Háskólinn á Akureyri
University of Akureyri

Assessing Fisheries Subsidies

Brynhildur Benediktsdóttir

Viðskiptadeild
Viðskipta- og raunvísindasvið
Háskólinn á Akureyri
2022

Assessing Fisheries Subsidies

Brynhildur Benediktsdóttir

30 eininga lokaverkefni
sem er hluti af
Magister Scientiae-prófi í viðskiptafræðum

Leiðsögukennari
Helga Kristjánsdóttir

Viðskiptadeild
Viðskipta- og raunvísindasvið
Háskólinn á Akureyri
Akureyri, 14. ágúst 2022

Titill: Assessing Fisheries Subsidies
30 eininga meistaraprófsverkefni sem er hluti af Magister Scientiae-prófi í viðskiptafræðum

Viðskiptadeild
Viðskipta- og raunvísindasvið
Háskólinn á Akureyri
Sólborg, Norðurslóð 2
600 Akureyri

Sími: 460 8000

Skráningarupplýsingar:
Brynhildur Benediktsdóttir, 2022, meistaraprófsverkefni, Viðskiptadeild, viðskipta- og raunvísindasvið, Háskólinn á Akureyri, 74 bls.

Prentun: Ásprent
Akureyri, ágúst, 2022

Útdráttur

Almennt er talið að ríkisstyrkir til fiskveiða geti stuðlað að ofveiði og ósjálfbærri auðlindanýtingu. Heildstæðum gögnum um ríkisstyrki til fiskveiða á heimsvísu er ekki til að dreifa. Á vegum Alþjóða viðskiptastofnunarinnar (WTO) er unnið að frekari viðbótum við nýundirritaðan samning um bann við skaðlegum ríkisstyrkjum í fiskveiðum. Mikilvægt er að slíkar samningaviðræður, sem einnig tengjast heimsmarkmiði 14.6, byggi á traustum grunni og þekkingu á umfang slíkra styrkja. Í þessari ritgerð er leitað svara við spurningunni: Gefa aðferðir sem notaðar eru við nýjasta mat á umfang ríkisstyrkja til fiskveiða í heiminum og birtar eru í grein Sumaila ofl. á árinu 2019 (Sumaila, Ebrahim, et al., 2019) skilvirkt mat fyrir Ísland? Ísland er notað til að kanna áreiðanleika þessara matsaðferða á umfangi ríkisstyrkja. Fyrir Ísland var metið að ríkisstyrkir til fiskveiða hafi numið 162 milljónum Bandaríkjadala eða 17,6 milljörðum íslenskra króna á árinu 2018, eða um 14% af virði landaðs fiskafla það ár. Einstaka liðir matsins eru greindir, upplýsingar sem íslensk stjórnvöld senda til OECD ásamt upplýsingum úr Ríkisreikningi bornar saman við mat höfunda þar sem við á. Farið er í yfir reikniaðferðir þar sem talið er að gögn vanti, útreikningar greindir og endurteknir fyrir einstaka liði. Niðurstaðan er að 17,6 milljarðar séu líklega ofmat á ríkisstyrkjum til íslenska fiskveiðiflotans á árinu 2018.

Abstract

It is widely regarded that fisheries subsidies can contribute to overfishing and pose a challenge to sustainable fisheries management. In absence of reliable data on fisheries subsidies worldwide, modelling work quantifying subsidies contributes to a meaningful outcome in the ongoing World Trade Organization negotiations and fulfillment of SDG 14.6. The research question in this thesis is the following; Are the methods used in the latest assessment of fisheries subsidies worldwide by Sumaila et al. (2019) applicable when estimating fisheries subsidies in Iceland? Using Iceland as a case count, this thesis evaluates the appropriateness of the methods resulting estimate of 162 million USD, or around 17,6 billion ISK total in 2018. This is around 14% of landed value of catch by Icelandic vessels in that year. The estimated amount for Iceland is compared with the subsidies that are reported to the OECD and the expenditure for fisheries management in the Icelandic government accounts. The methods used to model "missing" amounts are reconstructed where possible, and the assumptions behind the modeling assessed. The conclusion is that the methodology of the Sumaila et al. (2019) likely overvalues fisheries subsidies in Iceland.

Foreword

This 30 ECTS thesis is part of a Magister Scientiae study in Business Administration at the University of Akureyri. I would like to thank my supervisor Helga Kristjánsdóttir for her support and guidance throughout the process. In addition, Kristján Freyr Helgason at the Ministry of Food, Agriculture and Fisheries offered invaluable advice regarding Icelandic fishing agreements with other nations. I would also like to express my gratitude to Baldvin Baldvinsson at the Directorate of Fisheries for providing detailed data on Icelandic catches by fishing grounds.

Table of Contents

Table of figures

Table of tables

List of abbreviations

AR	Average revenue
CPI	Consumer Price Index
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of the United Nations
FSE	Fisheries Support Estimate
IMF	International Monetary Fund
MC	Margnal cost
MEY	Maximum economic yield
MFRI	Marine and Freshwater Reseach Institute in Iceland
MR	Marginal revenue
MSY	Maximum sustainable yield
OECD	Organisation for Economic Co-operation and Development
SCM	WTO Agreemnt on Susidies and Countervailing Measures
SDGs	Sustainable Development Goals
SMC	WTO Agreemnt on Susidies an Countervailing Measures
TC	Total cost
TR	Total revenue
UNEP	United Nations Environment Programme
WTO	World Trade Organization

1 Introduction

In June 2022 the 12th World Trade Organization (WTO) Ministerial Meeting in Geneva concluded successfully on an Agreement on Fisheries Subsidies, the first WTO agreement on fisheries. The agreement prohibits support for illegal, unreported, and unregulated (IUU) fishing as well as fishing for overfished stocks and ends subsidies for fishing on the unregulated parts of the high seas. The Agreement enters into force upon acceptance of its legal instrument by two-thirds of the membership (WTO b., 2022)

The Ministerial Meeting also tasked the Negotiating Group on Rules on Fisheries Subsidies to continue negotiations on curbing subsidies that contribute to overcapacity of fishing fleets and overfishing. (WTO c., 2022).

This agreement is a milestone in longstanding WTO negotiations that started more than 20 years ago. With the adoption of the United Nations Sustainable Development Goals (SDGs) in 2015, where SDG 14.6 called for nations to “prohibit fisheries subsidies which contribute to overcapacity and overfishing and eliminate subsidies that contribute to IUU fishing, by 2020” (UN Department of Economic and Social Affairs, 2022) the WTO negotiations were revitalized, but still it took seven years to finalize the first face of this WTO agreement on fisheries.

In 2020, global capture fisheries production was 90.3 million tonnes and aquatic foods (capture fisheries and aquaculture) accounted for 11 percent of total agricultural trade, equaling the total trade in meat and meat preparations (FAO, 2021). Aquatic foods are a source of high-quality proteins and have positive nutritional impacts, even in small quantities. They are, for a large part of the world population an important source of essential nutrients that are scarce in plant-based diets (FAO, 2022).

As recognized in the WTO agreement, subsidies in the fishing sector can contribute to overfishing and depletion of fisheries resources and with the emerging food crisis in 2022, the sustainable management of natural resources for food production is more important than ever.

For the 2022 WTO agreement and further agreements on fisheries subsidies to be effective there needs to be solid knowledge on fisheries subsidies, their magnitude, and effects. WTO agreements are legally binding and need to be clear and concise. To guide the ongoing negotiations in WTO on fisheries subsidies there also needs to be an agreement and understanding on which subsidies contribute to overcapacity of fishing fleets and overfishing.

Aim of the study

The aim of this exercise is to contribute to an informed dialogue on fisheries subsidies and thereby support the ongoing efforts in the WTO on curbing fisheries subsidies, especially those that contribute to overcapacity and overfishing.

There are currently no comprehensive datasets on fisheries subsidies worldwide (WWF, 2002). Official data on fisheries subsidies can be accessed from WTO notifications and the OECD compiles Fisheries

Support Estimate (FSE) database, which measures fisheries support policies, mostly confined to the OECD countries. This data is self-reported and not directly comparable.

There are studies reaching back to the 1990s, (Milazzo, 1998) that have used differing methodology to assess fisheries subsidies in individual countries, regions, or globally. These have given different results as can be seen from the WTO statement from the Ministerial Meeting in 2022, that fisheries subsidies are "estimated to range from USD 14 billion to USD 54 billion per year globally" (WTO c., 2022).

The latest work on estimating fisheries subsidies on a global scale is by U. Rashid Sumaila Naazia Ebrahim, Anna Schuhbauer, Daniel Skerritt, Yang Li, Hong Sik Kim, Tabitha Grace Mallory, Vicky W.L. Lam and Daniel Pauly and was published in 2019 as: *"Updated estimates and analysis of global fisheries subsidies"* (Sumaila, Ebrahim, et al., 2019). This is the most recent publication relating to ongoing work on fisheries subsidies, led by the UBCs Institute for Oceans and Fisheries in Canada that stretches back several years, with several updated estimates published. In this thesis this latest publication, *"Updated estimates and analysis of global fisheries subsidies"*(Sumaila, Ebrahim, et al., 2019) will be referred to as the Sumaila et al. study, or simply the study.

According to the study the estimated fisheries subsidies worldwide amounted to 35 billion USD in 2018, or almost 25% of value of marine capture fisheries that year (FAO, 2018). This is a substantial percentage, even higher that the estimated share of total subsidies to agriculture or 17% (FAO, 2021). Beneficial subsides were estimated 10.6 billion and ambiguous subsidies 2.5 billion, but the largest share of fisheries subsidies

in the study, or 22 billion USD are deemed to be capacity enhancing, or harmful, the type that is the focus of the ongoing negotiations at the WTO.

Research question

In this study the research question is: Are the methods used in the latest assessment of fisheries subsidies worldwide, Sumaila et al. (2019) applicable when estimating fisheries subsidies in Iceland? Using Iceland as a case count, this thesis evaluates the result of the assessment from Sumaila et al. (2019) for the Icelandic fishing fleet. The estimated amounts for Iceland are compared with the subsidies that are reported to the OECD and the expenditure for fisheries management in the Icelandic government accounts and the methods used to model "missing" amounts are reconstructed where possible and the assumptions behind the modeling assessed.

Recognizing the importance of solid information as basis for international negotiations including the ongoing WTO negotiations of fisheries subsidies, there is considerable work ahead in the area of fisheries subsidies. An important caveat is that fisheries management systems in different countries are integral part of their institutional, economic, and environmental settings and therefore unlikely to be a one-size-fits-all method for global estimation of subsidies.

The observations and conclusions on the estimate fit of the Sumaila et al. (2019) study to the Icelandic fleet, are the first step in evaluating the appropriateness of the methodology used by the authors for assessing fisheries subsidies worldwide.

The structure of the thesis is as follows. Chapter 2 sets out the theoretical background of the main subjects of the thesis, namely subsidies and foreign access agreements for fishing fleets. In chapter 3 the main methods and material of are described. Chapter 4 presents the results from the analysis of the individual types of fisheries subsidies for the Icelandic fleet from the Sumaila et al. study (2019). The methods in the study are described and the estimates reviewed to assess how well they apply to Icelandic fisheries. Lastly the calculations for the modeled approach for estimating subsidies from foreign access agreements for the Icelandic fishing fleet will be reconstructed and possible alternative evaluation methods explored. In Chapter 5 the results are be discussed, and Chapter 6 summarizes the main conclusions.

2 Theoretical background

2.1 Subsidies

Definition of subsidy

There is no universally agreed definition of a subsidy. The OECD defines a subsidy as "a result of a government action that confers an advantage on consumers or producers in order to supplement their income or lower their cost" (OECD b., 2006, p. 25). FAO defines subsidies as "government actions or inactions outside of normal practices that modify - by increasing or decreasing - the potential profits of the industry" (Westlund, 2004, p. 7). The WTO Agreement on Subsidies and Countervailing Measures (SCM) defines a subsidy as a "(i) a financial contribution (ii) by a government or any public body within the territory of a Member (iii) which confers a benefit. All three of these elements must be satisfied in order for a subsidy to exist." It also defines financial contributions as grants, loans, equity infusions, loan guarantees, fiscal incentives, the provision of goods or services or the purchase of goods. (WTO a., 2022).

