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Method Article

Methodological issues in estimating the profit of the core catch business unit of a fishing vessel firm

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A B S T R A C T

In fisheries, only the strategic business unit (SBU) of a firm that exploits a common-property natural resource can yield a resource rent. Hence, we discuss issues in isolating the economic return of the catch business unit (CBU) of a fishing vessel firm based on public accounting data. Furthermore, if detailed data on the CBU are available, some of its profit may stem from financing activities. Accordingly, we discuss issues in separating the economic return of the financing and operative activities of the CBU.

- Frequently, the industry is the unit of analysis in profitability surveys of fisheries. The data applied do not always clearly separate the profit of the CBU from other strategic downstream business activities in the value chain such as processing, sales, and non-fishery activities. Further, the economic return is always corrected for financial items. In addition, profitability may not properly reflect the return from the operational activities of the CBU.
- In the method described in this paper, the unit of analysis is the individual CBU and not the industry. Moreover, the accounting figures from the firm level have been corrected to disclose only the economic return of the operational part (core) of the CBU.

A R T I C L E I N F O

Method name: The fundamental method of firm valuation

Keywords: Strategic management accounting analysis, Investor-oriented profitability measurement, Net operating profit less adjusted taxes (NOPLAT), Return on invested capital (ROIC), Residual income (RI)

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Specifications table

Subject area:	Social Sciences
More specific subject area:	Business economics
Method name:	The fundamental method of firm valuation
Name and reference of original method:	[5,12]
Resource availability:	n/a

Method details

Bertheussen and Vassdal [1] essentially found the present value of free cash flow of a firm in order to estimate the value of net operating assets. They applied the equivalence of the RI method for valuation with the more commonly used free cash flow method to isolate the "*superprofit*," which is interpreted as a valid measure for resource rent [5,6,12] of a CBU. In this paper, we discuss in more detail the methodological issues in arriving at the correct net operating asset (IC) and use IC for estimating return on asset for a CBU.

Issues in isolating the economic return of the CBU only

The validity of the comparison of the firms' profitability is highest when firms are similar [13]. The CBU of the firm is the unit of analysis in Bertheussen & Vassdal [1], and accordingly, we wanted to isolate the profitability of the CBU. We therefore chose an industry of similar firms, which is the entire Norwegian purse seiners fleet. None of these firms are neither vertically nor horizontally integrated with other SBUs such as processing, sales, or non-fishery SBU's.

Moreover, each purse seiner in Norway is formally organized as a limited liability company. Thus, the information in the firms' public financial statements only includes data related to the CBU. Furthermore, according to the Norwegian Participation Act (2013, §6), a fisherman must be actively fishing for at least three of the last five years to be allowed to own a fishing vessel. Consequently, all Norwegian firms are owned by active fishermen [4]. Further, to prevent concentration of quotas on a few vessels, there is a quota ceiling for each vessel in Norway at 850 tons at present, which represents approximately 2% of the total allowable catch (TAC) share. The quota basis of the largest vessel in the industry is less than three times the quota basis of the smallest firm.

Finally, to avoid concentration of quotas to a few firms, there is a quota ceiling for each firm, which corresponds to approximately 6% of the total number of quota shares. To sum up, the ownership of Norwegian purse seiners is organized in similar firms with comparable scale and scope. As a result, we find it reasonable to claim that, in the research context chosen, the validity of the comparison of the CBU's financial performance is high [13].

Issues in estimating free cash flow of the CBU

Free cash flow (FCF) is a key concept in firm valuation. FCF is defined as the NOPLAT; see Table 1) and further corrected for changes in operating assets and changes in operating working capital. Operating assets are often shortened as PP&E (to denote Plant, Properties, and Equipment), whereas the working capital is the current assets minus the current liabilities. Current assets are those

Table 1
Calculating NOPLAT.

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

expected to generate cash within one year, and current liabilities are obligations due to mature within one year.

