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Strategic sources of superprofit in a well-regulated fishery

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ABSTRACT

This study is motivated by the ongoing debate on resource rent taxation in Norwegian fisheries. Drawing on strategy literature, this paper argues that resource rent is just one of several conceivable sources of above-normal profit (superprofit) for a firm in a natural resource-based industry. The financial statements of almost the whole population of the Norwegian purse seine fleet were analyzed (61 firms owning 65 vessels) for a 5-year period and the level of superprofit for each company was calculated. The findings show that the average firm made modest superprofit in 4 out of 5 years. One reason is that the firms have received a large portion of their quota portfolios gratis. Another reason is that the competition arena is favorably protected through institutionalized barriers to entry. Moreover, the study reveals large profitability variations among seemingly similar firms. Different sources of superprofit were therefore investigated. It was found that the most profitable firms were the most risk adverse. They invested in neither large quota shares nor large catch capacities; as a result, their balance sheets were not debt loaded. The paper concludes by discussing policy implications and limitations of the findings.

1. Introduction

It is not surprising that resource economists have devoted considerable research efforts to investigate different issues related to resource rent generation (e.g., Refs. [1–13]. Several of the abovementioned studies are rooted in traditional industrial organization theory. A general key assumption within this perspective is that management can neither affect a firm's performance nor conditions within the industry [14,15]. Another assumption is that resources are expected to be mobile and homogeneously distributed, i.e. firms have the same resource mix and as a consequence follow the same strategies [16]. Resource rent, therefore, is the only source left to explain the above-normal profit earned by average firms of natural resource-based industries (NRBIs).

Furthermore, industry has been used as the unit of analysis in most of the abovementioned studies. As an empirical consequence, average industry data from national accounts or industry surveys are used to estimate the level of rents. However, at industry level, average calculations may be misleading indicators of economic rents in fisheries [17]. One reason is that average numbers include all business units of the firms in the industry, which is both catch-, process-, sales-fishery entities and non-fishery entities. In addition, even if only catch-related activities were included, unprocessed data based on firms' financial statements will involve returns related to not only operating activities of fishing but also general investments and financing activities of the firms. Accordingly, average industry data that mix diverse business entities and various business activities will provide inaccurate estimates of profits stemming from the harvesting of a wild natural resource.

Investigating the existence of above-normal profit at the firm level, as seen through strategic lenses, is the core of the present study. In the literature, a plethora of terms have been attached to the idea of above-normal profit. This paper defines rent or superprofit in line with Magni [18] as the surplus profit that remains after the opportunity cost of capital has been charged. That is, rent or superprofit is used as synonyms for the business economics term “residual income” (RI). Superprofit may stem from diverse sources. For example, firms may be extraordinary efficient (e.g. Ref. [16] or they may have gained a favorable strategic position within the industry (e.g., Ref. [19]. Finally, the paper argues that resource rent in combination with regulatory rent may be a third source contributing to above-normal profit [20,21] for natural resource-based firms. However, the terms resource rent and regulatory rent are discussed as an integral part of the theoretical perspective applied (Fig. 1).

To test the theoretical framework empirically, hypotheses were developed and the financial statements of almost the entire population of Norwegian pelagic fishing vessels firms (65 units) were reviewed and analyzed. The findings of the study support arguments in the literature that both industry effects (e.g. Ref. [22] and firm-level effects (e.g. Ref. [23] significantly affect a firm's performance. The profit of most firms was above normal most of the time. In 4 out of 5 years, the average firm

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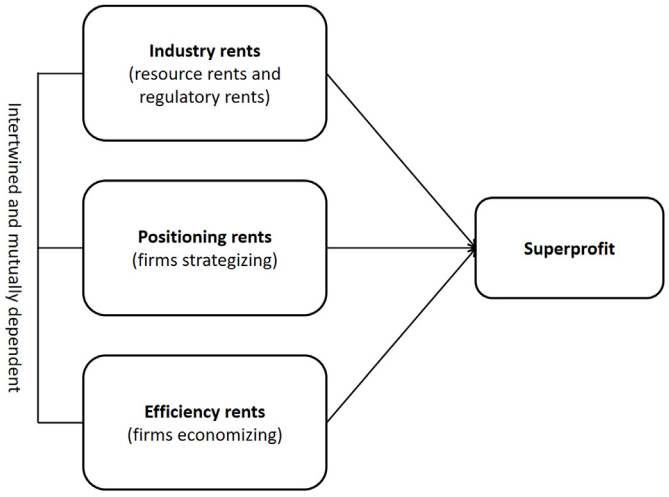

Fig. 1. Tentative theoretical framework.

made superprofit. Furthermore, the findings show that the firms that had acquired the largest quota shares did not achieve highest return on invested capital. However, they had incurred the largest relative debt burden. The firms that based their entire operation on quotas received for free turned out to be most profitable.

