.10366	0.1677	5,730	6,175	1,694	2,740	16,338	47	7	2	1	189	824	423	318	1,755	542		
40	194	1,100	PGP		17 VL0006	1978	0.80000	1.00000	35	18,780	0.35072	0.3779	0.10366	0.1677	5,269	5,678	1,557	2,520	15,024	38	8	3	3	334	568	195	692	1,789	505		
41	196	1,100	PGP		17 VL0006	1960	0.45000	1.00000	54	18,780	0.35072	0.3779	0.10366	0.1677	2,364	3,194	876	1,417	8,451	57	7	2	1	47	426	219	321	1,014	542		
42	198	1,100	PGP		17 VL0006	1963	1.56000	1.00000	51	18,780	0.35072	0.3779	0.10366	0.1677	10,275	11,072	3,037	4,913	29,297	54	4	4	5	204	3,503	190	570	4,467	1,185		
43	201	1,100	PGP		17 VL0006	1967	0.75000	1.00000	47	18,780	0.35072	0.3779	0.10366	0.1677	4,940	5,323	1,460	2,362	14,085	50	-	-	1	131	5,323	1,460	1,535	8,450	2,607		
44	206	1,100	PGP		17 VL0006	1968	1.12000	1.00000	45	18,780	0.35072	0.3779	0.10366	0.1677	7,377	7,943	2,180	3,527	21,034	48	8	3	6	226	736	273	366	1,561	444		
45	213	1,100	PGP		17 VL0006	1968	0.66000	1.00000	46	18,780	0.35072	0.3779	0.10366	0.1677	4,347	4,684	1,285	2,079	12,395	49	9	4	-	124	352	80	2,079	2,635	864		
46	216	1,100	PGP		17 VL0006	1961	0.57000	1.00000	53	18,780	0.35072	0.3779	0.10366	0.1677	3,754	4,046	1,110	1,795	10,705	56	6	1	-	65	720	555	1,795	3,134	1,030		
47	217	1,100	PGP		17 VL0006	1952	0.64000	1.00000	62	18,780	0.35072	0.3779	0.10366	0.1677	4,215	4,542	1,246	2,016	12,019	65	5	-	2	38	1,078	1,246	852	3,213	1,193		
48	221	1,100	PGP		17 VL0006	1972	0.58000	1.00000	42	18,780	0.35072	0.3779	0.10366	0.1677	3,820	4,117	1,129	1,827	10,892	45	5	-	3	146	977	1,129	502	2,753	935		
49	226	1,100	PGP		17 VL0006	1976	1.02000	1.00000	38	18,780	0.35072	0.3779	0.10366	0.1677	6,718	7,239	1,986	3,212	19,156	41	1	1	6	343	5,430	393	242	7,007	1,963		
50	237	1,036	DTS		17 VL0612	1979	6.26000	4.00000	35	16,066	0.45883	0.2545	0.021104	0.2656	46,147	25,596	2,123	26,710	100,576	38	8	3	3	2,928	2,562	265	7,335	13,090	3,545		
51	238	1,100	PGP		17 VL0006	1958	1.33000	1.00000	56	18,780	0.35072	0.3779	0.10366	0.1677	8,760	9,440	2,589	4,183	24,977	59	9	4	3	121	709	162	1,150	2,142	669		
52	241	1,039	DTS		17 VL2440	1977	######	######	37	16,066	0.45883	0.2545	0.021104	0.2656	763,910	427,033	35,413	445,615	1,677,970	40	-	-	5	42,243	427,033	35,413	51,704	556,393	145,518		
53	246	1,130	PGP		18 VL0006	1983	1.26000	1.00000	31	18,780	0.35072	0.3779	0.10366	0.1677	8,239	8,943	2,453	3,968	23,663	34	4	4	6	704	2,830	153	239	3,386	938		
54	253	1,100	PGP		17 VL0006	1980	0.91000	1.00000	34	18,780	0.35072	0.3779	0.10366	0.1677	5,394	6,459	1,772	2,866	17,090	37	7	2	4	409	862	443	1,211	2,925	889		
55	256	1,063	DTS		17 VL2440	1984	######	######	30	16,066	0.45883	0.2545	0.021104	0.2656	746,468	414,031	34,334	432,046	1,626,879	33	3	3	5	68,069	174,669	4,232	50,130	297,160	68,124		
56	257	1,038	DTS		17 VL1824	1984	58.45000	78.00000	30	16,066	0.45883	0.2545	0.021104	0.2656	430,881	238,990	19,819	243,383	933,073	33	3	3	5	39,231	100,824	2,477	28,936	171,529	39,323		
57	260	1,032	DRB		17 VL1218	1985	3.93000	15.00000	29	19,153	0.36168	0.3789	0.022751	0.2367	66,811	72,085	4,328	45,028	190,253	32	2	2	4	6,747	40,548	1,082	8,038	56,415	13,964		
58	266	1,038	DTS		17 VL1824	1981	58.64000	68.00000	33	16,066	0.45883	0.2545	0.021104	0.2656	432,282	239,767	19,883	250,199	942,131	36	6	1	1	31,707	42,673	3,942	####	246,351	74,779		