It is standard practice to separate financial from operating assets and liabilities [12]. Such separation is, however, not always obvious. Norwegian fishing vessel firms have little activity linked to downstream activities in the value chain. Thus, the operating activity is clearly defined for this sector. This sector thus poses less difficulty in separating operating from financing activity than in many other industries. The adjusted taxes used in NOPLAT are not the same as the income taxes in a normal income statement. Income taxes include the tax effect of interest on debt and financial assets. A simple, but reliable shortcut will be to calculate effect of taxes on operating profit as EBIT multiplied by (1 − marginal tax rate).

The marginal tax rate in Norway has been declining during the period of study; however, on an average it is about 25% for the whole period. It is important to emphasize that neither financial revenues nor financial costs are included in NOPLAT. Thus, there must be a similar separation between financial assets and financial debt when we reformulate the balance sheet for the purpose of valuation and return on capital calculations. Reformulation of the balance sheet must be congruent with the reformulated income statement.

Issues in assessing depreciation of licenses and quotas

Operating assets (PP&E) also include intangible assets. In Bertheussen and Vassdal [1], intangible assets are almost exclusively the values of licenses and quotas acquired over time. The values of licenses/quotas are booked as intangible operating assets. We have observed a few cases where licenses are booked as long-term financial assets. When this is observed, we have corrected the accounts. Depreciation of intangible assets is normally 5% annually. We observed, however, that a few vessel owners do not depreciate the value of licenses and quotas. Contrasting views exist in the industry on this issue. One point of view is that such intangibles reflecting the values of quotas and licenses have a time limit and will expire after about 20–25 years. The opposite view holds that the market value of licenses has actually been increasing. According to IFRS accounting standard, fair value, interpreted as market value, shall be reflected in the book value. The Norwegian accounting authorities have made a statement on the issue, favoring the practice of depreciation.[1] On this issue, we have not made any corrections to the depreciations that the firms have reported.

Issues in estimating cash needed for operating transaction activities

Financial assets may be operational or purely financial. Operational financial assets are included in the operating working capital. Receivables, inventory, prepaid expenses, and other current assets are the main items of operational financial assets and easily identified. Cash holdings are a debatable issue. Cash has a transaction purpose, but cash can also be hoarded temporarily as a financial investment. We have calculated the cash needed for operating transaction activities as 3% of the gross operating income. This is in the upper range of recommendations. Penman [[12]; p. 300] used 0.5%. We consider that the greater relative variability of revenues and expenses for fishing activities compared to activities in large, diversified companies may warrant a higher proportion of cash for transaction purposes.

Issues in separating non-interesting-bearing liabilities from interest-bearing liabilities

Operating working capital also has a liability side. Bertheussen and Vassdal [1] detracted from the current assets the current liabilities, trade payables, other accounts payable if non-interest-bearing debt, accrued liabilities (excluding dividend payable that is included in shareholders' equity), income taxes payable, and deferred income taxes and other similar liabilities. The basic issue is to separate

[1] Letter from Finanstilsynet to Havfisk ASA, April 11 2014, (in Norwegian): https://www.finanstilsynet.no/nyhetsarkiv/brev/2014/kontroll-av-finansiell-rapportering3/.

non-interesting-bearing liabilities from interest-bearing liabilities. The former enters working capital as a part of liabilities; the latter part is financial liabilities. Short-term debt includes some non-interest-bearing liabilities. Generally, all long-term debts are interest-bearing.