In the following sections, strategy literature that focuses on diverse sources that may lead to above-normal firm profit is presented. Next, the context of the study, empirical hypotheses, method used and results obtained are presented. Finally, findings, implications, and limitations are discussed before suggesting some possible directions for future research.

2. Theory

In the strategy literature, there is an ongoing debate on why some firms are able to generate above-normal profit, i.e., superprofit. According to the dominant perspectives, sources of a firm's superprofit can be found in the firm itself (e.g., Ref. [16], or in the industry (e.g., Ref. [19], which may provide the firm's access to natural resources, which form the basis of its existence (e.g., Ref. [21]. This section discusses the manner in which superprofit concept is treated in each of the two main perspectives. Subsequently, it makes an attempt to integrate them to obtain a more holistic view of conceivable sources of superprofit for a firm.

Porter's works (e.g. Refs. [19,24–27] have significantly influenced strategic literature in recent decades by taking an industry view of superprofit generation. Porter claims that an overriding strategic goal of a firm is to uncover and select an attractive industry, thus enabling it to earn industry rents. This paper argues that industry rents may arise from different but related sources in an NRBI. First, a firm may gain access to free or cheap natural resources, enabling it to earn industry rents. This is the *resource* rent part of industry rents. Resource rent denotes the extra return that can be expected by allowing firms to use scarce and valuable common natural resources as input without having to pay for it [20,21]. For firms participating in wild fisheries, these rents represent the value of the input, which is biologically generated by the stock of fish (e.g., Refs. [3,7]. Fishing licenses received gratis by the state or purchased at a price below the market value can provide a good foundation for generating resource-type of industry rents and subsequently superprofit for a business.

Next, the firms in the industry may make additional rents resulting from being part of a competition arena that is favorably protected through institutional arrangements implemented through government policy, i.e., *regulatory* rent. Public policy and regulations can affect the overall attractiveness of an industry and the competitive forces and dynamics within it. Although Porter's five-force model did not explicitly acknowledge the role of government, he and others did note the manner in which government could influence a number of the forces, for example, by creating higher barriers to entry through regulations or other means [27]. Firms, being part of an NRBI, may be highly protected through institutional arrangements. Intentionally, these may have been designed to protect the stocks of fish and to create a profitable environment for the players (e.g., Ref. [13]. Thus, any firm that is favorably protected through institutional arrangements in a NRBI has a potential to earn regulatory-type of industry rent and hence superprofit.

After having selected an attractive industry, Porter argues that the next strategic move of a firm is to find a favorable position within the industry either as a cost leader or by differentiating its products. If succeeding, a firm has the potential to earn monopoly-type of rent, or *positioning* rents. Porter [19] claims that five forces can threaten a firm's prospects to develop an advantageous strategic position within an industry. The industry threats may arise from new entrants, harsh rivalry, access to substitutes, powerful suppliers, and powerful buyers.

Finally, superprofit may be a result of superior internal efficiency. This argument is in line with the resource-based view of strategy (RBV) that examines potential sources of economic rents internally in the firm (e.g., Refs. [16,28–31]. Thus, efficiency is primarily driven by resources and capabilities, which are built within the boundaries of the firm. Resources are defined as tangible or intangible assets that are semi-permanently linked to a firm [32]. It may be intangible fishing rights, brand names, technology knowledge, personnel skills, trade agreements, working procedures, institutionalized practices, and so on [31]. Resources are assets that are owned or controlled by the firm, whereas capabilities are described as socially complex procedures that determine how efficient a firm is able to transform inputs into outputs [33]. Properties of the accumulation process can make resources and capabilities valuable, rare, inimitable, and non-substitutable, and thus hard to acquire for competitors [16]. This is in contrast to resources that are bought in strategic factor markets [34,35]. Hence, RBV claims that the basis for competitive advantages and superior performance is grounded in resources and capabilities that are heterogeneously distributed between firms and are immobile and hard to imitate. Accordingly, above-normal profit generation is a result of a firm being able to economically exploit strategic resource portfolios that it owns or controls. A firm that is able to use its internal strengths economically has a potential to earn *efficiency* rents.

To sum up, the literature review reveals that there may be several sources of superprofit for a firm, as illustrated in Fig. 1. Having free [21] and protected access to scarce and valuable natural resources may give rise to industry rents, which are composed of resource rents and regulatory rents. Another source is based on the firm's ability to strategically position itself favorable within the industry, i.e., strategizing [19]. A final source is internal and stemming from superior internal efficiency, i.e., economizing [16]. For a firm to perform above normal, there must be a good fit between internal capabilities and the strategy being followed [31]. However, there must also be a good fit between firm strategy and the industry environment as changes in the industry may change the significance of resources to the firm [36]. Thus, the different sources of superprofit are intertwined and mutually dependent of each other, and methodologically it is challenging to separate one type of rent from the other.

In the next section, the empirical context of the study is described.