59	267	1,032	DRB		17 VL1218	1984	3.98000	13.00000	30	19,153	0.36168	0.3789	0.022751	0.2367	63,158	72,448	4,350	45,255	181,211	33	3	3	5	6,306	30,564	544	5,251	42,665	10,192		
60	268	1,127	DTS		18 VL1824	1981	53.31000	64.00000	33	16,066	0.45883	0.2545	0.021104	0.2656	441,644	244,959	20,314	255,618	962,535	36	6	1	1	32,394	43,538	10,157	166,152	252,300	76,398		
61	270	1,032	DRB		17 VL1218	1985	3.82000	14.00000	29	19,153	0.36168	0.3789	0.022751	0.2367	68,049	71,287	4,281	44,530	188,146	32	2	2	4	6,672	40,099	1,070	1,949	55,790	13,809		
62	276	1,036	DTS		17 VL0612	1974	4.63000	4.00000	40	16,066	0.45883	0.2545	0.021104	0.2656	34,574	19,176	1,590	20,011	75,351	43	3	3	1	1,526	8,090	139	13,007	22,822	6,781		
63	285	1,102	TBB		17 VL2440	1968	######	######	46	16,066	0.45883	0.2545	0.021104	0.2656	846,484	469,505	38,935	489,935	1,844,859	49	9	4	-	24,170	35,253	2,433	####	551,791	163,139		
64	287	1,032	DRB		17 VL1218	1986	3.90000	11.00000	28	19,153	0.36168	0.3789	0.022751	0.2367	68,603	71,867	4,315	44,892	189,678	31	1	1	3	7,233	53,901	2,158	12,329	75,620	19,375		
65	288	1,101	PGP		17 VL0612	1986	2.88000	2.00000	28	18,780	0.35072	0.3779	0.10366	0.1677	18,369	20,441	5,607	9,070	54,086	31	1	1	3	2,000	15,331	2,803	2,491	22,625	6,246		
66	293	1,053	DTS		16 VL0612	1978	3.16000	10.00000	36	16,066	0.45883	0.2545	0.021104	0.2656	67,526	37,453	3,106	39,083	147,168	39	9	4	4	3,384	2,812	194	6,377	13,967	3,521		
67	295	1,032	DRB		17 VL1218	1986	3.65000	14.00000	28	19,153	0.36168	0.3789	0.022751	0.2367	66,811	70,053	4,206	43,759	184,888	31	1	1	3	7,050	52,533	2,103	12,017	73,710	18,886		
68	297	1,032	DRB		17 VL1218	1986	3.82000	12.00000	28	19,153	0.36168	0.3789	0.022751	0.2367	68,116	71,359	4,285	44,575	188,337	31	1	1	3	7,182	53,539	2,142	12,241	75,085	19,238		
69	298	1,032	DRB		17 VL1218	1986	13.90000	15.00000	28	19,153	0.36168	0.3789	0.022751	0.2367	96,322	100,905	6,059	63,031	266,316	31	1	1	3	10,155	75,679	3,029	17,310	106,173	27,204		
70	299	1,032	DRB		17 VL1218	1987	14.71000	19.00000	27	19,153	0.36168	0.3789	0.022751	0.2367	101,935	106,785	6,412	66,704	281,835	30	-	-	2	11,556	106,785	6,412	28,182	152,935	40,574.96		
71	301	1,100	PGP		17 VL0006	1956	0.68000	1.00000	58	18,780	0.35072	0.3779	0.10366	0.1677	4,479	4,826	1,324	2,142	12,770	61	1	1	5	54	3,620	662	248	4,584	1,327		
72	304	1,032	DRB		17 VL1218	1986	14.80000	16.00000	28	19,153	0.36168	0.3789	0.022751	0.2367	102,558	107,438	6,451	67,112	283,560	31	1	1	3	10,813	80,579	3,226	18,431	113,048	28,365.08		
73	306	1,032	DRB		17 VL1218	1987	9.83000	13.00000	27	19,153	0.36168	0.3789	0.022751	0.2367	68,116	71,359	4,285	44,575	188,337	30	-	-	2	7,722	71,359	4,285	16,833	102,199	27,114		
74	307	1,101	PGP		17 VL0612	1983	1.67000	1.00000	31	18,780	0.35072	0.3779	0.10366	0.1677	10,999	11,853	3,251	5,253	31,356	34	4	4	6	933	3,750	203	397	5,283	1,243.29		
75	308	1,053	DTS		16 VL0612	1966	3.31000	2.00000	48	16,066	0.45883	0.2545	0.021104	0.2656	24,401	13,534	1,122	14,123	53,180	51	1	1	2	603	10,150	561	5,367	11,281	4,349		
76	309	1,126	DTS		18 VL1218	1987	34.34000	53.00000	27	16,066	0.45883	0.2545	0.021104	0.2656	253,147	140,409	11,644	146,513	551,719	30	-	-	2	28,699	140,409	11,644	61,904	242,656	64,599		
77	310	1,096	DTS		17 VL0612	1979	6.23000	4.00000	35	16,066	0.45883	0.2545	0.021104	0.2656	46,369	25,718	2,133	26,838	101,057	38	8	3	3	2,342	2,575	267	7,370	13,153	3,562		