Some international institutions have not used the term "subsidy" to create a distance from the WTO framework. The OECD has used "Government Financial Support" or "Financial Support Estimate" for their data on fisheries subsidies, and in this thesis the term "subsidy" might not be in harmony with the WTO definition.

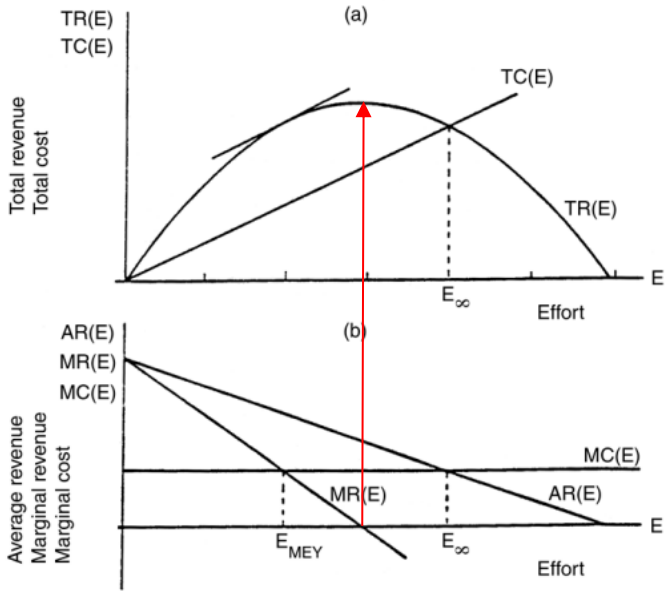
Effects of subsidies in fisheries

Subsidies as such are not in themselves good or bad, but their impact depends on their policy objectives, design, and subsequent implementation. Subsidies can both distort production and trade in domestic and international markets, but can also be used to address market failures stemming from externalities, implying that subsidies can raise social welfare in special cases as well as supporting local social policies (IMF, OECD, World Bank, WTO, 2022). For governments it is however an extremely information intensive exercise to device programs that correct market failures, but do not aggravate them (Sovacool, 2017).

The special economic and ecological circumstances in the fisheries sector are a case in point where subsidies can both aggravate and address environmental externalities, depending on the context and implementation (Cisneros-Montemayor et al., 2020) (Martini & Innes, 2018).

A classical figurative model for explaining the effects of subsidies in fisheries is best described by the following figures from Flaaten (2011) where the total cost/revenue (TC/TR) curve of the industry is a function of the fishing effort E. The total cost/revenue curve corresponds is derived from a corresponding yield curve for the fish stock.

Figure 1 Fishing effort, total cost and total revenue

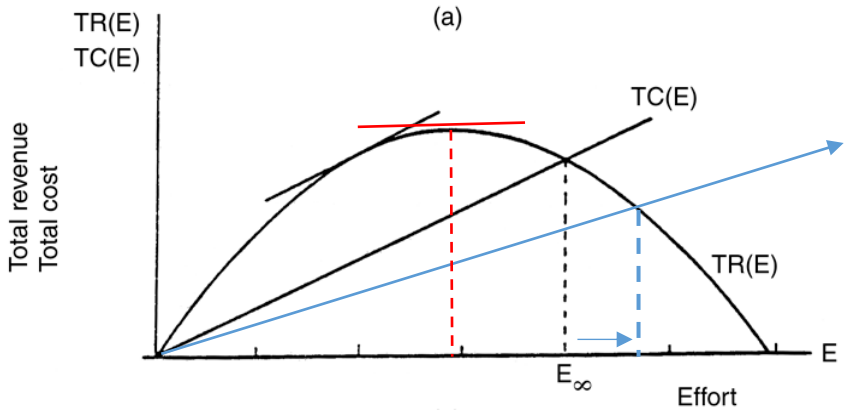


Source: (Flaaten, 2011)

Before subsidies the fishing cost TC(E) line crosses the total revenue TR(E) curve at the effort level E_∞. At this level of effort, the average revenue is equal to the marginal cost, AR=MC. In open access fisheries the level of effort E_∞ is chosen, but it can theoretically be higher or lower than the E_{MEY} (maximum economic yield) which is where the maximum revenue can be reached or where marginal revenue is zero MR(E)=0 (red arrow) or the top of the TR/TC curve where its slope is zero. In most models for effects of fisheries subsidies the open access assumes that the initial effort E_∞ is higher than E_{MSY}. If subsidies are introduced into the model, assuming $E_\infty > E_{MSY}$ before subsidy there is a new (lower) TC curve (in blue) that crosses

TR at a higher effort level with corresponding shift in AR and MR curves and higher E.

Figure 2 Effects of subsidies on fishing effort



Source: (Flaaten, 2011)

In open access fisheries effort and resulting catch is not restrained, and E_∞ shifts to a higher level. The assumption of higher effort with subsidies does not hold in fisheries where catches and effort are successfully restrained at maximum sustainable yield (MSY) or E_{MSY}.

Introducing subsidies in a fishery where a catch of E_{MSY} is effectively enforced, will according to this model, not result in effort shift but only results in higher income for the industry. For fisheries where the E_{MSY} is controlled, but not effectively, subsidies can result in effort "creep". Homans and Wilen (1997) conclude that long term equilibrium in regulated open access fishery as opposed to fisheries with harvest quotas, will be characterized by higher biomass levels and generally even higher levels of inefficient input use than the model above indicates.

To what extent fisheries worldwide are managed at sustainable levels has been assessed in the FAO SOFIA (State of World Fisheries and

Aquaculture) for some years. In the 2022 yearbook, FAO estimates that the share of fish stocks that are within biological sustainable levels was 64,6% in 2019. In 1974 this share was 90%. This translates into 35,4% of fish stock being fished at biologically unsustainable levels in 2019 (FAO, 2022).

Hilborn et al. (2020) compiled scientific assessments for fish stocks worldwide which resulted in around half of the worlds fish catch, and paired with surveys of the fisheries management systems. The findings indicate that a robust or "intense" fisheries management system results in fish stocks above target levels or rebuilding. Less intense fisheries management results in less satisfactory stock status. The evidence also indicates that half of the world fisheries are not assessed or intensely managed and their status might be under sustainable levels.

It OECD (2017) the authors state that achieving effective fisheries management also requires minimizing fisheries subsidies. An efficient management system can address some of the negative externalities of subsidies, but the inherent incentives need to be in place in the system to contribute to the willingness of the industry to operate at an effort level that is sustainable in the long run. Subsidies that skew the incentives in the system and result in political pressure to set total allowable catches above sustainable levels.

Bayramoglu et al. (2018) offer a novel conclusion on the effects of fisheries subsidies in international trade and consequently how these effects could affect the willingness of countries to regulate these subsidies through the WTO. They assume that open access fisheries supply curves are backward bending. Subsidizing fisheries where fish stocks are already depleted, aggravates their depletion, lowers supply, thereby it raises prices

and improve terms of trade for other countries that export similar fish species, weakening their will to curb subsidies. Spillover benefits to trading partners could also stem from of policy substitution if there is implicit motivation to weaken other regulation targeting the fishing sector when governments are forced to face out fisheries subsidies because of internationally binding rules.

This indicates that the effects of fisheries subsidies are different in different management systems and fisheries, and that the analysis of their real effects needs to be context specific (OECD a., 2006).

Classification of fisheries subsidies

There are several ways to identify, classify, evaluate, and quantify subsidies. OECD offers four approaches to assess and quantify value of subsidies:

1. Compiling budgetary amount of transfers
2. Measuring the price-gap between world and domestic market of goods in question
3. Measuring budgetary transfer and price gaps in production and consumption that stem from relevant government programs
4. Measuring difference between charged price vs. marginal social cost

(OECD b., 2006, p. 26).

Of these four methods compiling budgetary amounts of transfers is the least resource intensive method, relying on government accounts already published for other uses.

The WTO Agreement on Subsidies and Countervailing Measures (SCM Agreement), This agreement establishes three categories of subsidies based on their effects and potential to distort trade. These are i) prohibited, ii) actionable, and iii) non-actionable. Potential effects of subsidies on fishery resources fall outside of the scope of the SCM Agreement (Bayramoglu et al., 2018)

There are several ways that have been used to classify fisheries subsidies, but these main ones are listed below.

Table 1. Basis for Classification of Subsidies

Study/Institution	Basis for Classification
WTO	Recipients, trade impact
Milazzo (1998)	Economic impacts and trade implications
OECD	The way transfer is implemented, recipients
APEC (2000)	Operation of subsidy, application, scale
FAO	Type of transfer, economic impact
UNEP	Objective of subsidy
Sumaila et al. (2016)	Impact on fishery resources
Merayo et al. (2018) Harper and Sumaila (2019)	Distributional and equity impacts of subsidies

Source: (Arthur et al., 2019, p. 8)

The basis for classifications of subsidies in Table 1. varies considerably, as can be expected from the mandate of different institutions and therefore the rationale behind the subsidy compilation of the studies. WTO focus is on

impact to trade and UNEP on the objectives, FAO is unique in including the economic impact of subsidies.

For comparison and difference between the WTO, OECD and FAO classifications the following schema from OECD (OECD, 2017, p. 10) is a helpful overview of what is included in each category:

Table 2. Comparison of Different Subsidy Classifications

	Data from government budgets		**Border protection can be used as approximation**	**Estimates can be obtained from detailed modelling**
WTO Agreement on Subsidies and Countervailing Measures	A subsidy under Article 1 is a financial contribution that confers a benefit. This includes: i). Direct transfers ii) Potential direct transfers iii) Foregone government revenue (tax exemption) iv). Government provision of goods & services other than general infrastructure	*Grey areas in WTO definition: MRE expenditure, access agreements, infrastructure*		
OECD definition of GFT (Government financial transfer) used in this study	As above plus:	Management, research and enforcement expenditure, access agreements, infrastructure		

OECD definition including market price support	As above plus:	Market price support	
Broad definition of subsidies (e.g. FAO)	As above plus:		Uninternalized externalities, untaxed rents, negative subsidies

Source: (OECD, 2017)

As can be seen from Table 2 the WTO classification is the narrowest, as can be expected for a legally binding treaty, involving subsidies that are actionable, but FAO includes the most comprehensive coverage. Un-internalized externalities, untaxed rents, negative subsidies categories, need as indicated in the table detailed economic modeling and from a decade long debate in Iceland on the size of the resource rent in fisheries with widely different conclusions, this is no small exercise. It is therefore not surprising that the OECD takes the middle road and compiles data on fisheries subsidies in its FSE database from government budgets. The OECD has also concluded that the market price support is difficult to assess for seafood products.

The most frequently used classification of fisheries subsidies in the literature is however by the effects of subsidies on sustainable use of fisheries resources. The rationale behind this classification of subsidies is based on the assumption that government expenditure for constraining catches and fishing effort at a long-term sustainable level are beneficial, but other subsidies that result in increased fishing effort and lead to catches being above sustainable levels are harmful to the environment.

This focus has been dominant in the WTO negotiations and can be traced from the 1993 FAO chapter in SOFIA "Decade of Change" (FAO,

1993) to the SDG 14.6 (UN Department of Economic and Social Affairs, 2022) and the consequent WTO agreement in 2022 (WTO b., 2022).

This is the basic classification in the study by Sumaila et al. (2010), and consequent updates to the estimate of fisheries subsidies published by the authors and in the 2019 study. The studies classify subsidies into i) beneficial ii) capacity enhancing and iii) ambiguous. The beneficial ones are for activities aimed at sustainable management of the fisheries resources, such as research, management, and enforcement. All capacity enhancing subsidies are assumed to have adverse effects on fish resources and therefore harmful, but the ambiguous ones can work both ways, depending on design and setting. The three main categories are then divided into 13 different sub-categories, which are as follows:

Table 3. Subsidies by Effects on Fish Resources

Beneficial	Capacity-enhancing	Ambiguous
Fishery Management Programs and Services	Boat/Vessel Construction, Renewal and Modernization	Fisher Assistance
Fisheries Research and Development	Fishery Development Projects and Services	Vessel Buybacks
Marine Protected Areas	Port Construction and Renovation	Rural Fisheries Community Development
	Marketing, Processing and Storage, Infrastructure and Support	
	Tax Exemptions (non-fuel)	
	Fisheries Access Subsidies	
	Fuel Subsidies	

Source: (Sumaila et al., 2010)

This list is considerably shorter and less detailed than the FAO one, but mostly in line with the first OECD classification, the one referred to in Table 2 as OECD FSE, the first one, without market price support.