3. Empirical context

Pelagic fishing has a long tradition in Norway. Export of herring can be traced back to the 13th century. As a result of the collapse of the herring stock in 1968–1969, a halt on registration of purse seiners was introduced, and vessels of 90 feet and above registered in 1973 received their fishing licenses for free [37]. The main aim of the licensing system was to avoid biological overexploitation of the stock (biologic

sustainability), ensure a profitable harvesting industry (economic sustainability), and maintain a reasonable regional distribution of the values created by the fleet (social sustainability) [2]. As of today, the stock is rebuilt, and herring is managed within safe biological frameworks.

Pelagic fishing takes place during hectic and partly overlapping seasons, followed by long periods of inactivity. In 2011 (the year before this study begun), the population of Norwegian purse seiners consisted of 80 vessels. The average vessel was then 18 years old and 63 meters long, with an engine power of approximately 4700 HK. Mackerel and Norwegian spring-spawning herring were the two main species and accounted for approximately 73% of the revenues. The profitability of the industry has been good the last decade or so [38].

The number of purse seiners in Norway has been relatively stable the past 10 years. Southern Norway has the largest geographic concentration of firms, and Hordaland county controlled 41% of the rights in 2011. The ownership of purse seiners is fragmented. As a rule, there are different families who own a vessel each. In 2011, 50% of the rights were controlled by 17 major owners (ibid.). The crew of the boats is more or less independent of the boat size and consists of about 10 members.

Formally, Norway does not manage its fisheries by individual transferable quotas (ITQs). However, in reality, the fisheries management system in Norway has many similarities with such a system [1,6]. In this system, a total quota (TAC) was allocated to individual vessels based on the vessel size (IVQ) [13]. Norway implemented a new quota transfer system in 1996. This system allows a vessel to buy another vessel and add a certain fraction of the acquired vessel's quota to its own vessel. The condition is that the purchased vessel is scrapped or sold out of the fishery [6]. For example, if a purse seiner registered in Northern Norway acquires another vessel from the same region, 95% of the original quota carried by the acquired boat is transferred to the buyer's boat [13]. Although the basis (original) quota is not limited in duration, the transferred quota (also called “structural quota”) is limited to 20 years (ibid). The degree of transferability for individual quotas has generally increased over time in Norway [11].

4. Development of hypothesis

According to the theoretical approach that forms the basis of this study, a firm can generate superprofit by selecting a favorable industry, and strategize and economize within the industry selected (Fig. 1). In the present section, empirical hypotheses will be developed that can help explain performance similarities and differences among the firms that take part in the Norwegian pelagic catch industry.

4.1. Superprofit as a result of attractive industry attributes

Profitability varies among industries. Thus, investing in a favorable industry is a vital strategic choice for a firm [19,27]. However, for many of the current family-owned firms that are included in this study, the choice of industry has hardly been a relevant issue. Instead, “the industry has chosen the firms” as parents, grandparents, or great-grandparents once upon a time invested in a pelagic fishing boat. This historical decision has guided many firms' current industry affiliation through path dependency [39]. The Norwegian pelagic industry is characterized by a number of attractive attributes for the incumbent firms. Historically, the firms were provided access to scarce valuable wild fish resources for free [2]. A significant portion of their quota portfolios has thus no footprint in their financial statements. Accordingly, all firms have a potential to harvest resource rent. The industry's specific advantage is further enhanced by the fact that the firms do not have to pay a resource rent tax on their catch or profit.

The catch capacity in the pelagic fishing industry has been gradually regulated through access restrictions and structural measures [3,6]. This has resulted in the total catch revenue being distributed to ever fewer vessels [13]. The reduction in catch capacity that is taking place is likely to improve the financial performance of the remaining firms in the industry.

Moreover, there are institutional barriers to enter as fishing rights and quotas are needed. Only Norwegian citizens (fishermen) can obtain permission to own a fishing boat and participate in fisheries (Participation Act of 1999). This effectively rules out financial institutions and foreign investors from entering the industry. In an attractive well-regulated NRBI where firms have received a substantial part of their quotas for free, not only the best firms are expected to create superprofit but also the average firm. Accordingly, the following two hypotheses are posited.

H1a. The average firm in the Norwegian pelagic catch industry is able to make superprofit.

H1b. The profit among most of the firms is above normal most of the time.

4.2. Superprofit as a result of firms' strategizing efforts

In strategic factor markets, firms can buy and sell resources in order to implement their strategies [34]. However, if the cost of strategy implementation is greater than the returns obtained, a firm will not create above-normal profit from its strategizing efforts (ibid.). If strategic factor markets are perfectly competitive, the full value of the resources will be discounted when purchased and sold. Accordingly, fishing vessel firms will only obtain normal returns from purchasing strategic resources as, for example, quotas in a competitive marketplace [9].