Fleet_2014 | Pivot | priceGT 2014 | share on total value | age schedule

Figure 3 – "Fleet" Sheet. Source: Replacement value capital estimation_Simple template.xlsx.

Valuation of fishing rights

Pgecon Workshop October 2019, Wednesday

10/9/2019

J.A.E. van Oostenbrugge, G Hoekstra



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TOR

1. TOR 4. Practical implementation of guidelines provided by SecFish WP 4 on the evaluation of intangible assets

Wednesday:

Present and discuss the tests of methods implemented on national cases

Thursday:

Discussion on harmonization of methods and parameters used (e.g. discount rates).

Which vessel is worth more??





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Secfish approach

Theory

Guidelines

Avaliable data

Type of fishing rights

Type of rights (1)

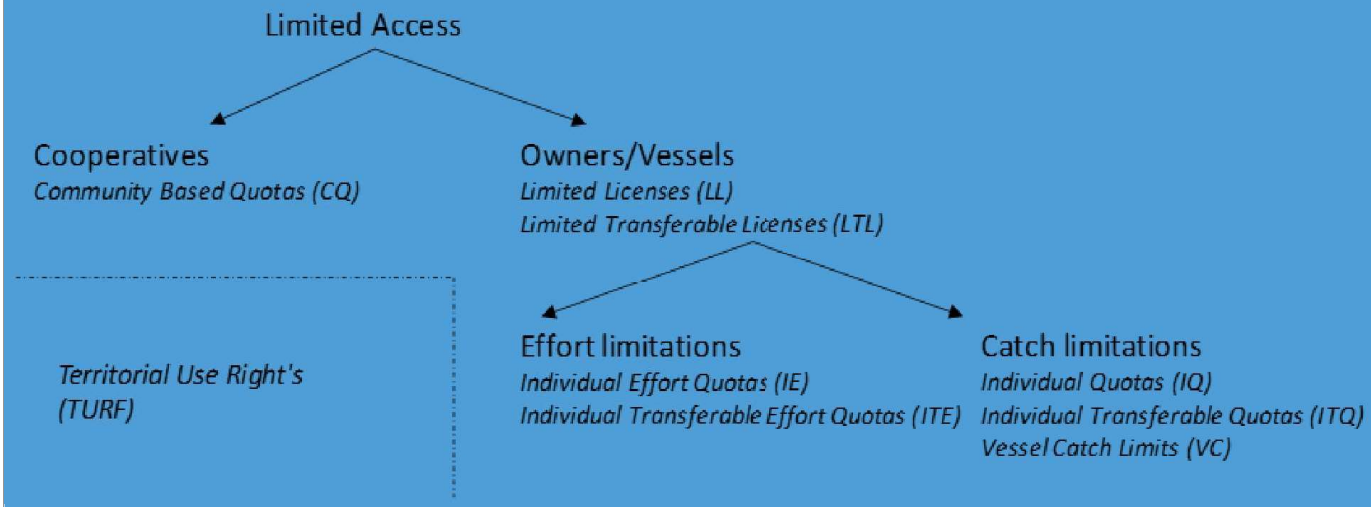


Figure 1: Overview of fishing right regimes (MRAG et al, 2009)