Information on fisheries subsidies and estimates

According to a 2022 report by the IMF, OECD, World Bank and WTO, "Subsidies, Trade, and International Cooperation" (IMF, OECD, World Bank, WTO, 2022), subsidies are widespread and can be found in "… all sectors, used by countries at all stages of development, take many forms, and affect all countries". The report also concludes that both frequency and complexity of distortive subsidies is increasing (IMF, OECD, World Bank, WTO, 2022, p. vii).

In spite of this there is no comprehensive official data available on fisheries subsidies (Formenti, 2022) (WWF, 2002). Data is available from WTO notifications and the OECD Fisheries Support Estimate (FSE), but both datasets contain self-reported data and are not directly comparable.

The WTO data has been criticized for being outdated and non-comprehensive and that the characteristics of the framework of notification may even hinder sound reporting (Formenti, 2022). The OECD data is mostly from member countries, which limits its usefulness, although there are recent additional countries to the data, China is one of these additions, which increases coverage considerably.

There have been some attempts to estimate global support or subsidies to fisheries including FAO, (1993), Milazzo (1998), and APEC (2000) that have used different methods and estimations, with differing results. The latest estimate is from Sumaila et al. (2019) , which estimates subsidies to fisheries worldwide in 2018 to be 35 billion USD or almost

25% of value of marine capture fisheries (FAO, 2018). The largest share of these subsidies, or 22 billion USD are capacity enhancing, or harmful subsidies. The estimate is based on official statistics from a variety of sources but supplemented with modelled approaches.

1.2 Fishing access agreements

Most estimates of fisheries subsidies include valuation of access of fishing fleets to other countries EEZ. Robert et al. (2014), in a World Bank report state that approximately half of the world's economic exclusion zones (EEZs) are subject to some form of foreign fishing arrangements.

Definition of fishing access agreements

Fishing access can be viewed as a form of trade in fishing rights, where the coastal states sell´s fishing rights in its Exclusive Economic Zone to another country (Oreallana, 2007).

Robert et al. (2014) on the other hand argue that access agreements are a form of inter-national trade in fishing services (TIFS) that include more than just bilateral agreements between governments. The study lists three main forms of trade in fishing services:

i) government-to-government foreign fisheries access agreement

ii) joint venture between coastal state and distant fishing nation

iii) chartering of foreign fishing vessels by coastal state

(Robert et al., 2014, p. 1).

Gordon Munro, author of Appendix A in the Robert et al. study (2014, pp. 45–60) states that "Fisheries access agreements can be described as a form of trade, where a country with fisheries resources in its Exclusive

Economic Zone sells fishing rights to another country." As the cash apparently flows from the flag state to the coastal state, which must therefore be exporting something, but Munro argues that by signing an access agreement the coastal state is actually importing fish-harvesting services from the distant-water country. The payment for the import, however, is implicit and disguised because part of the gains from trade is left with the distant-water fishers.

Effects of fishing access agreements

Like any other trade, access agreements have the potential to benefit both exporting and importing country, depending on their comparative advantage in fishing services. Comparative advantage can stem from the relative efficiency of the fishing sector in the coastal state and distant water flag state, but also from relative efficiency of the other industries in the coastal state, compared with its fishing industry. Foreign access agreements, therefore have the potential to increase benefits of the coastal state from its fish resources and there by enhance economic growth and contribute to social welfare. (Robert et al., 2014, p. 31).

The realized relative distribution of benefits of the trade in fishing services are in the end determined by the outcome of negotiations between the coastal state and the flag state. The outcome of such negotiations is difficult to predict and depends among other on negotiating strategies and relative strength of parties negotiating positions (Malhorta, 2016).

The literature on access agreements has mostly evolved around analyzing agreements where developed countries secure access for their fishing fleet fishing in developing countries EEZ. It has generally been the view that such access agreements, pose a threat to the sustainable

management of fish stocks of the coastal state as the control and enforcement of these fleets by the coastal and flag state are inadequate or/and the foreign fleet fishing hinders the development of the coastal state fishing sector, threatening livelihoods of small-scale fishers (Mwikya, 2006) (Nichols et al., 2015).

"Northern" access agreements

As special subset of foreign access agreements is the so called "Northern agreements" as they are the prevailing type of agreements in the N-Atlantic. The northern agreements are mostly bilateral agreements where governments reciprocally exchange access to fishing opportunities involving only access for fishing the foreign fleets own quota, or access to fishing and exchange of fishing opportunities that involves either fishing quotas or fishing effort (Arthur et al., 2019) (Robert et al., 2014).

In the NE-Atlantic most of the coastal/flag states have bilateral or multilateral fishing agreements. This is not surprising as these states have EEZ close to each other and several shared stocks.

The gravity model of trade, which has widely been applied to explain trade flows in the New Trade Theory (Kristjánsdóttir, 2012) has been applied to analyzing trade in fishing rights, or access agreements. Chesnokova & McWhinnie (2019) apply the gravity mode to test for effects of size and distance on access agreements. They conclude that access agreements and fish exports can be explained by both patterns of comparative advantage and gravity factors of economic size and distance with larger countries that are closer to each other a more likely to sign access agreements or to trade.

The northern agreements seldom involve payments so in general, one would conclude that they do not constitute a subsidy to the fishing industry. Robert et al. (2014) however conclude that the first level of benefits from these agreements go directly to the fishing firms. In these cases, there are no payments from the flag state governments to the coastal state government and the proceed can therefore not be used to benefit the wider sector or coastal communities in the coastal state. Whether the proceeds are actually used for to benefit coastal communities or the wider public is another matter and there is no scarcity of examples of countries where resource rent never reaches the general population (Acemoglu & Robinson, 2012).

3 Methods and materials

To analyze the methods and evaluations of subsidies to the Icelandic fishing fleet data from the study was downloaded from the data article “A global dataset on subsidies to the fisheries sector” (Sumaila, Skerritt, et al., 2019) where the detailed description of the methods were published as well as the data, both raw data and the estimations.

To assess the validity of the raw data and the consequent estimated values of subsidies for Iceland, official Icelandic statistics and information were used.

Data on value of catches for the Icelandic fishing fleet, were obtained from the websites of Statistic Iceland (Statistics Iceland a., 2022) and the from Directorate of Fisheries in Iceland catches of shared stocks (Directorate of Fisheries, 2022). This data was downloaded during the period April to August 2022. Additional detailed data on value of Icelandic catches by fishing area were obtained directly from the Directorate in July 2022.

Data on government expenditure were downloaded from the Icelandic official government accounts (Fjársýsla ríkisins, 2022) in June-July 2022.

Exchange rates for USD and ISK are obtained from the website of the Icelandic Central Bank (Seðlabanki Íslands, 2022), and the Consumer Price Index for USA is from the website of the World Bank (World Bank, 2022).

Information on current and past access agreements to foreign fishing grounds for Icelandic fishing vessels was obtained from the

Ministry of Food, Agriculture and Fisheries, Department of Fisheries (K. Helgason, personal communication, May 2022). The agreements themselves were accessed directly from the website of Alþingi or from the website of Stjórnartíðindi, C-Part (Stjórnartíðindi, 2022), which the official publication web of the Government of Iceland.

For each case when in the final data subsidies were recorded for Iceland the methods, calculation and value are reviewed. Raw data is compared to its recorded sources and assumptions behind modeled data evaluated.

The method of calculating the value of subsidy to the Icelandic fleet of access to other countries EEZ is reconstructed using official data from Statistics Iceland (Statistics Iceland a., 2022), the Directorate of Fisheries (Directorate of Fisheries, 2022), The Icelandic Central Bank (Seðlabanki Íslands, 2022) and The World Bank (World Bank, 2022). Detailed data on catches and value of catches of Icelandic vessels from all fishing areas was obtained directly from the Directorate of Fisheries in July 2022, see Annex II.

The relevant access agreements that the Icelandic government has signed with other nations that include access for Icelandic vessels were listed and the form of rights that change hands in those agreements analyzed. Consequently, some alternative methods to estimate the value of these access agreements are be explored.

4 Results

4.1 Overview of methodology in the study

A short overview of methods used in the Sumaila et al. (2019) study is as follows:

1. Recorded: Where recorded expenditure was found, the total amount was recorded with source reference.
2. Null Values: Where there was evidence that no subsidies were provided by a country, these were recorded as values.
3. General modeled approach: Where there was decided that evidence existed for a subsidy, but no data was publicly available a calculated "subsidy intensity factor" SI was applied according to the country status as high or low on Human Development Index.
4. Fuel tax subsidies: Values for fuel tax subsidies were based on fuel consumption data reported in from (Greer et al., 2019) and the mean of the reported fuel subsidies for each HDI group applied.
5. MPA subsidies: The subsidies spent on MPAs is assumed to be equal to the cost of establishing managing and running the MPA, both depending on the size of MPA coverage by country. Area size was obtained from The World Database on Protected Areas, estimates for cost were obtained from (McCrea-Strub et al., 2011).
6. Foreign fishing access subsidies: Subsidy for access to other countries EEZ was assumed to be equal to 6% of the landed value of catches from these EEZs.

Each item where there was an estimated or reported amount for Iceland will be reviewed in the following subchapters.

4.2 Estimated subsidies for Iceland

Estimated total subsidies, including reported subsidies, to the Icelandic fishing fleet in the year 2018 were according to data in Annex I in (Sumaila, Skerritt, et al., 2019) as follows:

Table 4. Estimated Fisheries Subsidies for Iceland 2018 in USD

			% of total	
Beneficial		**57.868.843**	36%	
A1	Fisheries management	35.767.416		Reported
A2	Fishery R&D	20.569.572		Reported
A3	MPAs	1.531.854		Modeled
Capacity-enhancing		**90.865.742**	56%	
B1	Boat construction & renovation	0		not found evidence of subsidy
B2	Fisheries dev. projects	0		not found evidence of subsidy
B3	Fishing port develop.	0		not found evidence of subsidy
B4	Marketing & storage infrastructure	8.645.023		Reported
B5	Tax exemption	68.865.010		Modeled
B6	Fishing access	13.355.709		Modeled
B7	Fuel subsidies	0		Reported
Ambiguous		**13.233.094**	8%	
C1	Fisher assistance	13.233.094		Modeled
C2	Vessel buyback	0		not found evidence of subsidy
C3	Rural fisher communities	0		not found evidence of subsidy
	Total subsidies	**161.967.678**		

Source: (Sumaila, Skerritt, et al., 2019)

For those familiar with the Icelandic fishing industry this is a considerable amount, 162 million USD, or around 17,6 billion ISK around 14% of landed value of catch by Icelandic vessels in 2018. Of-all the modeled subsidies constitute 60% of the total. In line with the total

subsidies worldwide the harmful subsidies for Iceland far exceed the beneficial ones or for that matter beneficial and ambiguous ones together.

There are no reported or modeled subsidies for Iceland in the category fuel subsidies, there is no further discussion regarding this category. There are pros and cons to the lack of discussion on fuels subsidies. The cons are that fuel subsidies are the far largest single item in the total estimate for harmful subsidies worldwide. The pros are that the field of fuel subsidies would warrant a separate study due to the complexities involved.

4.3 Reported data

Government expenditure

The reported subsidies for Iceland are around 65 million USD, or 6,7 billion ISK. According to the raw data, 3,8 billion are from the FSE-OECD database and from The Icelandic Ministry of Fisheries and Agriculture 2017 2,9 billion. As the raw data is published in ISK and the source material also, we will follow the amounts in ISK.

The data for Iceland in the FSE OECD database includes two large expense outlays, R&D cost for 2016 of around 2 billion ISK, which is the total government outlay to the Marine and Freshwater Research Institute (MFRI) and management and enforcement cost which include Directorate of Fisheries (0,7 billion ISK) and the estimated fisheries enforcement part of the Icelandic Coast Guard (1,1 billion ISK), other amounts are minimal. The OEC total amount of government expense rimes with the raw data in the study.

