SNF-REPORT NO. 44/01

Measuring Financial Performance: A Case Study

by

Frøystein Gjesdal

SNF project No. 7680
"Supply of capital as a condition for success in the maritime industries"

This project is financed by the Norwegian Shipowners' Association.

FOUNDATION FOR RESEARCH IN ECONOMICS AND BUSINESS ADMINISTRATION
BERGEN, NOVEMBER 2001

© Dette eksemplar er fremstilt etter avtale
med KOPINOR, Stenersgate 1, 0050 Oslo.
Ytterligere eksemplarfremstilling uten avtale
og i strid med åndsverkloven er straffbart
og kan medføre erstatningsansvar.

ISBN 82-491-0167-7
ISSN 0803-4036

MEASURING FINANCIAL PERFORMANCE: A CASE STUDY

PART I

Frøystein Gjesdal*

Abstract

This paper studies long-term financial performance at the firm level. Fundamentally financial performance measurement is capital budgeting (or valuation) done ex post; expected cash flows and terminal values are replaced by realized or re-estimated flows and/or values. Beginning values may be derived from acquisition costs, opportunity costs or present (market) values at the start of the period. Similar choices must be faced with respect to terminal values. The interpretation of the performance measures differs accordingly. Note that there is no return concept corresponding to return on value in capital budgeting. For going concerns (accounting) book values represent acquisition costs. Hence choice of depreciation plan may affect the performance measure. Performance is measured relative to investors' required returns. Ex post some variations in required returns are known and must be incorporated in the analysis - in particular variations caused by changes in tax regimes as well as rates of inflation. In this paper it is assumed that investors have a fixed required real, risk-free rate of return after tax. Hence the nominal required return before tax depends on *actual* rates of inflation and taxes. Return on value for the case company - Odfjell ASA - is very close to estimated required return on equity over the 1986-97 period, about 16% before tax. However, estimated return on invested capital is smaller - in the 10% - 12% range depending on depreciation method. The empirical analysis also demonstrates that value added on capital employed and operational capital exceeds value added on equity. In an ex ante analysis this will not happen as long as financial markets are competitive. Further analysis indicates that foreign exchange gains and losses may explain this result. Whether movements in exchange rates have actually favoured holders of financial claims in the period or estimation errors are to blame, is unclear.

*The author is grateful for interesting discussions with representatives of Odfjell ASA as well as comments form Thore Johnsen, Tore Leite and participants at the 2001 European Accounting Association Annual Meeting, Athens, Greece.

Centre for Research in Financial Economics,

November 2001

SUMMARY (in Norwegian)

I denne rapporten gjennomføres en omfattende lønnsomhetsanalyse for et større norsk rederi - Odfjell ASA – for perioden fra 1985 da selskapet ble børsnotert, til 1999. Selv om analysen av selskapets lønnsomhet er interessant i seg selv, er formålet med rapporten langt bredere. Ett hovedformål er å utvikle et teoretisk metodeapparat for mer langsiktige lønnsomhetsanalyser. Et annet hovedformål er å studere de generelle problemer en støter på når en skal implementere metodeapparatet ved bruk av regnskapstall utarbeidet etter norske lover og regler.

Lønnsomhetsanalyser utføres normalt for en periode på et år. Mer langsiktige analyser er av betydelig interesse fordi tilfeldige svingninger, som kan ha vesentlig påvirkning på det enkelte år, jevnes ut slik at den underliggende lønnsomhet kommer klarere frem. Ulempen er at utvidelser av tidsperioden vil måtte innebære at en inkluderer mindre aktuelle tall.

Selskapet målsetting bør være å maksimere verdien av egenkapitalen innenfor gjeldende rammer. Eierne vil ha et avkastningskrav som definerer den minimumsavkastning som er nødvendig. (Netto nå)verdi skapes bare dersom avkastningen er større enn dette. Residual income måler årets verdiskapning (bidrag til netto nåverdi). I kapittel 2 vises at verdiskapningen for en periode som går over flere år, måles ved å akkumulere residual income med rente og rentes rente over hele perioden. For et enkelt år måles ofte avkastningen i prosent dvs rentabiliteten. Denne kan så jamføres med avkastningskravet. I kapittel 2 vises også hvordan rentabiliteten kan generaliseres til lengre måleperioder.

Når en skal måle lønnsomhet, må en ta standpunkt til kapitalbegrep og verdsettelsesmetode. I prinsippet kan en måle lønnsomhet for en hvilken som helst kapitalstørrelse. Fokuseres det på selskapet som helhet er det vanlig å

velge enten egen-, sysselsatt- eller driftsrelatert kapital. Dette gjøres også her. For ethvert kapitalbegrep vil avkastningen være en funksjon av den avkastningen kapitaleierne har mottatt i form av kontanter i perioden samt endringen i kapitalens verdi fra begynnelsen til slutten av perioden. Kapitalens verdsettelse blir dermed av stor betydning spesielt dersom kontantstrømmen er beskjeden eller til og med negativ (for et vekstselskap som Odfjell).