Nevertheless, in the present industry, some firms have pursued an aggressive quota share accumulation strategy as they have invested in a larger share of the total quota market than their more risk adverse rivals. In an imperfect quota market, an obvious motive is that the investment is regarded as profitable in itself. If a seller has lower expectations of the future than the buyer, he or she may sell the quota below its market value [34]. A firm that wants to exit the industry because he/she is less efficient than the rivals may psychologically have lowered his/her future expectations and subsequently charged a lower price than necessary for the quota sold. If this happens, the buyer of the quota will reap the economic benefits. The majority of boat owners in the sample have purchased quota shares either before or during the period of analysis. The firms in this strategic group have entered intangible assets (fishing rights and quotas) in their balance sheets. Furthermore, the input generated by the fish stock also has a cost in the firm's income statements through depreciation and interest on the additional debt.

A firm can increase its profitability by increasing revenues or reducing costs. When investing in quotas, both of these aims can be achieved. Larger catch capacity enables the firm to better exploit economics of scale [7,9]. For a boat owner who is harvesting a natural resource, the possibility of cost-effective fishing will only exist for short periods [40]. In this case, it is important for the company to have sufficient catch capacity to exploit the short time windows when they are open. Based on the above discussion, the following hypothesis is posited.

H2. There is a positive relationship between quota share holdings and firm profitability.

4.3. Superprofit as a result of firms' economizing

Efficiency rents refer to excessive profit that stem from a firm's unique assets or capabilities. Consequently, considerable performance variations are expected among firms as they own and control different resource portfolios (e.g., Ref. [16]. Wild fish represents the critical

input of the pelagic fishing industry, and fishing rights provide access to this valuable natural resource. Quota is a threshold resource that "qualifies" a firm to participate in the industry. Thus, fishing rights are necessary for a firm to achieve supply parity with its competitors in the pelagic harvesting place. All of the participants in the sample thus have access to pelagic fishing resources.

Nevertheless, performance variations may arise from diverse sources. Heterogeneity in cost and revenue structures [8] may, for example, stem from economics of scale (see Hypothesis 2), economics of scope or from differences in boat capacity (e.g., boat length and engine power) and capacity utilization, and catch technology and skills of the skipper and crew [17]. Accordingly, any individual firm may be earning profits above normal because of internal efficiency gains [16,41].

Fishing rights and quotas that a firm has received for free at a specific historical point in time, which probably will never occur again, certainly have the potential to create above-normal profit. Consequently, such an asset is considered as valuable, rare, inimitable, and non-substitutable [16]. In addition, the fishing vessel's reputation and the skills of its crew and skipper are expected to give rise to competitive advantages and thus superior performance [42]. The same applies to the owner's/board's capabilities in making strategic investments in quotas, boats, and fishing gear. Ten of the fishing vessel firms in the sample have not purchased quotas, because there are no signs of intangible assets in their balance sheets. Thus, the input generated biologically by the fish stock has essentially a zero cost in the firm's income statement. These firms have gained a cost advantage compared to their peers. Accordingly, they seem to follow an economic harvesting strategy, because they appear to be satisfied with their original quota base. The following hypothesis is posited:

H3. Firms that economize with quotas received for free are most profitable.

5. Data and methods

5.1. Sample and data collection

For this study, 65 financial statements for Norwegian purse seiners were obtained. Of these, 61 boats were owned by firms that only had one fishing boat, whereas 4 firms owned two boats. For each of the firms, accounting figures were obtained from the Brønnøysund Register Centre (in Norwegian: Brønnøysundregistrene, www.brreg.no) based on industry code and company identification. A number of studies have shown that extraordinary firm performance can in part be explained by random events and that they may vary widely in a medium or longer perspective [43]. To avoid a snapshot of the profitability of the sample firms, the analysis period typically extend over 5 years. Accordingly, financial statements were collected for the years 2012–2016. Only those firms that had complete accounts for all 5 years were included in the database. The database has 325 observations (65 vessels over 5 years). For each boat, additional information was also collected from the Norwegian Directorate of Fisheries' open database of licensed fishing vessels. The following information was included: 1) year of construction, 2) maximum vessel length, 3) engine power of vessel (HK), 4) structure quota, 5) bases quota, 6) blue whiting quota, 7) quota for small sand eel/Norway pout, and 8) other quotas (which, if applicable, are quotas for saithe south, haddock/cod, argentine, and shrimps). Few boats have quotas of type 8, and for those who have, quota for saithe dominate.

In some of the analyses, the accounting figures were characterized by "outliers." When outliers are removed from the calculations, there were usually 1 to 4 firms with highly unreasonable accounting figures that were removed. Treatment of outliers will be noted in each individual analysis. The 5 years of data included in this study are not equal in terms of economic performance, because some analyses use pooled data, whereas others use dummy variables for years.