Issues in estimating intangible assets as licenses and quotas

Intangible assets warranted special consideration in Bertheussen and Vassdal [1]. Intangible assets may consist of goodwill or other identifiable intangible assets acquired through a market transaction. The most relevant for our study are quotas and licenses bought from other license or quota holders. Generally, the book value of intangibles shall be included in the net invested capital (IC). In some studies, return on capital is calculated both with and without intangibles included in IC. The reason for this dual approach is to separate the profitability of investment in intangibles from the profitability of the total investment of vessel, gear, intangibles, and other miscellaneous equipment. In the calculations in Bertheussen and Vassdal [1], the values of intangibles are always included in IC. However, several vessel firms reported no intangibles in their books. We have looked into the ownership of quotas for each of these vessels separately. The finding is generally that this group of vessels actually has not operated in the quota market. Every vessel has a base quota given for free, and the majority of vessels have bought additional quotas [3]. However, about 18 vessels have not used this opportunity. This non-action in the quota market [1] is an expression of the investment strategy chosen. This group of vessels has less than average annual revenues and less than average IC. The study of return on capital for this group is a central part of the paper (ibid.). We interpreted the actions of this group to reveal risk aversion. Financially, they are strategically following a harvesting-and-exit strategy, rather than the predominant growth strategy, as followed by the rest.

Issues in estimating the intrinsic value of the CBU

The fundamental formula for estimating the intrinsic value of IC is

$$V_0^{IC\_FCF} = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+k)^t}.$$

$V_0^{IC\_FCF}$ is the value of IC ($t = 0$) based on all future FCFs, discounted to present time by cost of capital k. FCF_t is the free cash flow time t, and $(1+k)^t$ is the discount factor from year t to year 0. The cost of capital in the future may change from year to year. In our calculations, we used the same cost of capital for every year. Risk adjusted cost of capital, k, is normally on the firm level calculated as the weighted average cost of debt and equity after taxes according to the following formula:

$$k = r_D \cdot \frac{D_t}{V_t}(1 - t_m) + r_E \cdot \frac{E_t}{V_t}.$$

This formula (WACC), attributed to Miles and Ezzell [7] and built on the seminal work of Modigliani and Miller [8,9], is based on assumptions normally not fulfilled. In the formula, t_m is the marginal tax rate (for income year 2017, $t_m = 0.23$ in Norway, but was 0.27 in 2013). D_t is the market value of debt year t, and E_t is the marked value of equity year t. r_D is the nominal average interest rate for the interest-carrying debt, and r_E is the market cost of equity, with the cost of risk included according to CAPM theory. We may safely assume the market value of debt to be close to the book value. The same assumption does not apply for equity, which, for many firms in this sector, has an estimated market value twice or more than the book value.

The firms studied in Bertheussen and Vassdal [1] are not traded on a stock exchange market. Using CAPM for pricing relevant market risk for individual firms or for the sector is therefore challenging. We may resort to finding the price of equity capital in similar sectors where stocks are traded. There used to be only one company in Norway in the cod-fishing sector traded on the stock exchange (Havfisk ASA). However, the company ceased trading in November 2016 after being wholly absorbed into the much larger Lerøy Seafood Group ASA.

By definition, $V_t = D_t + E_t$, obviously the cost of capital will vary from year to year unless debt rate D_t/V_t is constant at market values. Market valued debt rate is seldom constant over time. The

values of r_D *and* r_E are determined by, among other elements, systematic risk relative to market risk and are best estimated by CAPM. Market risk is time-varying and so is each firm's exposure to market risk. Regardless of the well-known reservations against using a stable WACC for the cost of capital, Bertheussen and Vassdal [1] followed the standard use of the formula.

Issues in calculating residual income of the CBU

The RI method is an alternative procedure for calculating the estimated value of assets. The formula for the value of IC is

$$V_0^{IC\_RI} = IC_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+k)^t},$$

where

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

ROIC can be defined as follows: $ROIC_t = \frac{NOPLAT_t}{IC_{t-1}}$, that is, $NOPLAT_t = ROIC_t \cdot IC_{t-1}$. The formula can also be written as

$$V_0^{IC\_RI} = IC_0 + \sum_{t=1}^{\infty} \frac{NOPLAT_t - k \cdot IC_{t-1}}{(1+k)^t}, \text{ or } V_0^{IC\_RI} = IC_0 + \sum_{t=1}^{\infty} \frac{(ROIC_t - k) \cdot IC_{t-1}}{(1+k)^t}.$$

RI is not universally used as the name of the concept defined in the formula for $V_0^{IC\_RI}$ above. Magni [6] listed 29 different designations for the same concept, including *Superprofit* and *Economic Rent*. RI is defined as the monetary return above risk adjusted cost of capital multiplied by the IC at the start of the period.