The raw data is referred to in the study to be from The Ministry of Fisheries and Agriculture in Iceland and is harder to trace back to its source. If we assume that the data is from the published Government Financial Accounts or "Ríkisreikningur 2017" (Fjársýsla ríkisins, 2022) and the ministry in question is The Ministry of Industries and Innovation (MII), in which sat the Minister for Fisheries and Agriculture and Minister of Trade, Industries and Innovation from 2012-2021. Under the Minister for Fisheries and Agriculture there were two departments, Department of Agriculture and Food and Department of Fisheries and Aquaculture. The expenditure reported in 2016 or 2017 for fisheries would therefore also include expenses on aquaculture. The amount that can be said to connect d mostly to fisheries is around 4,4 billion ISK in total, but some of the individual items still include expenditure for aquaculture. The largest items in the financial accounts are the MFRI (2,4 billion) and Directorate of Fisheries (0,9 billion), both institutions serve aquaculture as well as fisheries. In 2016 the Marine Research Institute and the Freshwater Institute were merged into The Marine and Freshwater Institute, which served freshwater fisheries, mostly angling and sports fisheries. Identifying which expenditures in the government accounts are for marine fisheries (industrial) is not straightforward and for OECD reporting the ministries approach has been taken to report all government expenditure to the FSE for both MRFI and the Directorate.

The combined amounts for government expenses from OECD (2016) and the Government accounts (2017) are roughly the same as the total reported data in the study. That indicates that 3.3 billion for the MFRI and Directorate expenses are double counted, as these are include in both datasets. The only item that is not under fisheries in "Ríkisreikningur" but

in the OECD data is the fisheries enforcement expenditure part of the Icelandic Coast Guard. The Coast Guard falls under the Ministry of Justice and is reported as such in the government accounts. Around 25% of the total expenditure of the Coast Guard has been reported as fisheries control and enforcement expenditure to the OECD FSE. This is by no account based on a "scientific" assessment but a best guess estimate.

In absence of further information on which items were included from the government reported data and where that data was sourced, it is not possible to validate the accuracy of reported subsidies for Iceland, but there are indications that there is double counting of expenditure.

Cost recovery

The net support for Icelandic fisheries according to the OECD FSE is in general very low, as the fishing fee that collected from Icelandic vessel pay is reported as cost recovery and taken as "minus" values. In the study this fee is not included the reported data.

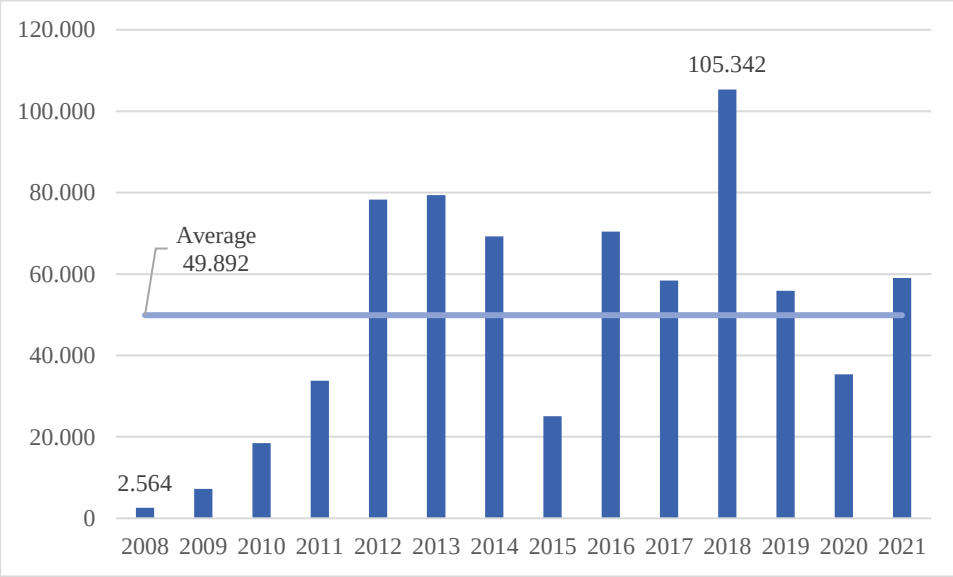
The fishing fee is not reported in the government accounts under the Ministry of Industries and Innovation, Department of Fisheries and Aquaculture, but in the general government revenues under the category other asset revenues [1].

The Icelandic fishing fee has the intended purpose to recuperate the cost of managing the fisheries, and to secure the Icelandic people share in the proceeds of the fisheries (145/2018, n.d.). It is calculated as a yearly amount levied on kilo of landed catch by each fish species. Converted into USD the yearly amount has varied considerably from 2,600 to 105,300

[1] Aðrar eignatekjur, veiðigjald

thousand USD, with at least 4 different methods of calculations in use during the period 2008-2021.

Figure 3. Fishing fee in USD 2008-2021 (current prices)



Source: (Fjársýsla ríkisins, 2022), (Seðlabanki Íslands, 2022)

As can be seen in Figure 3. the average fee for the period 2008-2021 is around 50.000 thousand USD in current prices. In 2016, the year quoted in the study for the OECD the fee amounted to 70.448 USD, not an insignificant amount and in fact higher than the total government expenses the study refers to as reported.

There are several methods governments use to collect fees for a given service. For fisheries management this can take the form of "selling" services, such as a daily fee for inspector´s coverage onboard a vessel. In some countries private companies are contracted for enforcement purposes, payable directly from vessel owners to the company. In some cases, the Directorate of Fisheries in Icelandic charges vessel owners directly for cost of inspector´s presence onboard vessels.

The reported government expenditure is the net payment to the government institutions from the state. This means that significant differences can occur in net reported government expenditure for fisheries depending on the method used for cost recovery. In the case of Iceland, the cost recovery by the Directorate for inspection services results in lower estimate for government expenditure to the Directorate, but in the study the Icelandic fishing fee is not taken as reported cost recovery. This might be explained by the fee being reported as "Other payments by the fishing sector" to OECD as it has been deemed impossible to distinguish between the percentage of the fee intended for cost recovery and percentage for resource rent in the reported data from Iceland.

The Government Finance Law in individual countries can also add to the confusion and the Icelandic law from 2015 makes it difficult to "earmark" certain fees and taxes for particular purpose. The fee therefore does not appear under the heading cost recovery from the fishing industry, but as other asset revenue (Icelandic: aðrar eignatekjur). In general, it is not helpful if the tax laws or general method of collecting fees dictates the classification of "cost recovery" and subsequently reported government financial support to international institutions. The difficulties in collecting and classifying which data to report are quite enough already.

4.4 MPA cost

This category is to account for the costs incurred in establishing and maintaining MPAs in the countries EEZ. In the case of Iceland all the MPAs are government run. The initial establishment as well as assessing the effectiveness of the MPAs in Icelandic EEZ, would be the responsibility

of the MFRI, the Directorate and the Ministry and therefore establishment costs would already be included in the reported expenditure. Running cost would mainly involve the Directorate of Fisheries Iceland and the Coast Guard and these expenditures are already accounted for in the reported data. Costs incurred by NGOs in the establishment were minimal, but some costs were incurred by the industry itself, which would not count as subsidy.

For Iceland the modeling for the expenditure on MPAs in the study would likely be double counting already reported expenditures.

4.5 Tax exemptions

In general, there have been few tax exemptions to the Icelandic fishing fleet during the last decades, so it is not straightforward to trace or guess which tax exemptions were evaluated to have been in force, but not reported. The fishing industry is subject to general corporate tax law, including deductions for R&D and accelerated depreciation on fixed assets. The only specificity is the fishing fee, as explained in Chapter 4.2 Cost recovery. The fishing fee is like any other cost recovery fee, deductible expense before income tax, which cannot be classified as a subsidy.

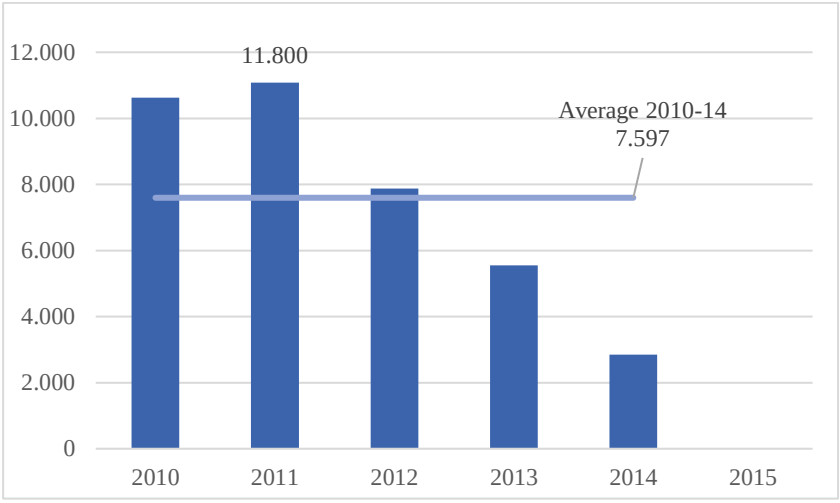
The modelled amount of tax exemptions for almost 69.000 thousand USD would therefore need further detailed analysis before any conclusion on the appropriateness of the modeled amount could be reached.

4.6 Fisher assistance

In Iceland the only support to fishers that has been in effect for the past decades that is the so-called “fishing days deduction”. Icelandic tax law

included a tax deduction to individuals that were employed onboard Icelandic fishing vessels, depending on how many days they spent on sea each year. The total tax deduction in USD current prices from 2010-2015 were as follows:

Figure 4. Total tax relief for Icelandic fishermen 2010-2015



Source: (Fjársýsla ríkisins, 2022), (Seðlabanki Íslands, 2022)

In 2011 the tax deduction for the whole fleet was 11.000 thousand USD, but the average amount 2010-14 around 7.600 thousand USD. The facing out of this tax allowance was started in 2012 and 2014 was the last year where it was effective.

There are no other support measures in force for fishermen in Iceland that could explain the assumption that there was evidence for a subsidy in 2018. The modeled amount for 13.2 million USD is therefore not applicable for 2018 and the assumption that subsidies still exist if they have been detected in previous years in this case leads to overvaluation.

4.7 Fishing access to foreign EEZ

This category is to account for the payments from flag state government to coastal state government for access for fishing vessels to fish in their EEZ.

The subsidy for the Icelandic fishing fleet from access agreements is according to the model around 13.300 thousand USD per year. According to the study data on landed value of catches from the Sea Around Us database is use. This data is based on catches reported to ICES and then inflated to account for discards and IUU fishing to arrive at “real catches”. The estimation method involves extracting the value from other countries EEZ from the database, which is equal to total value of catch less value of catch from the countries own EEZ and the high seas. A compensation rate of 6% from the value of landings from other countries EEZ was used to estimate the value of access to the fleet. The 6% is an average estimated payment by the EU and China to countries in West-Africa for access in their waters, according to Belhabib et al. (2015).

As the study aims to estimate fishing subsidies in 2018 official data was used to check the applicability of the modelled amount for that year to the Icelandic fleet. To even out possible fluctuation in catches and values from different fishing grounds a three years average is chosen. According to data for the years 2017-2019 from Statistics Iceland (Statistics Iceland a., 2022) the catch value (in current prices) of main species from Icelandic vessels outside Icelandic EEZ is as follows:

Table 5. Average Landed Value of the main species of Icelandic Catches outside Icelandic EEZ 2017-2019 by fishing area

ISK Thousands (current prices)	Barents Sea	Flemish Cap	Norwegian fishing zone	Russian fishing zone	Other areas	Total Outside Icelandic EEZ
All species	..	..	2.085.176	1.501.371	12.981.914	16.568.461
Cod	..	..	1.926.418	1.392.433	10	3.318.862
Haddock	..	..	106.160	70.157	0	176.317
Saithe	..	..	35.942	24.707	0	60.650
Redfish	..	..	11.681	3.744	55	15.480
Ocean redfish	..	..	0	0	17.090	17.090
Other demesals	..	..	2.061	3.090	835	5.985
Flatfishes	..	..	2.914	7.239	153	10.306
Herring	..	..	0	0	29.810	29.810
AS-herring	..	..	0	0	3.628.475	3.628.475
Blue whiting	..	..	0	0	5.427.695	5.427.695
Mackerel	..	..	0	0	3.695.164	3.695.164
Shrimp/shellfish	..	..	0	0	182.619	182.619

Source: (Statistics Iceland a., 2022)

The Barents Sea and Flemish Cap are high seas areas (outside EEZs), so neither of those would be access to foreign fishing grounds, which leaves Norwegian and Russian fishing zones and Other areas. The average value of landed catch for these ground for 2017-2019 is around 16,6 billion ISK. Using the exchange rate for the year 2018 from the Icelandic Central Bank (Seðlabanki Íslands, 2022), and calculating 6% of the USD amount gives around 7.400 thousand USD, which is considerably lower than the 13.400 thousand USD estimate in the study.