5.2. Measuring of dependent variables

In this study, the dependent variables were return on invested capital (ROIC) and superprofit resulting from the catch business only, because the validity of comparison is highest when firms are similar [44]. The accounting data forming the basis of the analyses are compiled according to the normal accounting principles in Norway (see Chapter 6 of the Norwegian Accounting Act). In traditional financial statements, assets are grouped in relation to their liquidity and debts are grouped in relation to their maturity. Such a format is useful for creditors when analyzing if a firm is liquid to pay off its debts on maturity. In this investor-oriented profitability measurement study, because a standard setup of the income statement and balance sheet was not suitable for further analysis reorganized income statements and balance sheets provided by Penman [45] were used. The overall purpose was to classify assets and liabilities into one of the following two categories: 1) operating assets and liabilities, and 2) financial assets and liabilities. The same procedure was applied to the profit and loss accounts. The major aim was to calculate the operating results of the core activity (i.e., the catching business only), which is not affected by financial items. Subsequently, operating profit after tax deduction was calculated in accordance with the NOPLAT definition (Table 1).

Operating items are to be separated from financial items in the profit and loss account. A similar congruent separation is to be made in the balance sheet when calculating working capital. Thus, operational working capital was allowed to comprise assets regarded necessary for the operation, i.e., receivables (debtors), prepaid expenses, and inventory. After this, financial assets comprised cash, other liquid funds, and short-term investments. Typically, some cash is needed for transaction purposes, which was regarded as financial operating assets. An amount equivalent to 3% of revenues was estimated as required cash for ongoing transactions. The remainder cash was considered as financial assets.

Current liabilities comprised trade payables, current liabilities due to accrued liabilities and due taxes and fees, and any other short-term liabilities for which interest is not payable. Deferred dividends not paid and booked as accrued liabilities were reallocated to equity. Briefly, debt that did not charge operating expenses with interest or similar payments was regarded as operating debt and was included in net operating working capital. The remainder was regarded as short-term operational interest-bearing debt together with long-term interest-bearing liabilities. Interest-bearing items were considered financial liabilities. Operating assets (plant, properties, and equipment [PP & E]), intangible assets, and operating financial assets are defined as "invested capital" (IC).

According to NOPLAT guidelines, free cash flow (FCF) and the ROIC ($ROIC_t = NOPLAT_t/IC_{t-1}$) of the firms was calculated. Present value of the firm's FCF was the estimated fundamental value of operating net investment. The estimated value of IC is different from the book value of IC. The method used was triangulated with the RI method, which, as expected, provided the same outcome. Finally, ROIC was compared with normal profit to calculate the firm's superprofit.

5.2.1. Opportunity cost of capital (normal profit)

The risk-adjusted capital cost, k, can be calculated as the standard

Table 1
Calculating NOPLAT.

	Income from fishing
-	Operating costs
-	Labor costs
-	Depreciation
=	EBIT (Earnings Before Taxes)
-	General Taxes on operating profit (EBIT)
=	NOPLAT (Net Operating Profit Less Adjusted Taxes)

textbook weighted average cost of capital. As clarified by Miles and Ezzell [46] and building on Miller and Modigliani [47]; the assumptions behind this often used formula is not normally fulfilled. Relative to this study, the market value of equity, only book value is known. The market value of debt and equity cannot be assumed to be stable over time. The systematic risk for equity and debt cannot be easily estimated from equity markets, because none of the firms in the study are traded on open stock markets. Accordingly, a constant discount rate of 5% during the period of analysis was used. The results have been tested for variations in the discount rate.

5.2.2. Calculating RI and ROIC

RI and ROIC were calculated as follows:

$$RI_t = NOPLAT_t - k{\cdot}IC_{t-1}$$

$$ROIC_t = \frac{NOPLAT_t}{IC_{t-1}}, \text{ that is } NOPLAT_t = ROIC_t{\cdot}IC_{t-1}$$

RI represents the excess return of the firm beyond its own risk-adjusted capital cost multiplied by its book capital invested at the beginning of the period. All standard textbooks on valuation state that the FCF method and RI method, when properly applied, yield exactly the same value. Koller et al. [48] provides a mathematical demonstration of this, and Ohlson and Juettner-Neuroth [49] show, by another method, the conditions for the formulas to yield the same output.

6. Results

This section presents the empirical findings of the study in the same order as the hypothesis in the theory section.

6.1. Superprofit as a result of attractive industry attributes

The following hypothesis was posited in the theory section of this paper:

H1a. The average firm in the Norwegian pelagic catch industry is able to make superprofit.

According to H1a, an average firm in the pelagic industry is expected to make superprofit. Table 2 shows the average ROIC and RI for each year analyzed and also for the whole period of 2012–2016.

Table 2 discloses that an average firm in the Norwegian pelagic catch industry made a superprofit in 4 out of 5 years using a cost of capital of k = 5% and after normal profit tax (on average 25% in Norway for this period, in 2019: 22%). The results for calculated superprofit in access book value of already bought quotas and licenses depend on assumptions on taxes and cost of capital. In Table 3, the average annual residual income is summarized.