It is well established that the two methods for calculating firm value, $V_0^{IC\_FCF}$ and $V_0^{IC\_RI}$, will give the same estimate of V_t any year. See Koller et al. [5] for a mathematical proof and Ohlson and Juettner-Nauroth [11] for presenting conditions for the two formulas to give the same value. For example, there is no need for IC to be a "correct" value of the invested capital in a single year. In addition, different depreciation profiles of IC will give the same value of V_t.

A slight reformulation of the RI formula for the value of IC will be the following: $V_0^{IC\_RI} - IC_0 = \sum_{t=1}^{\infty} \frac{RI_t}{(1+k)^t}$. The expression to the left of the equality sign is the difference between the value and book value of the IC. In case of market transactions of IC (not to be confused with market transactions of equities), this difference will be termed *goodwill*, an intangible asset. The formula then states that the value of goodwill in a fictional transaction may be calculated as the present value of all future RIs (or the present value of all future superprofit). When analyzing the accounting information of firms, goodwill and other intangible assets may already be included in the book value of the total intangible assets. For a firm involved in fishing, dominant among intangible assets will be the book value of acquired quotas and licenses. Recall that the formula for the present value of residual profit may be written as

$$\sum_{t=1}^{\infty} \frac{NOPLAT_t - k \cdot IC_{t-1}}{(1+k)^t}$$

If quotas and licenses are part of the book value of intangible assets, thus included in the book value of IC_t, this situation will influence both $NOPLAT_t$ and IC_t. $NOPLAT_t$ decreases as depreciation and amortization increase. IC_t increases compared to the situation when licenses and quotas are given for free. Thus, RI_t may approach zero if the book value of intangibles is fairly priced to the market value. In case RI_t is less than or equal to zero, we may conclude that no superprofit exists. This may be the situation when firms buy licenses at high prices.

The observation of positive RI may not always be interpreted as the presence of what economists call resource rent. Firms not in the position to harvest resource rent may have ROIC larger than the cost of capital for the firm [10]. Generally, such superprofit will be accumulated over time. The existence of superprofit in an industrial sector will attract other entrants. The advantageous competitive position may then be eroded. Occasionally, however, individual firms or a group of firms

may hold on to the above normal profitable position, whereas the above normal growth normally erodes (see, for example, Cao et al., [2], Fig 4). This may be due to restrictions on entry into the industry. The restrictions may be of financial nature; the operating cost may consist of high fixed costs and very low marginal costs. The first entrants will benefit permanently, and the market may converge to the so-called "natural monopoly." Relevant for fishing vessels, legal limits to entry for new potential competitors exist. Existing firms already inside the fisheries may, however, bid more for additional quotas. Quota prices may increase to such a level that superprofit vanishes.

Concluding remarks

The goal of this paper was to discuss how valuation methods derived from business economics can be applied to fishing vessel firms to more accurately estimate the profit and economic value of their CBUs. In traditional industry-based profitability surveys, it is not common to isolate the economic return of the CBU. Thus, the profitability measurement applied aggregate the return of different SBUs, most of which are not related to the harvesting of natural resources. It is not common to separate the profits accrued from the operating and financial activities of the firms. These studies therefore applied a biased and less valid measurement to assess whether the firms are harvesting resource rents. Nevertheless, as discussed by Bertheussen and Vassdal [1], there may be other strategic sources of extraordinary profit for a CBU than resource rents, e.g., regulatory rents, positioning rents, and efficiency rents.

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