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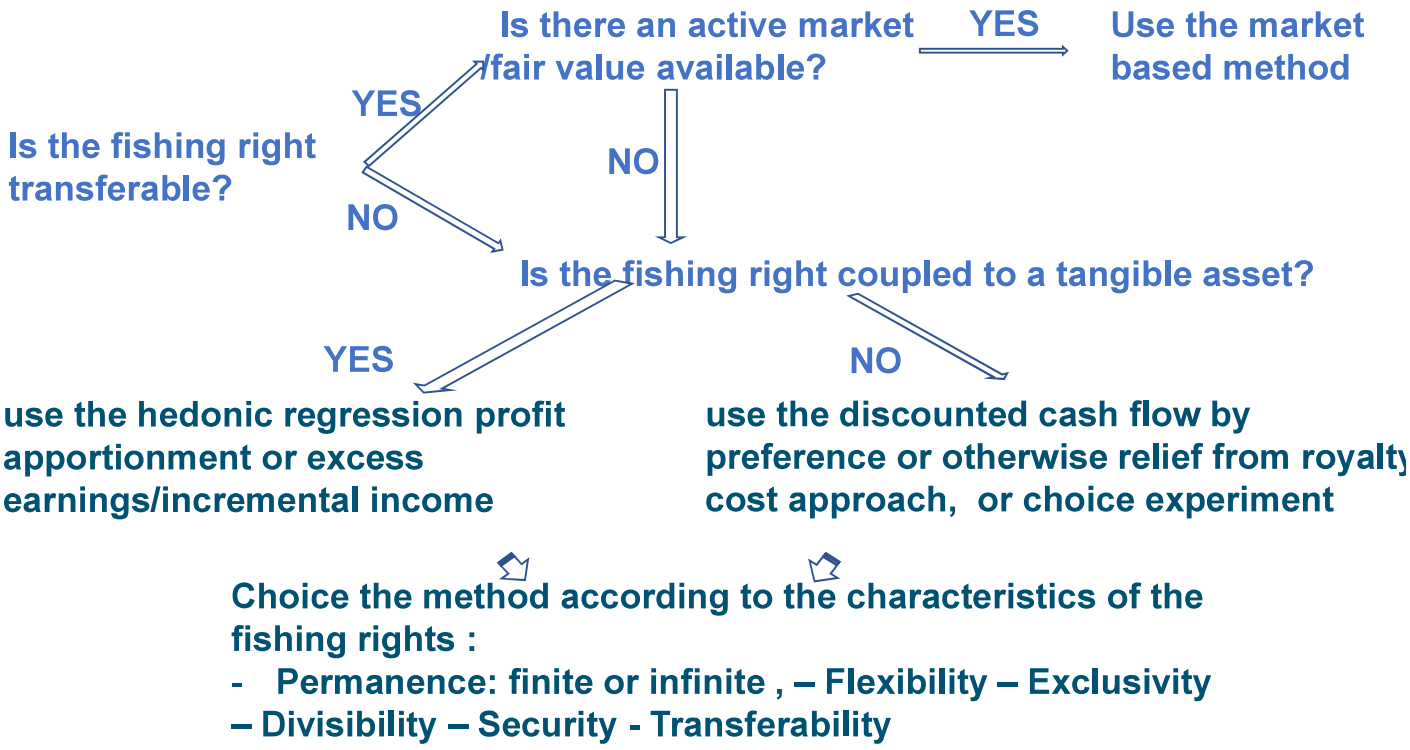
Type of fishing rights (2)

1. Fishing rights that are traded in a market
2. Fishing rights that are not traded (or not in big enough volumes for a reference price to be established)
3. Fishing rights that are attached to a tangible asset (often the vessel) are traded inseparably from each other.

However, according to IAS 38 (2008, art.44) an intangible asset acquired by government grant should be valued at fair value (if applicable) or by the symbolic value (e.g. initially nominal consideration) plus any expenditure that is directly attributable to the operations of preparing the asset for the use of it which it is intended for.

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Valuation methods: Decision tree



Implementation: Discounted Cash Flow Method

- value intangible assets: present value of future economic income adjusted by discount rate(s)

- **Accounting theory:**
  - Value = NPV (Operating Cash Flow) = Net Income + Non-Cash Expenses – Increase in Working Capital
- **Application in fisheries (UK):**
  - Value = NPV (Net profit).
  - Net profit for each stock from value of quota and profitability of fiseries
  - Discount rate: 10% discount rate and a 15 year asset life

Hedonic price method

- To be used in case the rights are attached to tangible asset.
- prices of a good traded on the market are determined by a set of factors, sometimes implicit
- Required data: net physical value and market value
- hedonic price regression model:
- NPV = β0 + β1A1 + ...+ β2IA1 + ... + ε
  - - β = coefficients
  - - A = Fair value of similar/identifiable tangible asset
  - - AI = Fair value of similar/identifiable intangible asset
  - - E = error term (how the observed data differ from actual data)