From a firm's point of view, the 5-year average value of RI becomes zero with a tax rate of 25% and a cost of capital between 5% and 6% (5.59% exactly). However, with tax rate set to 0%, the same break-even cost of capital will be 7.46%. A tax rate of zero is relevant when calculating the value added for society. Although taxes are a cost item for private firms, they are a part of the distribution of total value added for the entire society.

With discount rate of 5% and company tax rate of 25%, the average superprofit (RI) is positive for 4 out of 5 years for the period 2012–2016. It is notable that this calculation is based on a definition of capital where book values of all acquired licenses and quotas are included. Average firms in the Norwegian pelagic catch industry did make a private superprofit in 4 out of 5 years and an average public superprofit (private plus taxes) for discount rates less than 7.5%. To sum up, it seems reasonable to conclude that H1a is supported by the findings reported in Tables 2 and 3.

Furthermore, H1b was developed in the theory section of the paper.

H1b. The profit among most of the firms is above normal most of the time.

H1b expected most firms to perform financially above normal most of the time. Fig. 2 illustrates the average ROIC of 64 firms in 2014 and in 2016.

In the sample of 64 firms, only 36% (23 vessels) made a superprofit in 2014, which was the worst year in the period. The corresponding figure was 78% (50 vessels) in 2016, which was the best year. Consequently, the results reported in Fig. 2 support H1b.

6.2. Superprofit as a result of strategizing

H2 hypothesis was posited in the theory section.

H2. There is a positive relationship between quota share holdings and firm profitability.

Fig. 3 illustrates the relationship between the quota size and ROIC for the 5-year period analyzed (2012–2016).

The findings in Fig. 3 reveal that there is no statistically significant relation between the quota size and ROIC ($R^2 = 0.0003$).[1] Accordingly, firms with largest quotas do not have significantly higher ROIC (intangible assets included) than firms with smaller quotas. However, as long at ROIC is larger than cost of capital, the investment in quotas is profitable in terms of discounted wealth for investors. It therefore seems reasonable to reject H2 and conclude that the most profitable vessel firms have not acquired largest quota shares.

6.3. Superprofit as a result of economizing

In the theory section of the paper, the following hypothesis was posited.

H3. Firms that economize with quotas received for free are most profitable.

Table 4 shows the average ROIC, profit margin, and firm leverage for the strategic group that has not invested in quotas and the group that has invested in quotas for the period.

Table 4 shows that the ten firms that based their activity on quotas received for free (QF) are more profitable than the firms that have also invested in quotas (QI), because ROIC is significantly better in the first group. The PM is almost identical in the two groups, whereas FL is significant lowerly in the QF group than in the QI group. To summarize, the results presented in Table 4 support H3, which claims that firms that economize with quotas received for free are most profitable.

7. Discussion

The purpose of the study was to contribute to the theoretical and empirical research stream regarding above normal profit generation in NRBIs from a firm's perspective. Accordingly, this work is theoretically grounded in business strategy literature aiming to investigate different sources of superprofit. Financial statements of 65 Norwegian pelagic fishing vessel firms were obtained, corrected, and analyzed. To avoid snapshot data that may be influenced by random events [43], an extended period of analysis of 5 years was used. Methodically, the profit resulting from each firm's catch business only was isolated [45].

The Norwegian purse seine fleet participates in a regulated limited entry and quota-based catch industry that harvests pelagic fish stocks, the most important species being herring, mackerel, and capelin. Historically, the owner of the natural resource, i.e., the Norwegian State, distributed fishing rights and quotas to all firms in the industry by providing them exclusive access to harvest a common wild fish resource

[1] One outlier vessel with ROIC larger than 100% is excluded from figures and calculations.

Table 2
Average return on invested capital and annual residual income[a].

	2012	2013	2014	2015	2016	Average
$ROIC_t = NOPLAT_t/IC_{t-1}$	6.64%	5.20%	3.90%	5.29%	6.81%	5.57%
$RI_t = NOPLAT_t - k^aIC_{t-1}$	213,349	26,332	−145,755	41,866	273,445	81,847

[a] All numbers in 1000 NOK. Book value of acquired quotas and licenses are included as Intangible Assets and are part of net IC used in calculations.

Table 3
Average annual residual income as function of two tax rates and varying cost of capital.

		Cost of Capital					
		3.0%	4.0%	5.0%	6.0%	7.0%	8.0%
Tax Rate	25.0%	358,305	220,076	81,847	−56,381	−194,610	−332,839
	0.0%	615,968	477,739	339,511	201,282	63,053	−75,175

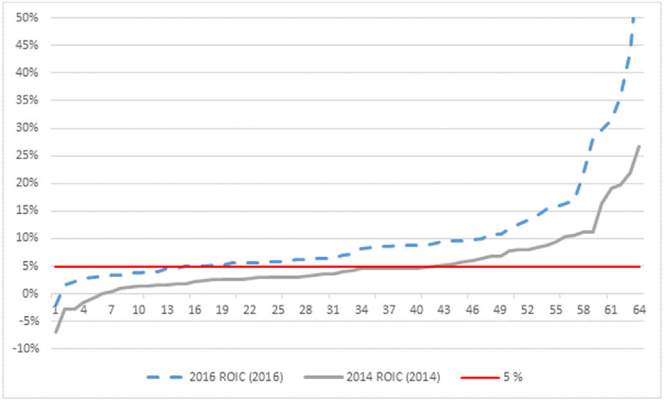

Fig. 2. Firms with a ROIC after tax more or less than the opportunity cost of capital (5%) in 2014 and 2016 (one outlier excluded both years).