The original method was based on landed value of catches from other counties EEZ in 2005-2014. Changes is fishing patterns of the

Icelandic fleet between 2005-14 and 2017-2019 might explain some of the difference in the calculated value of access agreements. Calculating the USD value of landed catches outside the Icelandic EEZ and high seas, using data from Statistics Iceland (Statistics Iceland a., 2022) and The Icelandic Central Bank yearly exchange rate (Seðlabanki Íslands, 2022) and converting these to constant 2018 US prices using CPI in USA (World Bank, 2022), the average landed value of catches in constant prices) for the period 2005-2014 is 122.000 thousand USD, 6% of that is around 7.300 thousand USD, similar to the value above of 2017-2019 landed value average in current prices.

It is noticeable for those familiar with Icelandic fisheries that the only high seas areas in the Statistics Iceland categories are the Flemish Cap, which is the NW-Atlantic NAFO regulatory area and Barents Sea, there is no category for the high seas in the NE-Atlantic around Iceland, or the NEAFC regulatory area in general. The data shows significant Icelandic catches of pelagic stocks in the Other area category, mainly Norwegian spring-spawning herring, blue whiting, and mackerel. These are shared stocks in the NE-Atlantic. The Other area value is the far highest or almost 80% of the value from all areas outside the Icelandic EEZ for the years 2017-19. For further information on the fishing area the shared stocks one needs to look to the Directorate of Fisheries. The Directorate publishes data for each stock by fishing areas, including Icelandic EEZ, Greenland EEZ, Faroe Island EEZ and outside EEZ or the NEAFC regulatory area[2] The date is for volume of catches (tonnes), not value (Directorate of Fisheries, 2022). Looking at catches of individual species the tonnage from the

[2] This data is only available in Icelandic.

Directorate indicates that the mackerel in the data from Statistics Iceland in the Other areas' category is mostly from the NEAFC regulatory area. Blue whiting and herring are fished both in the Faroe Island EEZ and NEAFC regulatory area. The data for the Atlantic-Scandian herring is not compatible between the Directorate and Statistics Iceland, with higher catches on the Directorate website for 2017 than from Statistics Iceland. Further work is evidently needed to corroborate these two datasets between institutions.

To reconstruct the calculations for value of catches in 2005-14, detailed data landed value of all Icelandic vessels, by fish species and fishing area, was obtained from Directorate of fisheries, by special request. A detailed compilation of value of Icelandic catches by fishing area is available in Annex II. The value of catches from other countries EEZ were as follows.

Table 6. Landed value, Icelandic vessels from other countries EEZ 2005-14 (ISK millions)

	East Green-land	Dohrn-bank (EG/Ice)	Faroe Islands	Jan Mayen	Norwegia EEZ	Russian EEZ	other counties EEZ total
2005	0	3	0	0	681	299	983
2006	0	0	0	0	726	401	1.127
2007	0	0	0	0	1.673	852	2.525
2008	0	0	76	594	3.575	928	5.173
2009	0	0	1.593	87	3.373	738	5.792
2010	0	2	2.908	0	3.920	1.519	8.348
2011	143	42	1.403	7	2.930	2.006	6.530
2012	88	0	5.606	0	2.310	1.291	9.295
2013	0	347	4.595	0	2.217	1.349	8.508
2014	146	34	4.495	0	2.887	2.873	10.435

Source: Directorate of Fisheries, direct communication

These are values in ISK millions in current prices. To convert into USD and constant 2018 prices the yearly average exchange rate from the

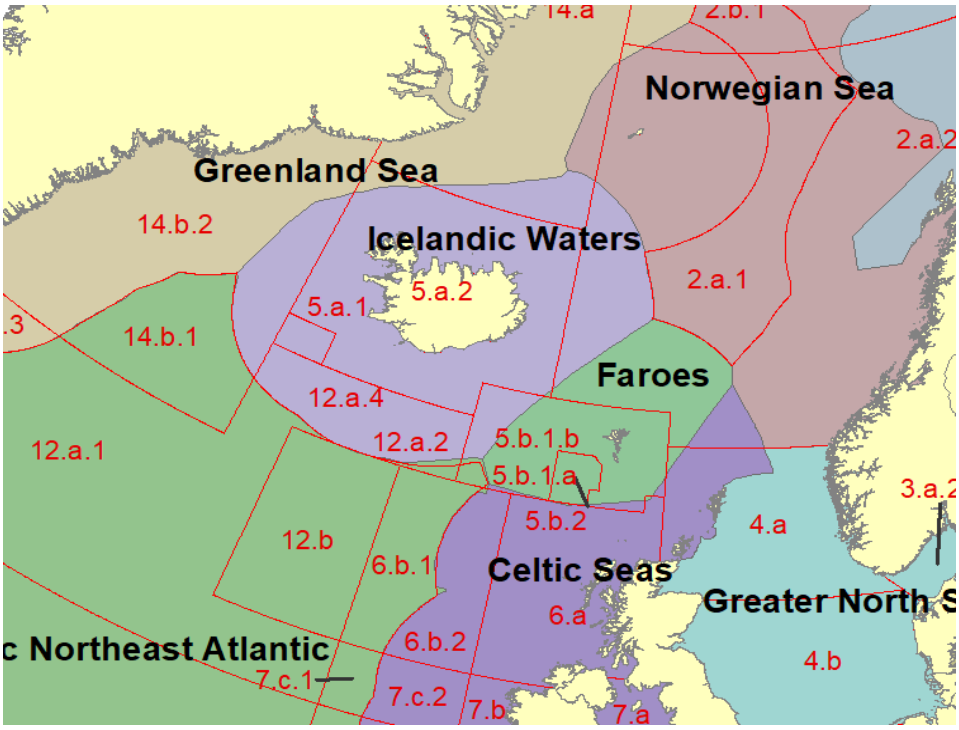
Icelandic Central bank is applied as before (Seðlabanki Íslands, 2022) and converted into constant 2018 prices from World Bank data (World Bank, 2022).

According to the calculations the average landed value of catches 2005-2014 in constant USD 2018 prices is around 47.500 thousand USD and a 6% rate of that is approximately 3.600 thousand USD. This is very far from the estimated 13.400 thousand USD in the study.

The main difference in the calculation in this thesis and the original study is the source of landed value. The 3.600 thousand USD estimate is based on data obtained directly from the Directorate of Fisheries. The disparity is likely to stem from differences in the data from the Sea Around Us database and the Directorate. The Sea Around us database contains ICES data which is inflated to account for “real” catches.

There are known differences in delimitation of fishing area between official Icelandic sources and ICES.

Figure 5. ICES areas and Icelandic EEZ.



Source: (ICES, 2020)

As can be seen on figure 2. the Icelandic EEZ covers several ICES subareas or parts of subareas and the Icelandic pelagic catches are often fished in large quantities in deep waters near the EEZ boundary. It should also be noted that ICES data is for scientific purposes and stock assessment, but the Directorate is responsible for the official statistics on catches and quotas for Icelandic vessels. The rationale and mandate behind the data collection is very different.

It is outside the scope of this thesis to analyze the difference in catch by fishing area used in official statistic in Iceland and ICES, which would affect data in the Sea Around Us database. The only other explanation for the large difference in valuation of subsidies from access to other countries

EEZ would be the inflation rate used by Sea Around us to account for “total catches”. The inflation rate would have to be extremely high, to explain the differences in the estimations for access subsidies in the original study and the calculation in this thesis. This is not supported by Valtýsson (2014) where the original estimated of inflation rates is published.

4.8 Icelandic access agreements

Setting aside the possible source of data disparity, the Icelandic government does have several bilateral or multilateral agreements with other coastal states in the NE-Atlantic, which allow for either fishing access or quotas and access in other countries EEZ. These agreements are similar in many aspects but not fully comparable. There are bilateral agreements that allow for fishing opportunities and access, but access is also negotiated between individual parties as part of the coastal state agreements on the shared pelagic stocks in the NE-Atlantic. These special bilateral bookings or annexes are renewed, some yearly, others when a new agreement on a particular stock is signed. A further look at the bilateral agreements can clarify what kind of rights are exchanged and therefore if calculating 6% of value of from other countries EEZ can reflect fairly their value to the fishing industry. If not, are there be alternative methods to evaluate the value of the access agreements to the industry, and/or cost to the governments. For simplification the focus will be on the long-term bilateral agreements, as there can be frequent changes to the special bilateral bookings or annexes to the shared stocks agreements.

EU – Iceland bilateral agreement

The EU-Iceland bilateral fisheries agreement is a Framework Agreement originally signed in 1993. According to the agreement the EU gets redfish quota and access to fish the quota in the Icelandic EEZ, in exchange Iceland gets a quota for capelin that can be fished in Greenlandic or Icelandic waters. The volumes of quota to be exchanged are to be agreed upon on an annual basis following bilateral consultations. There are certain restrictions on time and areas for EU vessel fishing the redfish quota in Icelandic EEZ. The EU is not a part of the coastal state sharing arrangement for capelin, which only includes Iceland, Greenland, and Norway so it needs to source the capelin quota it needs for the exchange from Greenland or Norway (K. Helgason, personal communication, May 2022).

There have been no consultations under the EU-Iceland agreement since 2011. This might be a reflection of the agreement not being balanced enough to allow for fishing from either side, but the mackerel dispute between the coastal states in the NE-Atlantic has also been quoted as the official reason (Robert et al., 2014, p. 108). Past years the EU has used the capelin quota it gets from Greenland under the EU-Greenland bilateral agreement in exchange for cod quota with Norway. Norway has fished that capelin quota in Icelandic EEZ according to special provision between Iceland and Greenland in the capelin agreement between coastal states.

Faroe Islands – Iceland bilateral agreement

Icelandic vessels have access to the Faroe Islands EEZ through a bilateral agreement on fishing between the government of Iceland and the Faroe Island (Stjórnartíðindi, 2021). The agreement is threefold

Icelandic and Faroe Islands pelagic vessels fishing Norwegian spring-spawning herring and blue whiting have reciprocal rights to fish in Icelandic and Faroe EEZ. Iceland and the Faroe Islands both have a share in these species and no quota exchange is included in the agreement. Icelandic vessels can fish a certain amount of mackerel from the Faroese quota as bycatch in the blue whiting – herring fisheries.

The agreement gives Faroe Islands a quota in capelin and access to fish the quota in Icelandic EEZ (Ministry of Food, Agriculture and Fisheries, 2021). There are limits on fishing gear, areas and season, and obligation to land a certain amount of capelin in Iceland. The Faroe Islands are not a coastal state in capelin and therefore not a partner to that agreement but get their only quota in capelin and access through this bilateral agreement.

The latest part of the agreement allocates Faroe longliners certain quota in demersal species and access to fish that quota the Icelandic EEZ. This part of the Icelandic-Faroe agreement has longer history than the other parts and can be traced to the historical fishing of Faroe vessels in Icelandic EEZ before it was extended to 200 miles.

Norway, Russia - Iceland "Loophole Agreement"

Icelandic fishing vessels have access to the Norwegian and Russian fishing zones for demersal fishing based on the trilateral "Loophole Agreement" (Smugusamningurinn) from 1999, officially named the "AGREEMENT BETWEEN THE GOVERNMENT OF ICELAND, THE GOVERNMENT OF NORWAY AND THE GOVERNMENT OF THE RUSSIAN FEDERATION CONCERNING CERTAIN ASPECTS OF CO-OPERATION IN THE AREA OF FISHERIES" (Alþingi, 1999).