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Other methods

Little or no data on transactions:

- **Choice experiments, or survey methods:**

- Disadvantage: depend on own perception, so prone to bias

Case studies

Little or no data on transactions:

- **Choice experiments, or survey methods:**
- Disadvantage: depend on own perception, so prone to bias

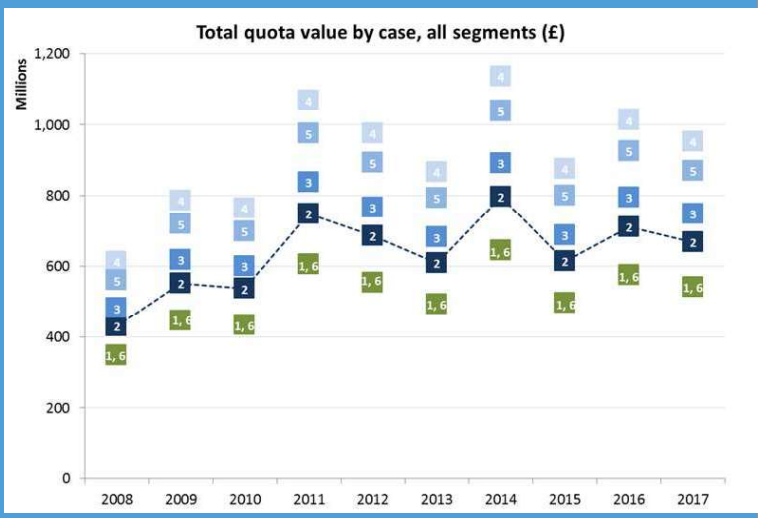
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Conclusions

- **Valuation of fishing rights is complex**
- **Current guidelines provide guidence:**
  - **Which methods to use**
  - **Worked examples**
- **Still no had science!:**
  - **e.g. UK: NPV conststants**
  - **e.g.NL: plaice value:**

    Market based: €98 mln

    DisCF: €30 mln - 82 mln.



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Overview fishing rights

MS	Limited Non-Transferable Licences (LL)	Limited Transferable Licences (LTL)	Individual Non-Transferable Quotas (IQ)	Individual Transferable Quotas (ITQ)
Belgium	1		3	
Bulgaria	1		1	
Croatia		1	2	
Denmark	1	1		2
Estonia				4
Finland				1
France	1		1	
Gemany			1	
Italy	1		2	
Ireland	1			
Latvia	1		1	
Lithuania				2
Netherlands	2	3		4
Poland			1	
Romania			3	
Sweden	1		1	1
UK		4		1
Total	10	9	16	15

Excercise: value your own quota

- **Data needed:**
  - **Landings**
  - **Prices**
  - **Economics: net profit margin**
- **Calculation:**
  - **Discounted cash flow method**
  - **Methods: see excel sheet.**