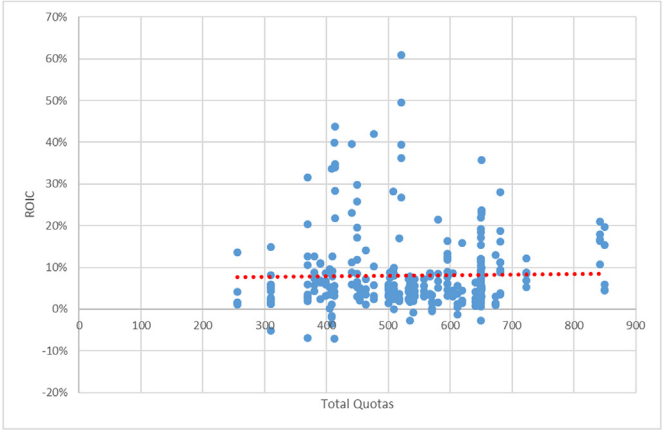

Fig. 3. The relationship between the quota size (horizontal axis) and financial performance (ROIC).

Table 4
Profitability measures of firms that have received licenses and quotas for free (QF) and firms that have invested in quotas (QI).

	QF (n = 10)	QI (n = 55)
	Average	Average
Return on Invested Capital (ROIC)	8.07%	5.37%
Profit Margin (PM)	27.39%	25.74%
Book value Total Debt/Book value Total Equity (FL)	0.59	1.86

for free. Since 1996, a variant of an individual transferable quota system has allowed a vessel to buy another vessel and add a certain fraction of the acquired vessel's quota to its own vessel [6,11]. In this way, fewer players have been able to accumulate ever larger quotas, although there is a quota ceiling, which efficiently limits the firm's growth opportunities.

According to the theoretical framework underpinning this study (Fig. 1), superprofit for a firm may originate from diverse sources: 1) the industry itself, 2) the firm's strategic position within the industry chosen, and 3) the firm's capability of exploiting its resource portfolio efficiently.

7.1. A moderate level of industry-related superprofit

In a free access unregulated fishery, the resource rent is expected to be wasted through excessive levels of effort being applied by the firms [20,21]. This will ultimately result in “the tragedy of the commons” through overfishing of the stock. However, if effectively managed, most fisheries are presumed to be able to generate substantial levels of resource rent [50].

The findings reveal that the average firm in the Norwegian pelagic catch industry did make a moderate superprofit in 4 of 5 years in the period 2012–2016 (Tables 2 and 3). The average superprofit was .57%, which is 11.4% above the normal profit of 5%. This finding is in accordance with previous research on above-normal profitability of the Norwegian pelagic fishing industry (e.g., Refs. [2,3,5,7]. Furthermore, the study found that the profit was above normal most of the time for most of the firms, because 36% of the companies made superprofit in the worst year and 78% made above-normal profit in the best year, which was 2016 (Fig. 2).

The findings disclose that threshold resources and threshold capabilities are adequate to earn superprofit, because even average firms were able to harvest above-normal profit. One reason is that the firms have received a large portion of their quota portfolios for free. Another reason is that the firms operate in an institutionally favorable protected resource industry. Government policy has enabled incumbent firms to earn a high level of economic profit while still strictly limiting entry. The findings support those of Schmalensee [51] and Spanos and Lioukas [52] who found that a firm's profitability was significantly affected by the elements of an industry structure.

7.2. No superprofit made via strategic quota investments

The study did not find a positive association between quota investments and financial performance (Fig. 3). A conceivable explanation is that quotas were bought above or at their full market price. This is in accordance with Hannesson [5] who found that a significant share of the resource rent is attributable to the seller when quota shares are

sold. A buyer, who has higher expectations of the future than the seller, may buy a quota above its market value [34]. This will especially be the case if the firm has already invested in overcapacity with regard to the vessel. Subsequently, the initial investment in overcapacity can be regarded as sunk cost and motivate the buying firm to pull up the bidding price on scarce quota resources to better exploit economics of scale [10]. The mechanism described resembles the transitional gains trap outlined by Tullock [53]. Moreover, as most of the boats in the industry have many unused operating days in a year [38], they may wish to acquire a wider quota portfolio to be able to reap economics of scope (ibid.).