The Loophole Agreement is not a "typical" northern access agreement, but a culmination of a longstanding dispute between Iceland on the one hand and Norway/Russia regarding the right of Icelandic vessels to fish in the high seas part of the Barents Sea, the "Loophole" for a cod stock that staddles the Norway/Russian EEZ and the high seas. The agreement basically stipulates that Icelandic fishing vessels will not fish Barents Sea cod in the "Loophole", but Icelandic fishing vessels can fish cod, with a bycatch allowance of other demersal fish in Norwegian and Russian EEZ.

In exchange Norwegian fishing vessels get a quota in demersal species and capelin [3] in the EEZ and access to Icelandic fishing grounds to fish the quotas.

For access to the Russian EEZ Icelandic vessels pay a yearly negotiable fee for the cod quota per kilo. The fee is paid directly from the Icelandic vessel owners to the Russian Federation. Indirectly tied to the Loophole Agreement Iceland has negotiated with Russia a quota in the shared stocks, but access has not been granted in general.

Further details of the agreement, are to be found in the agreement itself at the website of Alþingi (Alþingi, 1999) and the long negotiating process and its conclusion in "Smugudeilan" by Arnór Snæbjörnsson (Snæbjörnsson, 2015).

[3] Norway has quota and access for capelin in Icelandic EEZ through i) Coastal state share ii) Loophole Agreement and ii) exchange with EU for cod, that EU gets from Greenland.

Valuation of Icelandic access agreements

The Icelandic bilateral agreements are all northern agreements as described in Chapter 1.2, as there are no government-to-government payments. The only payments in these agreements are directly from the Icelandic fishing industry to the Russian authorities. These agreements include either reciprocal exchange of access or both quota and access to fish that quota.

Suzannah F. Walmsley author Appendix F in Robert et al. (2014, pp. 99–116) looks at the EU northern agreements and assesses the value to each party to the agreement by comparing the landed value of catches for each country. EU prices are used for EU catch and other nations prices for their catch, to reflect the relative value of the reciprocal fishing opportunities. Her conclusion is that the relative value to parties in EU northern agreements is evenly balanced. If both sides receive about the same value, one could argue that no subsidies were extended to either fleet.

A more nuanced approach would be to assess the landed value less the cost of fishing for each side. If one party has a relative comparative advantage in fishing, i.e. lower cost, the value could be different between parties. This relies on publicly available data on cost of fishing being accessible which is not the case for most countries even if the Icelandic figures are (Statistics Iceland c., 2022). This limits the practicality of the approach for wider application.

The method that would be in line with the OECD FSE methodology is to compare the change in government expenditure and revenue stemming from the agreements. The cost of negotiating these agreements is minimal. In northern agreements the foreign vessels are subject to the management and enforcement mechanism of the coastal state (Robert et al., 2014) and

given that the same effort of enforcement is extended to domestic and foreign vessels, the difference in cost of monitoring and enforcement is therefore also minimal.

If we look at these agreements from the perspective of the industry, it gets extra quota in the foreign EEZ, but the "costs" is a lower quota in other species in its own EEZ. Reciprocal quotas are therefore not "free" from either countries industry perspective. This holds for the respective countries industry as whole, but individual fishing firms will possibly gain or lose from the agreements, according to their share in the individual fish stocks that are exchanged.

From the Icelandic government perspective, the main change in expenditure or revenue from these bilateral agreements would be in the total revenue from the fishing fee. The fishing fee is only levied on Icelandic catches, not catches of foreign vessels within the Icelandic EEZ. If the Icelandic government signs an agreement that allows foreign vessels to fish a certain quota within the Icelandic EEZ that would in absence of the agreement be fished by Icelandic vessels, it loses the amount of fishing fee that the Icelandic vessels would have paid for that catch.

The "Loophole Agreement" gives Norwegian vessels quota for capelin and demersal species in Icelandic EEZ, no fishing fee is paid for that catch. A fishing fee is not levied on the Icelandic catches from the Norwegian and Russian EEZ, this does therefore not compensate for the loss of revenue from the catches of Norwegian vessels within the Icelandic EEZ. This calculation could be done yearly as the fee is levied as ISK per kilo of catch per species per year.

A bilateral booking to the herring and mackerel agreements is non-directly tied to the Loophole Agreement and allocates a certain amount of

the Icelandic quota in these pelagic species to Russia. No access is included. In absence of this allocation, Icelandic vessels would have been allocated the extra amount fishing fees levied on the catch.

Faroe Island vessels get both capelin and demersal quotas from Iceland, no fishing fee is paid on these catches. Iceland does not get any quota from the Faroes in exchange.

A quick estimate of the fishing fee that would have been levied on the catches of Faroes and Norwegian vessels in 2018 from the two long-standing bilateral agreements, if they had been fished by Icelandic vessels indicates that the "lost" fee could be around 1.500-1.600 thousand USD. The estimate is a rough one and assumes that the levied amounts for individual species as well as rules for "deductions" from the Regulation Nr. 637/2017 (Stjórnartíðindi, 2017) had been applicable for the whole calendar year 2018 , not fishing the year 2017/18[4]. The quota negotiated to Russia is changeable by years but for the year 2018 it was 1.500 tonnes of blue whiting and mackerel respectively. The estimated value of fishing fees from that catch could be around 50-60 thousand USD. In total the "lost" government revenue from the bilateral agreements with the Faroe Islands, Norway and Russia could therefore be 1.500-1.660 USD in 2018[5].

This estimation approach would not be applicable for "pure" access agreements with no reciprocal quota exchange. The Icelandic vessels are fishing shared stocks, as is the case for blue whiting, herring, and mackerel and the fishing fee is levied on catches of these species by Icelandic vessels in all fishing areas, all EEZs as well as those from the high seas. No fees

[4] Until 2019 the fee was levied on catches for each fishing year, which is 1 September to 30 August.

are “lost” from the Icelandic government side by the pure access agreements.

Reciprocal access is beneficial for both countries as the industry can concentrate the fishing effort to the season and area that gives highest value, and the industry will only use the access if it benefits them. From the government side, higher revenue should generate higher taxes and for the Icelandic case also higher fishing fee. One would therefore argue that pure access agreements do not constitute a subsidy to the Icelandic fleet.

Calculating the fee or cost recovery charge “lost” by access agreements could be used for a part of the northern agreements, at least to Faroe Island and Greenland vessels, as a fishing fee is collected by these governments, mostly on their industrial catches. It could also be extended to the countries that use cost recovery for fisheries management expenditure if the coastal state does not extend the cost recovery to foreign vessel fishing in its EEZ.

A limiting factor for using this method is that it only applies to countries that collect fishing fees or cost recovery and deduct the amount collected from government expenditure in reporting of subsidies. If the fee or cost recovery is not accounted for as payment by the industry, then the “lost” amount to government revenue from access agreements is not applicable as the general revenue is not accounted for either.

5 Discussion

The worlds governments are faced by a growing need for policies to address emerging crisis, such as climate change, health, food security and sustainable food production (IMF, OECD, World Bank, WTO, 2022). Subsidies in the fishing sector can support sustainable management of fisheries resources or contribute to overharvesting, depending on their implementation.

The first WTO agreement on fisheries subsidies signed in June 2022, and the subsequent negotiations on subsidies that contribute to overcapacity and overfishing call for a renewed effort to enhance the knowledge on fisheries subsidies worldwide, not least those that contribute to IUU fishing, overcapacity and overfishing.

In absence of reliable and comprehensive data on fisheries subsidies various studies have used different methodology to assess the scale and scope of fisheries subsidies worldwide. The wide margin between these estimates suggests that there is still some way to go. The aim of this thesis is to review the methods used for the latest of these assessment, i.e. Sumaila et al. (2019). The results for Icelandic fishing subsidies are evaluated to assess the validity of the methodology for the Icelandic fleet and consequent implications for the total world estimate.

The cost of fisheries management in Iceland is estimated to be considerably lower than in other countries in the N-Atlantic, around 3% of

landed value of catch (Arnason et al., 2000). Estimated subsidies to the fisheries sector in Iceland have also been assumed to be low (Schrank, 2003). Iceland has a small population but still is among the 20 largest fishing nations in the world, and the fishing sector dominated the export base in the 20th century, reaching 97% of exports in the 1950s. Seafood is still around 25% of total exports from Iceland (Statistics Iceland b.). There have been no other sectors in Icelandic large or profitable enough to provide funds to support the fisheries sector. Consequently Iceland has in the WTO negotiations on fisheries subsidies, firmly sided with the "Friends of Fish" (Grynberg, 2003), with the agenda to ban harmful subsidies and minimize subsidies to the fishing sector in general.

Considering this the estimated Icelandic fisheries subsidies in the Sumaila et al. (2019) study were surprisingly high, or nearly 162 million USD or 17% of the landed value of Icelandic catches in 2018, even if this is a lower percentage that the global average of 25%. The individual elements of the study assessments are analyzed in the previous chapter, but taken together the following picture emerges:

- Reported subsidies indicate double counting of expense items from the source data. The Icelandic fishing fee is not accounted as cost recovery or recuperation of resource rent. In 2016 the fishing fee was higher than the total amount of support reported. Expense items from the government accounts include expense for aquaculture and are therefore too high.
- Modeling MPA subsidies results in double counting expenses already included in reported data.

- Tax exemption amounting to 69 million USD do not rime with any identifiable items in Icelandic tax laws applicable to the fishing industry specifically, needs further background information from study for verification.
- Fisher assistance is most probably based on the assumption that the Icelandic "fishing day deduction" is still in force. It was abolished in 2015. Needs further background information from study for verification.
- Fishing access to foreign EEZ calculations cannot be verified when using official data from Iceland, and the method not applicable to the type of agreements in question.
- An alternative method for calculating subsidy from access agreements of the Icelandic fleet indicates a yearly amount of 1,6 million USD, as opposed to 13,4 million.

With the caveat that the tax exemption and fisher assistance need further verification regarding the type of exemptions being assumed, the conclusion is that the subsidies amount in the study to the Icelandic fleet is probably too high, if not considerably too high.

For the valuation of access agreements in particular, account needs to be taken of the different type of agreements. From the access agreements the Icelandic government has with its neighboring countries we can identify several types of "northern" access agreements, none include government-to-government payments:

a. Reciprocal access only, for fishing own quota of shared stock.
b. Reciprocal quota exchange in fishing opportunities with access to fish.

c. Reciprocal quota exchange with access on one side, but not the other
d. Quota and access with direct payment from individual fishing firms to coastal state government.
e. Hybrid c./d.

Valuing subsidy to the fleet from these types of agreements according to the method in the study, does not accurately reflect the inherent rights and obligations in these agreements.

The first step in refining the methods of valuing fishing access agreements would be to classify the agreements according to the form of exchange they include, that is if there is payment between governments, there are reciprocal exchanges of rights or payments from fishing firms to foreign governments. The last type would not be classified as a subsidy as the industry pays directly for the quota/access. The reciprocal exchanges of rights should be valued by a different method than the one in the study. For those countries that collect fishing fees or cost recovery fees, the valuation could take the form of lost revenue as such fees are generally not collected from foreign fishing vessels

In addition to their valuation one can question the classification of reciprocal quota/access agreements as capacity enhancing. For the pure access agreements there is no additional fishing involved by either fleet, the same amount of catch is taken only in a different area. For agreements with quota exchange there are no additional catches either, as quota in one species is exchanged with quota in another species. There is no "extra" effort or catch in either fishery if the total allowable catches for each species are unchanged. They should at least be classified as "ambiguous" not "capacity enhancing".

The conclusions on the applicability of the methods to assess fisheries subsidies in Iceland does not invalidate the approach used by Sumaila et al. (2019) to assess fisheries subsidies in general, they only conclude that the estimates in the study are not a compelling result for Iceland. This might be expected, taking into account the economic importance of the fishing sector in Iceland, matched by few countries and the rather unique development of the Icelandic fisheries management system in the past decades. For a more general validation of the methodology in the study their applicability would have to be tested more widely.

The Sumaila et al. (2019) study uses novel modeling approaches to quantify fisheries subsidies in absence of available data These approaches deserve to be further tested in different countries to determine their general or specific usefulness.