Questions



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Valuation of fishing rights

Pgecon Workshop October 2019, Thursday

11/9/2019

J.A.E. van Oostenbrugge





Harmonising parameters/methods

Oucome case studies Secfish

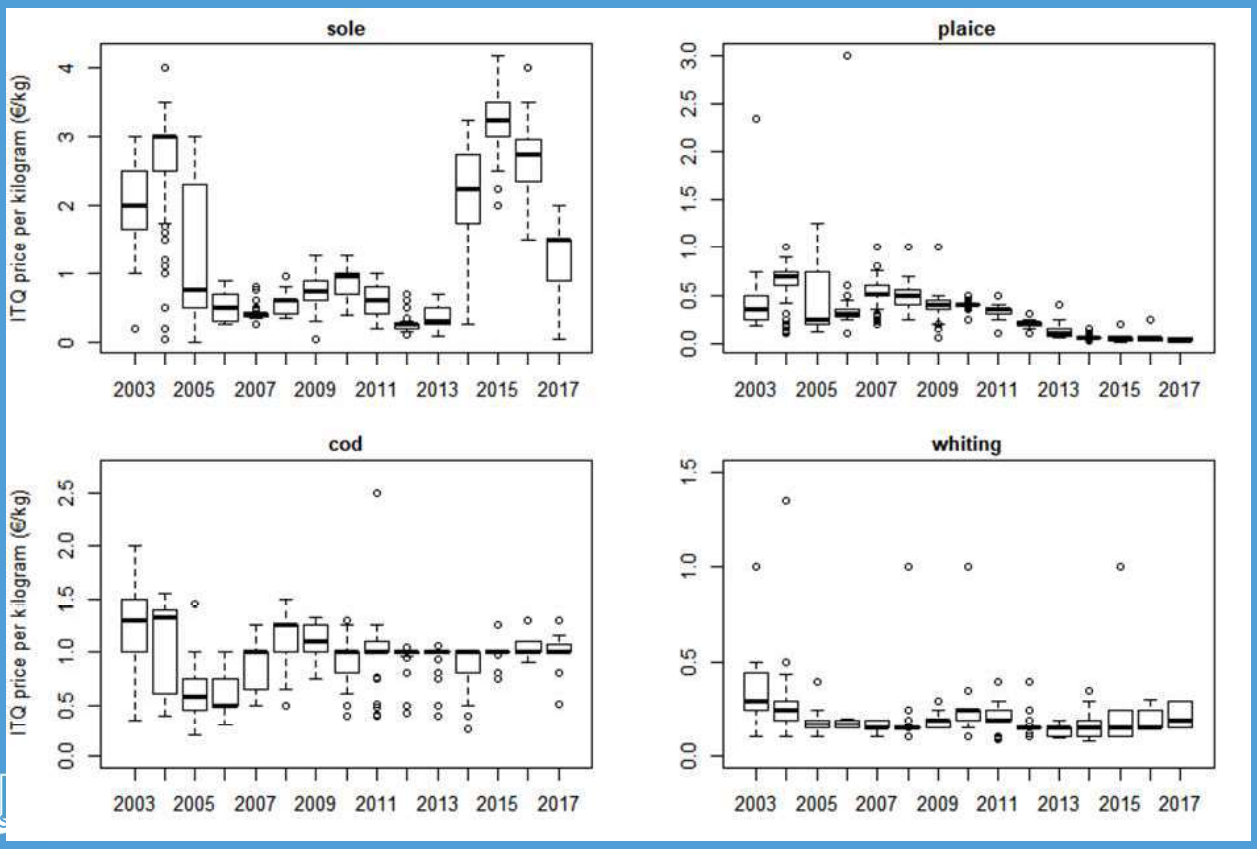
		Depreciation rate	lifetime	Resulting factor	Values (mln.)
UK	Fish	0.1	15	8	
	public goods	0.035	30	18	
NL	estimation			10-25	30-82
	market				99
BE	estimation			10	78
IT	estimation		infinite	10	48
	market				74
	estimation		3, 15	various	84-102

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Questions

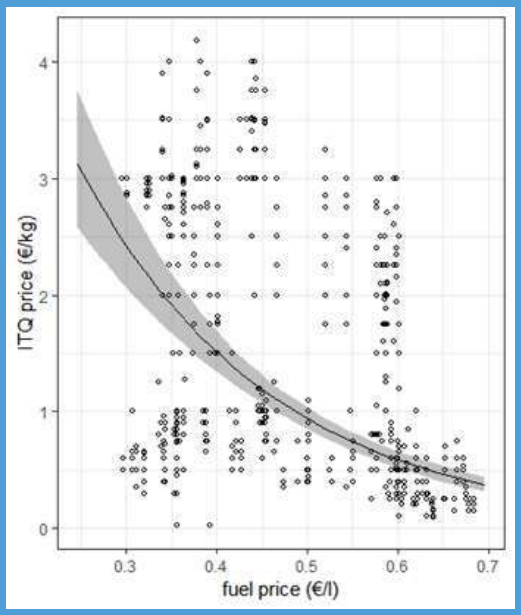


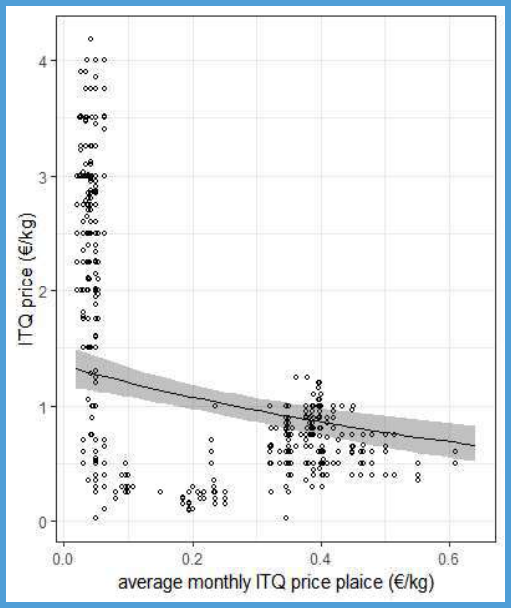
External factors influencing ITQ prices, results 1