Structural quotas are of limited duration, and currently they are of 20 years. The authorities plan to reassign them to the remaining players in the industry when these structural quotas expire. However, it is still an open political question which redistribution key should be followed if and when this happens [54]:26). To establish legitimacy about policy decisions on the distribution of natural resources, it is common to associate a significant part of the redistribution to the players' historical activity in the industry. It is therefore not unreasonable to assume that this principle will be adhered to in the future too. In that case, by accumulating large quota shares, a firm can be assured that it will also control large shares in the future. Accordingly, accumulating quota shares can be a rational long-term business strategy in a real option perspective. For example, if the structural quotas are made eternal, their values may increase sharply.

7.3. Substantial superprofit made by exploiting quotas received for free

Distinctive resources and capabilities are required to accomplish superior performance relative to peers. This is dependent on a firm having something unique that the competitors find difficult to imitate [55]. For a fishing vessel firm, it may, for example, be easier to make superprofit based exclusively on quotas that they have received for free by being in the right place at the right time [34]. Table 4 reveals that the ten firms in the sample that had no quotas entered in their books performed significantly better than their rivals, with an ROIC that equals 8.07% versus 5.37%. The profit margin is the same within the two groups; however, each firm's leverage is significant different as the aggressive quota buyers have funded a substantial part of their purchases by debt (Table 4).

There may be several reasons for these ten firms to have chosen not to participate in the quota competition and rather continued to economize using QF. One obvious explanation may be that they have not found it profitable to buy quotas in the market place. An alternative motive may be that they are planning a future exit from the industry, for example, in connection with a generational change, and that their main focus therefore is to maintain their attractive strategic position until this eventually occurs [9].

7.4. Policy implications

In Norway, the state taxes the resource rent in some industries through special tax arrangements. This applies, for example, to the energy sector, such as the petroleum and the hydropower industries. Therefore, these industries contribute extraordinarily to finance the Norwegian welfare state. The taxes have great legitimacy because both the hydropower and petroleum industries are allowed to harvest commonly owned natural resources. Fisheries have many similarities with these industries, and it does not seem unreasonable to use the same tax argument. However, until now, fisheries have not been subject to a separate resource rent tax in Norway. When the resource rent is not collected in a managed fishery, the value of it accrues to the vessel owners and the fishermen in the form of above-normal profits and super wages. In this sense, the resource rent that is generated is allocated to only two stakeholders of society [17]. Likewise, resource rent is realized by the vessel owners when quotas are sold at a price far beyond the vessel value without quotas [6].

A resource rent tax may be implemented in several ways; for example, on catch volume or profit. However, it is important that the tax does not cause a socio-economic loss by removing the incentives of the actors to operate efficiently. If a future resource rent tax is calculated from profit, the firms performing the worst will escape the tax (Fig. 2). Moreover, this may reduce all firms' incentives to economize and operate their business efficiently. For a resource rent tax to work neutral in relation to the operation of the firms, it should probably be based on the use of the natural resource that forms the foundation of their operations, that is, on the landed quantity of pelagic fish. However, this approach could lead to many firms paying a resource rent tax even if they are unprofitable, especially in years of poor economy. This is nevertheless a part of the market effect of resource rents, which contributes to increased economic efficiency. Thus, more profitable firms could grow, less efficient might leave, whereas new more innovative actors possibly will enter. And if the industry is not sufficiently profitable overall, harvesting may be cut back.

7.5. Limitations and further research

When using survey data to estimate changes in rents across years, changes in prices and costs are also to be considered. Profitability may increase in the fishery due to an exogenous increase in prices because of, for example, a shift in exchange rates or consumer preferences to seafood. Cost reductions can also occur, for example, reduced fuel costs [17]. Unsustainable rent may also be generated in the short-term through natural fluctuations in stock abundance, which may result in higher-than-average revenue per unit effort. Subsequently, the resultant increase in profitability will only be a quasi-rent rather than resource rent if the price, cost, stock, or institutional changes are only temporary (ibid.). Few market segments demand herring and mackerel for human consumption (Germany, Poland, Belarus, Japan, and South Korea). The customers are primarily of the older generation and, over time, they will be fewer. The industry is therefore vulnerable to a shift in demand. Moreover, while the price of herring was 8 NOK in 2016 (the best economic year in the period analyzed), it is halved by the time of writing of this paper (summer 2018). Accordingly, the superprofit that the players harvested in the period analyzed is not necessarily sustainable. It may be quasi rents [44].

To investigate whether quota investments causes better (or worse) firm profitability, we need information about what comes first in time; quota investments or firm profitability. In order to gain such insight, we need longitudinal data that include the timing of quota investments and their size (e.g. quota volume and investment amount). Based on such data it will also be possible to describe the price development of quotas over time and the data will provide a good basis for calculating how (un) profitable quota investments actually may be under a constrained ITQ fishery. This is an interesting future research endeavour.

Declarations of interest

None.

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