The empirical basis of the approach and estimate of 35 billion USD has been questioned from another aspect than a relative fit to one country. The OECD has pointed out that around 30% of the developed countries estimates rely on modelled approaches and 60% of developing countries estimates (OECD, 2017).

The Icelandic case can indicate that the model approaches might be "too general" to capture the reality on the ground in different countries and fisheries, and the old saying "The devil is in the detail" might apply. This can clearly be concluded regarding valuation of subsidies from fishing access agreements, which warrants further classifications of agreements by form and function before deciding how to evaluate their subsidy value to the industry.

This supports the conclusion in OECD (2022, p. viii) that detailed economic analysis is needed to understand if and how subsidy programs affect international markets and meet expressed domestic policy objectives as well as international policy goals, such as the United Nations SDGs (UN Department of Economic and Social Affairs, 2022).

It is the institutional structure of the fisheries management system that dictates if and how subsidies to the sector affect the fish resources, environment, international trade, and profits of the industry. One would caution against assuming the same effects of presumably similar government interventions in different systems (Acemoglu & Robinson, 2012).

The work ahead in the field of fisheries subsidies needs to find a balance between a country specific approach and a general approach. It should include both academia and government officials, to balance out economic analysis and applicability of methods for evaluation for individual countries as there are many potential pitfalls. Government accounts and tax laws in individual countries are notoriously difficult to navigate and other data can be deceptively complex. The example in Chapter 4.7 on classification of fishing grounds according to ICES or the Directorate are a case in point where data classification can result in large disparity in outcome.

The OECD has in the past years increased its work in the field of fisheries subsidies and made several updates and additions to its FSE database. There has also been increased cooperation between the OECD, FAO, and WTO in the field of fisheries subsidies. The further collaboration of these international institutions will hopefully facilitate better and fuller information on fisheries subsidies globally.

6 Conclusion

There is need for a solid understanding on the effects of fisheries subsidies so public investment and state intervention in the fisheries sector can be directed towards sustainable management of living marine resources and thereby contribute to sustainable food systems and food security. An important first step is to understand the current extent and nature of subsidies in the global economy (IMF, OECD, World Bank, WTO, 2022).

In absence of an international standardized reporting system for fisheries subsidies attempts at quantifying subsidies are a valuable input to an informed dialogue on the possible scope and scale of subsidies. Quantifying subsidies contributes to a meaningful outcome in the ongoing WTO negotiations on fisheries subsidies and fulfillment of SDG 14.6. The most pressing issue is to get a clearer picture of the "harmful" or capacity enhancing subsidies.

There have been several studies stretching back to the 1990s that have estimated the magnitude of fisheries subsidies in individual countries, regions or worldwide. The conclusion have ranged from USD 14 billion to USD 54 billion per year globally (WTO c., 2022). The last estimate, i.e. Sumaila et al. (2019) is for 35 billion USD per year or almost 25% of the landed value of catch in 2018 (FAO, 2018). This is a disturbingly high percentage, even higher than the estimate for agriculture in general or 17% (FAO, 2021).

Iceland is among the 20 largest fishing nations in the world (FAO, 2022) and reviewing the estimated subsidies for the Icelandic fleet can give

indication regarding the applicability of the methods used in the study for individual countries.

The estimated amount of subsidies for the Icelandic fishing fleet in 2018 from the Sumaila et al. (2019) study is 162 million USD, or 17,6 billion ISK which is 14% of landed catch value, the largest share capacity enhancing fisheries. 40% of the total subsidies are taken from reported sources, 60% stem from modeling approaches used in the study for missing values.

Item by item review of the individual subsidy types for Iceland indicates that for the reported amounts, data in the study does not adequately reflect the source material and might contain double counted expenses as well as omitting cost recovery by not including the Iceland fishing fee.

Modeling methods need further validation. Modeling specially for MPAs expense in Iceland results in double counting already reported government expenditure. Further information on the nature of the tax exemption that are assumed for the fleet is needed before their applicability can be verified. This also applies to the modeled fisher assistance. Tax deductions for fishers in Iceland existed some years ago but were abolished in 2015. Consequently, the conclusion is that the total amount of 162 million USD in subsidies for the Icelandic fleet in 2018 is does not reflect the “reality on the ground” in the Icelandic fishing industry.

Models help us identify and analyze in a structured manner parts of complex systems and think in a structured way. They are not intended to, nor indeed do, reflect all the relevant pieces at once but clarify important issues from different standpoint and help to build more in-depth knowledge.

Estimating fisheries subsidies worldwide is not an easy task and methods for such estimates need to strike a balance between being “too specific” or “too general”. The conclusion regarding Icelandic fisheries subsidies in this thesis indicates that the methods used by Sumaila et al. (2019) are of the latter type, but further analysis for individual countries are needed before a definite conclusion on the global applicability of the methodology can be reached.

Bibliography

Acemoglu, D., & Robinson, J. A. (2012). *Why Nations Fail: The Origins of Power, Prosperity, and Poverty* (1st edition). Currency.

Lög um veiðigjald nr. 145/2018. Retrieved July 25, 2022, from https://www.althingi.is/lagas/149b/2018145.html

Alþingi. (1999). *2/124 stjórnartillaga: Samningur milli Íslands, Noregs og Rússlands um þætti í samstarfi á sviði sjávarútvegs*. Alþingi. https://www.althingi.is/altext/124/s/0002.html

APEC. (2000). *Study into the Nature and Extent of Subsidies in the Fisheries Sector of APEC Member Economies, 2000* [SOM Steering Committee on Economic and Technical Cooperation (SCE), Committee on Trade and Investment (CTI), Ocean and Fisheries Working Group (OFWG)]. APEC Committee on Trade and Investment. https://www.apec.org/publications/2000/10/study-into-the-nature-and-extent-of-subsidies-in-the-fisheries-sector-of-apec-member-economies-2000

Arnason, R., Hannesson, R., & Schrank, W. E. (2000). Costs of fisheries management: The cases of Iceland, Norway and Newfoundland. *Marine Policy*, *24*(3), 233–243. https://doi.org/10.1016/S0308-597X(99)00029-9

Arthur, R., Heyworth, S., Pearce, J., & Sharkey, W. (2019). *The cost of harmful fishing subsidies* (IIED Working Papers, p. 32). IIED. https://pubs.iied.org/16654iied

Bayramoglu, B., Copeland, B. R., & Jacques, J.-F. (2018). Trade and fisheries subsidies. *Journal of International Economics*, *112*, 13–32. https://doi.org/10.1016/j.jinteco.2018.01.009

Belhabib, D., Sumaila, U. R., Lam, V. W. Y., Zeller, D., Billon, P. L., Kane, E. A., & Pauly, D. (2015). Euros vs. Yuan: Comparing European and Chinese Fishing Access in West Africa. *PLOS ONE*, *10*(3), e0118351. https://doi.org/10.1371/journal.pone.0118351

Chesnokova, T., & McWhinnie, S. (2019). International Fisheries Access Agreements and Trade. *Environmental and Resource Economics*, *74*(3), 1207–1238. https://doi.org/10.1007/s10640-019-00365-4

Cisneros-Montemayor, A. M., Ota, Y., Bailey, M., Hicks, C. C., Khan, A. S., Rogers, A., Sumaila, U. R., Virdin, J., & He, K. K. (2020). Changing the narrative on fisheries subsidies reform: Enabling transitions to achieve SDG 14.6 and beyond. *Marine Policy*, *117*. Scopus. https://doi.org/10.1016/j.marpol.2020.103970

Directorate of Fisheries. (2022). *Afli úr deilistofnum (catch from shared stocks)*. Vefur Fiskistofu. https://www.fiskistofa.is/veidar/aflaupplysingar/afliurdeilistofnum/

FAO. (1993). *Marine fisheries and the law of the sea: A decade of change. Special chapter (revised) of The State of Food and Agriculture 1992.* (No. 853; FAO Fisheries Circular, p. 66). FAO. https://www.fao.org/3/u9345e/u9345e.pdf

FAO. (2018). *SOFIA 2018—State of Fisheries and Aquaculture in the world 2018*. http://www.fao.org/state-of-fisheries-aquaculture/en/

FAO. (2021). *World Food and Agriculture – Statistical Yearbook 2021*. FAO. https://doi.org/10.4060/cb4477en

FAO. (2022). *The State of World Fisheries and Aquaculture 2022: Towards Blue Transformation*. FAO. https://doi.org/10.4060/cc0461en

Fjársýsla ríkisins. (2022, June). *Ríkisreikningur 2017*. Fjársýsla ríkisins. https://www.fjs.is/utgefid-efni/rikisreikningur/

Flaaten, O. (2011). *Fisheries Economics and Management*. https://munin.uit.no/bitstream/handle/10037/2509/book.pdf

Formenti, L. (2022). Assessing transparency in fisheries subsidies: A notification-driven analysis. *Marine Policy*, *136*, 104152. https://doi.org/10.1016/j.marpol.2020.104152

Greer, K., Zeller, D., Woroniak, J., Coulter, A., Winchester, M., Palomares, M. L. D., & Pauly, D. (2019). Global trends in carbon dioxide (CO2) emissions from fuel combustion in marine fisheries from 1950 to 2016. *Marine Policy*, *107*, 103382. https://doi.org/10.1016/j.marpol.2018.12.001

Grynberg, R. (2003). WTO fisheries subsidies negotiations: Implications for fisheries access arrangements and sustainable management. *Marine Policy*, *27*(6), 499–511. https://doi.org/10.1016/S0308-597X(03)00064-2

Harper, S., & Sumaila, U. R. (2019). *Distributional impacts of fisheries subsidies and their reform—Case studies from*

Senegal and Vietnam. Publications Library. https://pubs.iied.org/16655iied

Helgason, K. (2022, May). *Ministry of Food, Agriculture and Fisheries* [Personal communication].

Hilborn, R., Amoroso, R. O., Anderson, C. M., Baum, J. K., Branch, T. A., Costello, C., de Moor, C. L., Faraj, A., Hively, D., Jensen, O. P., Kurota, H., Little, L. R., Mace, P., McClanahan, T., Melnychuk, M. C., Minto, C., Osio, G. C., Parma, A. M., Pons, M., … Ye, Y. (2020). Effective fisheries management instrumental in improving fish stock status. *Proceedings of the National Academy of Sciences*, *117*(4), 2218–2224. https://doi.org/10.1073/pnas.1909726116

Homans, F. R., & Wilen, J. E. (1997). A Model of Regulated Open Access Resource Use. *Journal of Environmental Economics and Management*, *32*(1), 1–21. https://doi.org/10.1006/jeem.1996.0947

ICES. (2020). *Definition and rationale for ICES ecoregions*. https://doi.org/10.17895/ICES.ADVICE.6014

IMF, OECD, World Bank, WTO. (2022). *Subsidies, Trade, and International Cooperation*. Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/trade/subsidies-trade-and-international-cooperation_a4f01ddb-en

Kristjánsdóttir, H. (2012). Exports From a Remote Developed Region: Analysed by an Inverse Hyperbolic Sine Transformation of the Gravity Model. *The World Economy*, *35*(7), 953–966. https://doi.org/10.1111/j.1467-9701.2012.01464.x

Malhorta, D. (2016). *Negotiating the Impossible: How to Break Deadlocks and Resolve Ugly Conflicts (Without Money or Muscle)* (1st ed.). Harvard Business School Publishing.