External factors influencing ITQ prices, results 2

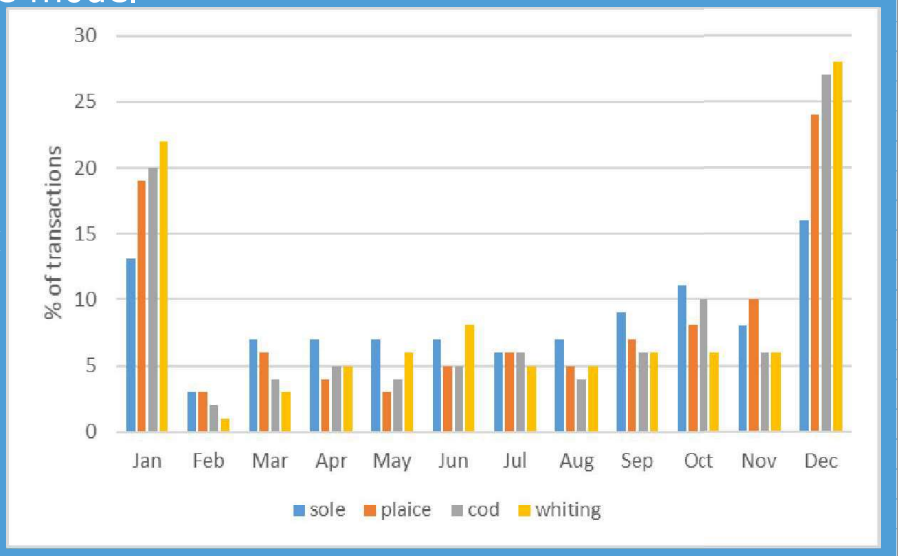
price_kg ~ quota_sol + tong_cpue + fuel_price + price_sol + avg_itq_ple_price + leasing_ID + leaser_ID + time_month





External factors influencing ITQ prices, conclusions

- Fuel prices, national quota and fish prices affect lease prices
- Small scale dynamics can only be explained to a small extent
- Many independent variables are correlated, so a limited number can be taken into account in the model
- Large seasonal effect:
- **Price formation of**
- **ITQ's is very complex**



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VALUE OF FISHERIES QUOTAS AND OTHER FISHING RIGHTS

INDIVIDUAL TRANSFERABLE QUOTAS IN LITHUANIA

Individual transferable quotas in Lithuania was introduced from 2016 December.

Data that can be obtained for Individual transferable quotas:

- Quantities acquired by transferable quota;
- Quantities of transferred quota;
- Quantities of bought quota through auction;

<u>No values of quota transactions</u>

Pilot study for 2018:

DEVELOPMENT OF METHODOLOGICAL MEASURES FOR DETERMINING THE VALUE OF QUOTAS IN LITHUANIA

VALUE OF FISHERIES QUOTAS AND OTHER FISHING RIGHTS

DEVELOPMENT OF METHODOLOGICAL MEASURES FOR DETERMINING THE VALUE OF QUOTAS IN LITHUANIA

The process of evaluating intangible assets:

Obtain market transaction values of transferable quota to estimate fair value of an intangible asset.



III. ŽVEJYBOS IŠLAIDŲ SKAIDYMAS PAGAL ATSKIRAS ŽUVŲ RŪŠIS 2018 M.

žuvų rūšis arba jų grupė (pvz.: pelaginės) | 1 (.....) | 2 (.....) | 3 (.....) | 4 (.....)

VĮ Žemės ūkio informacijos ir kaimo verslo centro 2019-07- rašto Nr. priedas

KINTAMŲJŲ ŽVEJYBOS IŠLAIDŲ IŠSKAIDYMO BEI ŽVEJYBOS KVOTOS IR KITŲ ŽVEJYBOS TEISIŲ VERTĖS 2018 M., PAGAL ATSKIRAS ŽUVŲ RŪŠIS TYRIMO, ANKETA