Martini, R., & Innes, J. (2018). *Relative Effects of Fisheries Support Policies*. OECD. https://doi.org/10.1787/bd9b0dc3-en

McCrea-Strub, A., Zeller, D., Rashid Sumaila, U., Nelson, J., Balmford, A., & Pauly, D. (2011). Understanding the cost of establishing marine protected areas. *Marine Policy*, *35*(1), 1–9. https://doi.org/10.1016/j.marpol.2010.07.001

Merayo, E., Waldo, S., & Nielsen, M. (2018). Impact of a simultaneous reduction in fishing subsidies and introduction of efficient management of rents: The case of the Northwest Spanish fleet. *Aquatic Living Resources*, *31*. Scopus. https://doi.org/10.1051/alr/2017041

Milazzo, M. (1998). *Subsidies in world fisheries: A re-examination* (WBG 406) [Technical Paper, Fisheries series]. World Bank Group. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/133031468776403491/Subsidies-in-world-fisheries-a-re-examination

Ministry of Food, Agriculture and Fisheries. (2021, November 6). *Endurnýjaður samningur við Færeyjar um fiskveiðimál*. https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2020/11/06/Endurnyjadur-samningur-vid-Faereyjar-um-fiskveidimal/

Mwikya, S. M. (2006). *Fisheries Access Agreements: Trade and Development Issues*. International Centre for Trade and

Sustainable Development. https://doi.org/10.7215/NR_IP_20060401

Nichols, R., Yamazaki, S., Jennings, S., & Watson, R. A. (2015). Fishing access agreements and harvesting decisions of host and distant water fishing nations. *Marine Policy*, *54*, 77–85. https://doi.org/10.1016/j.marpol.2014.12.019

OECD a. (2006). *Financial Support to Fisheries: Implications for Sustainable Development* (p. 375). Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/agriculture-and-food/financial-support-to-fisheries_9789264036642-en

OECD b. (2006). *OECD Sustainable Development Studies Subsidy Reform and Sustainable Development Economic, Environmental and Social Aspects: Economic, Environmental and Social Aspects*. OECD Publishing.

OECD. (2017). *Support to fisheries: Levels and impacts*. OECD. https://doi.org/10.1787/00287855-en

Oreallana, M. A. (2007). *EEZ Fisheries Access Arrangements and the WTO Subsidies Agreement: Legal Analysis and Options for Improved Disciplines* [Commissioned by the United Nations Environment Programme Economics and Trade Branch Geneva]. Center for International Environmental Law (CIELL). https://www.ciel.org/Publications/UNEP_Fisheries_Dec07.pdf

Robert, A., Bostock, T., Clark, T., Cunningham, S., Major, P., Mallory, T., McClurg, T., Munro, G., Rouchdi, G., Walmsley, S., & Wilen, J. E. (2014). *Trade in fishing services: Emerging perspectives on foreign fishing arrangements* (Text/HTML No.

92622-GLB; ENVIRONMENT AND NATURAL RESOURCES GLOBAL PRACTICE DISCUSSION PAPER #01). World Bank Group. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/504571468164949623/Trade-in-fishing-services-emerging-perspectives-on-foreign-fishing-arrangements

Schrank, W. E. (2003). *Introducing fisheries subsidies*. Food and Agriculture Organization of the United Nations.

Seðlabanki Íslands. (2022). *Seðlabankinn—Tímaraðir*. https://www.sedlabanki.is/hagtolur/opinber-gengisskraning/timaradir/

Snæbjörnsson, A. (2015). *Smugudeilan—Veiðar Íslendinga í Barentshafi 1993-999* [University of Iceland]. https://skemman.is/bitstream/1946/22730/1/Smugudeilan%20MA%20ritger%c3%b0.pdf

Sovacool, B. K. (2017). Reviewing, Reforming, and Rethinking Global Energy Subsidies: Towards a Political Economy Research Agenda. *Ecological Economics*, *135*, 150–163. https://doi.org/10.1016/j.ecolecon.2016.12.009

Statistics Iceland a. (2022). *Catch and catch value by species and fishing area 1993-2020*. https://px.hagstofa.is/pxen/pxweb/en/Atvinnuvegir/Atvinnuvegir__sjavarutvegur__aflatolur__fiskveidisvaedi/SJA09001.px/table/tableViewLayout1/?rxid=aa7fbf6f-1faa-4170-8cb8-5e3f1e2ecba3

Statistics Iceland b. (2022). *Útflutningur eftir völdum vöruflokkum (Hagstofuflokkun) 1840-2020*. Hagstofa Íslands - Talnaefni. http://px.hagstofa.is/pxispxis/pxweb/is/Sogulegar/Sogulegar__sogul_utanrikisverslun/SOG12001.px/

Statistics Iceland c. (2022). *Statistics Iceland: Financial accounts of fisheries*. Statistics Iceland. https://www.statice.is/statistics/business-sectors/fisheries/financial-accounts

Stjórnartíðindi. (2017). *Reglugerð nr. 637/2017 Um fjárhæð, álagningu og innheimtu veiðigjalds fiskveiðárið 2017/18*. https://www.stjornartidindi.is/Advert.aspx?RecordID=064a3158-24b5-4126-9587-dc72e9d14978

Stjórnartíðindi. (2021). *AUGLÝSING Nr. 38/2021 um samning við Færeyjar um fiskveiðar innan íslenskrar og færeyskrar lögsögu á árinu 2018.* Stjórnartíðindi C. Deild. https://www.stjornartidindi.is/Advert.aspx?RecordID=06144eee-7471-4def-83d9-9165621ac782

Stjórnartíðindi. (2022). *C deild, auglýsingar*. https://www.stjornartidindi.is/#

Sumaila, U. R., Ebrahim, N., Schuhbauer, A., Skerritt, D., Li, Y., Kim, H. S., Mallory, T. G., Lam, V. W. L., & Pauly, D. (2019). Updated estimates and analysis of global fisheries subsidies. *Marine Policy*, *109*, 103695. https://doi.org/10.1016/j.marpol.2019.103695

Sumaila, U. R., Khan, A. S., Dyck, A. J., Watson, R., Munro, G., Tydemers, P., & Pauly, D. (2010). A bottom-up re-estimation

of global fisheries subsidies. *Journal of Bioeconomics, 12*(3), 201–225. https://doi.org/10.1007/s10818-010-9091-8

Sumaila, U. R., Skerritt, D., Schuhbauer, A., Ebrahim, N., Li, Y., Kim, H. S., Mallory, T. G., Lam, V. W. L., & Pauly, D. (2019). A global dataset on subsidies to the fisheries sector. *Data in Brief, 27*, 104706. https://doi.org/10.1016/j.dib.2019.104706

UN Department of Economic and Social Affairs. (2022). *THE 17 GOALS | Sustainable Development*. https://sdgs.un.org/goals

Valtýsson, H. Þ. (2014). *Reconstructing Icelandic catches from 1950-2010, Fisheries Catch reconstructions: Islands, Part IV*. (22(2); Fisheries Centre Research Reports, pp. 73–88). https://sau-technical-reports.s3.amazonaws.com/352_Valt%C3%BDsson_2014

Westlund, L. (2004). *Guide for identifying, assessing and reporting on subsidies in the fisheries sector* (No. 438; FAO Fisheries Technical Paper, p. 71). FAO. https://www.fao.org/3/y5424e/y5424e00.htm#Contents

World Bank. (2022, July). *Consumer price index (2010 = 100)—United States | Data*. World Bank. https://data.worldbank.org/indicator/FP.CPI.TOTL?end=2019&locations=US&start=2013&view=chart

WTO a. (2022). *WTO | Subsidies and Countervailing Measures overview*. https://www.wto.org/english/tratop_e/scm_e/subs_e.htm

WTO b. (2022). *12th WTO Ministerial Conference Outcomes*. WTO. https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/MIN22/33.pdf&Open=True

WTO c. (2022, June). *WTO | Ministerial conferences—Twelfth WTO Ministerial Conference—MC12 "Geneva package"—In brief*. https://www.wto.org/english/thewto_e/minist_e/mc12_e/geneva_package_e.htm

WWF. (2002, May). *Hard Facts, Hidden Problems: A Review of Current Data on Fishing Subsidies*. https://www.wwf.eu/?3724/Hard-Facts-Hidden-Problems-A-Review-of-Current-Data-on-Fishing-Subsidies

Annex 1

	Category 1	Category 2	Category 3	Category 4
Reference to profit / loss account	Direct financial transfers	Services and indirect financial transfers	Interventions with different short and long-term effects	Lack of intervention
REVENUES				
SALES REVENUES (AND OTHER INCOME)	Price support (+) Direct export incentives (+) Vessel decommissioning programmes (+)	Import quotas (+ or -) Export promotion support (+) Direct foreign investment restrictions (+) Inspection and certification for exports (+) Fisheries management (+) International cooperation and negotiations (+)	Environmental protection programmes and regulations (+LT) Gear regulations (+LT) Chemical and drugs regulations (+LT)	Non implementation of existing regulations (-LT) Free access to fishing grounds (-LT) Lack of pollution controls (-LT)

OPERATING COSTS				
RUNNING (VARIABLE) COSTS	Import/export duties (-)	Fuel tax exemptions (+) Port and landing site facilities (+) Provision of bait services (+)	Chemical and drugs regulations (-ST)	Non implementation of existing regulations (+ST)
LABOUR COSTS	Income guarantee programmes (+) Disaster relief payments (+)	Special income tax deductions (+) Specialized training (+) Extension (+)		
FIXED COSTS	Grants for safety equipment (+) Taxes and fees (-)	Special insurance schemes for vessels and gear (+) Payments to foreign governments to secure access to fishing grounds (+) Government R & D programmes (+)	Environmental protection programmes and regulations (-ST) Gear regulations (-ST)	Free access to fishing grounds (+ST) Lack of pollution controls (+ST)
CAPITAL AND FINANCIAL INCOME AND EXPENSES				
DEPRECI-ATION AND INTEREST COSTS	Investment grants (+) Equity infusions (+)	Investment loans on favourable terms (+) Loan guarantees (+) Investment tax credits (+)		

TAX				
CORPORATE INCOME TAX		Deferred tax programmes (+)		

Annex II

Value of landed catch by fishing area, Icelandic vessels 2005-2014, ISK thousands, current prices

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Eastern Banks	5.260.053	4.185.826	2.814.085	5.124.087	7.464.363	7.288.268	8.392.567	7.104.643	5.014.110	2.878.971
Breiðafjörður	0	0	0	0	0	0	0	0	0	11.387
Icelandic EEZ	59.788.120	65.734.051	71.425.471	87.410.202	99.632.466	118.544.320	137.342.635	144.521.461	138.439.511	122.535.578
Inshore	22.613	419	1.147	26.474	95.245	51.898	205.198	155.455	437.315	489.456
Kolluáll	0	0	0	0	0	0	0	2.361	278.352	453.231
Norther area (flatfish)	4.940	718	1.090	298	310	2.124	1.099	254	976	740
Reykjanes Ridge EEZ	1.331.321	2.728.810	1.724.026	924.486	3.620.456	3.658.212	4.089.640	1.975.589	2.153.418	602.662
Snæfellsnes	0	0	0	0	0	0	0	0	0	34.178
Icelandic EEZ total	**66.407.047**	**72.649.824**	**75.965.819**	**93.485.546**	**110.812.841**	**129.544.823**	**150.031.138**	**153.759.762**	**146.323.682**	**127.006.203**
NAFO 3M	454.111	200.546	0	0	0	0	50.284	0	0	0
NAFO 3L	9.728	0	0	0	0	35.215	0	0	45.886	0
Reykjanes ridge NEAFC	339.674	174.074	0	0	0	0	0	0	0	0
Svalbard	0	0	0	0	0	0	0	0	0	41.929

NEAFC regulatory area	690.504	3.383.327	2.857.646	2.859.296	2.837.067	613.857	997.012	491.131	191.200	1.208.947
High Seas total	1.494.017	3.757.947	2.857.646	2.859.296	2.837.067	649.072	1.047.296	491.131	237.086	1.250.876
East Greenland	0	0	0	0	0	0	142.671	87.525	316	145.801
Dohrnbank (E-Greenl/Icel)	3.205	0	0	0	0	1.564	42.286	0	347.428	33.823
Faroe Islands	0	0	0	75.698	1.593.088	2.907.757	1.402.565	5.606.125	4.594.774	4.494.965
Jan Mayen	0	0	0	594.333	87.399	0	6.838	0	0	0
Norwegia EEZ	680.803	726.141	1.672.871	3.574.989	3.373.191	3.919.790	2.929.971	2.309.741	2.216.627	2.887.025
Russian EEZ	299.420	400.930	852.086	928.063	738.195	1.518.661	2.005.539	1.291.227	1.348.908	2.873.298
3rd counties EEZ total	**983.428**	**1.127.071**	**2.524.958**	**5.173.082**	**5.791.873**	**8.347.773**	**6.529.870**	**9.294.618**	**8.508.055**	**10.434.913**