Įmonės pavadinimas:		Ataskaitinis laikotarpis	2018 m.
Duomenis pateikė:		Tyrimo data:	
Tyrimo tikslas:	Parengti informacinę bazę, reikalingą metodinėms priemonėms, skirtoms jūrinės žvejybos laivyno kvotų ir kitų žvejybos teisių vertei nustatyti, sukurti.		
Teisinis pagrindas	2016 m. liepos 12 d. Komisijos įgyvendinimo sprendimo (ES) 2016/1251, kuriuo priimama 2017–2019 m. daugiametė Sąjungos duomenų rinkimo, tvarkymo ir naudojimo žvejybos ir akvakultūros sektoriuose programa, III skyriaus 5b punktas; 2017 m. gruodžio 21 d. Komisijos įgyvendinimo sprendimas C(2017)9142, kuriuo patvirtinamas Lietuvos Respublikos 2018–2019 m. žvejybos ir akvakultūros sektoriaus duomenų rinkimo darbo planas.		
Tyrimo rezultatų panaudojimas:	Tyrimo duomenys ir duomenų analizės rezultatai bus naudojami parengti metodines priemones jūrinės žvejybos laivyno kvotų ir kitų žvejybos teisių vertei (toliau – metodinės priemonės) nustatyti. Pagal metodines priemones apskaičiuoti rodikliai naudojami: - metinėms žvejybos laivyno ekonominės ataskaitoms, teikiamoms Europos Komisijai paregėti; - žvejybos laivyno pajėgumų ir žvejybos galimybių pusiausvyros balanso rodikliams apskaičiuoti ir teikti Europos Komisijai; - paramos ir kompensavimo priemonių 2021-2027 m. laikotarpiu žvejybos laivynui apskaičiavimams ir kitiems nacionaliniams poreikiams		
Garantuojamas gautų duomenų konfidencialumas			

I. ŽVEJYBOS KVOTOS[1]

žuvų rūšis arba jų grupė (pvz.: pelaginės)		1 (.....)	2 (.....)	3 (.....)	4 (.....)
Įsigytos (pirktos) perleidžiamos teisės į žvejybos galimybes[2]	kiekis, kg				
	vertė, Eur				
Aukciono būdu įsigytos teisės į žvejybos galimybes	kiekis, kg				
	vertė, Eur				
Perleistos (parduotos) teisės į žvejybos galimybes	kiekis, kg				
	vertė, Eur				

II. ŽVEJYBOS KAŠTAI - SAVIKAINA PAGAL ŽUVŲ RŪŠIS[3]

Savikaina, Eur/kg	2018				
	2017				
	2016				

[1] Žvejybos kvota – tikio subjektui skiriamas žvejybos limitas ar jo dalis individualios žvejybos galimybės jūrų vandenyse, išreiktos didžiausiu galimu sugauti tam tikros rūšies žuvų kiekiu.
[2] Perleidžiamoji teisė į žvejybos kvotą – tikio subjektui suteikiama kitam tikio subjektui galima perleisti teisė gauti tam tikro dydžio verslinės žvejybos kvotą.
[3] duomenys teikiami tik jeigu įmonė savikaina skaičiuoja atskiroms žuvų rūšims.

THE PROCESS OF EVALUATING INTANGIBLE ASSETS

Obtain market transaction values of transferable quota to estimate fair value of an intangible asset.

REFERENCE TO EVALUATING METHOD FOR ESTIMATING QUOTA VALUE

dividing economic variables by catches (species/segments/vessels)

Creating a forcasting model for economic variables

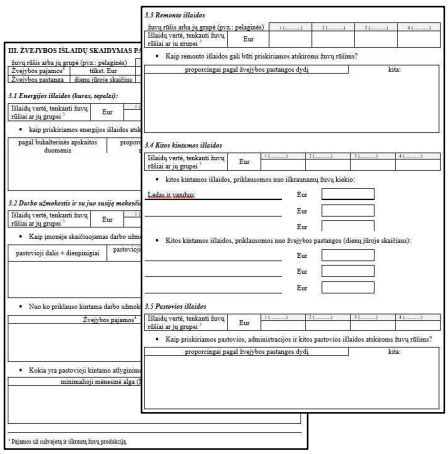
Evaluating intangible assets using Discounted cash flow (DisCF) approach

VALUE OF FISHERIES QUOTAS AND OTHER FISHING RIGHTS

THE PROCESS OF EVALUATING INTANGIBLE ASSETS

actual data/ estimations by fishing companies

Disaggregation by correlation beetween effort/capacity and cost



deviding economic variables by catches (species/segments/vessels)

Creating a forcasting model for economic variables

Evaluating intangible assets using Discounted cash flow (DisCF) approach

THE PROCESS OF EVALUATING INTANGIBLE ASSETS

Finding blanace beetween complex forecasting models and recources (time computing)

deviding economic variables by catches (species/segments/vessels)

Creating a forcasting model for economic variables

Evaluating intangible assets using Discounted cash flow (DisCF) approach

VALUE OF FISHERIES QUOTAS AND OTHER FISHING RIGHTS

THE PROCESS OF EVALUATING INTANGIBLE ASSETS

depreciation costs of quota

permanence/duration of the quota

desired net economic result

deviding economic variables by catches (species/segments/vessels)

Creating a forcasting model for economic variables

Evaluating intangible assets using Discounted cash flow (DisCF) approach

Thank You for Your attention