En kan skille mellom tre verdibegrep: markedsverdi, regnskapsmessig (bokført) verdi og alternativverdi. I kapittel 2 understrekes at ingen av disse er riktigere enn de andre. Valg av verdibegrep vil avhenge av formålet med analysen. Markedsverdi, som her betyr børsverdi eller lignende, brukes når en skal måle kapitaleiernes avkastning på sin investerte kapital. Markedsverdi vil være avhengig av forventninger både ved begynnelsen og slutten av perioden. Positiv verdi vil bare skapes dersom selskapet går bedre enn forventet. Sagt på en annen måte vil avkastningen være lik avkastningskravet når forventningene akkurat oppfylles.

Ved bruk av regnskapsmessig verdi måles på den annen side avkastningen på den kapitalen som er investert i selskapets virksomhet. Avkastning med utgangspunkt i bokførte verdier vil dermed måle den underliggende lønnsomhet i selskapet. Denne kan avvike fra eiernes avkastning i perioden. Et selskap kan ha underliggende lønnsomhet som er lavere enn avkastningskravet og likevel gi eierne tilfredsstillende avkastning i perioden dersom den utilfredsstillende lønnsomheten var forutsett av markedet. Odfjell kan ha vært i en slik situasjon i denne perioden.

Alternativverdi er relevant dersom en skal evaluere spesifikke beslutninger. For et rederi kan spørsmålet være om en skal forlate et markedssegment og selge deler av flåten. I så fall vil annenhåndsverdiene for de aktuelle skipene være relevante. Har fortsatt drift forrentet disse verdiene har beslutningen om fortsatt

drift vært riktig. I denne rapporten har alternativverdier vært ignorert. Metodikken som brukes er imidlertid like aktuell for denne type verdier.

I motsetning til markedsverdi og alternativverdi er regnskapsmessig verdi i prinsippet en beregnet verdi. Valg av avskrivningsplan bestemmer utvikling av bokført verdi over tid. I kapittel 2 vises at et selskaps avkastning kan bli identisk for ulike avskrivningsplaner. Dersom verdien i perioden (som helhet) har vokst med en rate som er like rentabiliteten, vil rentabiliteten være uavhengig av avskrivningsplan.

Generelt vil imidlertid avskrivningsplanens form påvirke lønnsomhetsmålet. Dersom for mye kostnadsføres tidlig i levetiden, vil avkastningen på nye investeringer undervurderes, mens eldre investeringer viser for høy lønnsomhet. Selv om en studerer et selskap - Odfjell – over en lang tidsperiode, vil det være et fåtall skip som anskaffes og avskaffes i perioden. Dermed kan en skjevhet i lønnsomhetsmåling over skipets levetid også påvirke selskapets lønnsomhet i perioden.

I kapittel 4 drøftes avskrivningsproblematikken nærmere. Dersom en ønsker at forventet rentabilitet skal være lik forventet internrente i hver periode (uansett skipets alder), må en velge såkalt internrenteavskrivning. Dette innebærer at avskrivningsprofil må samsvare med inntjeningsprofil. Dersom en benytter lineær avskrivning, må inntjeningen falle svært sterkt over levetiden. 25 års levetid på investeringen vil implisere en reduksjonen i kontantinntjening på 40 – 75% avhengig av internrenten. Motsatt skulle en bruke en annuitetsmetode (med økende avskrivninger) dersom inntjeningen er relativt konstant over tid.

Det er ikke urimelig å anta at økt vedlikehold og teknologiske fremskritt (indirekte via ratenivået) bidrar til å redusere inntjeningen for eldre skip. På den annen side vil den globale inflasjonen trekke i motsatt retning. I

lønnsomhetsanalysen benyttes både lineær avskrivning over 25 år og annuitetsmetode ut fra det resonnement at sannheten ligger et sted i mellom. Beregningene viser at forskjellen i rapporterte avkastningstall er under ett prosentpoeng (med ett unntak). I tillegg til de to nevnte metoder benyttes en prisjustert lineær metode. Begrunnelsen for dette er ikke at prisen på nye skip øker med prisstigningen (hvilket den heller ikke gjør i tilfellet Odfjell). Prisjustert metode har mange av de samme egenskaper som annuitetsmetoden (lavere avskrivninger i begynnelse av levetiden), og benyttes av samme grunn.

Avkastning i prosent må sammenlignes med eiernes krav til avkastning. Avkastningskravet er også en sentral parameter i beregningen av residual income. Kravet vil typisk variere over tid spesielt når prisstigningen endrer seg. I kapittel 3 drøftes beregning av årlige avkastningskrav. Disse er oppbygget av fire elementer: risikofri realavkastning, prisstigningskomponent, risikopremie og skatt. Skatteelementet er det som er vanskeligst å beregne både fordi skipsfartsbeskatningen har forandret seg mye i perioden, og fordi ulike eiere betaler forskjellig skatt.

Analysen tar utgangspunkt i en kortsiktig, norsk aksjonær. For en slik eier er gevinstbeskatningen den relevante skatten uansett næring. Selskapets avkastning før inntektsskatt jamføres med den representative eierens avkastningskrav før skatt. Dette varier mellom 22,6% (1987) og 12,2% (1996). Eiere i andre skattemessige posisjoner vil ha andre avkastningskrav. Spesielt vil eiere med lengre tidsperspektiv ha lavere avkastningskrav. For disse vil virksomheten fremstå som mer lønnsom enn beregningene i undersøkelsen tilsier.

Lønnsomhetsanalysen bygger på regnskapsdata som er tilgjengelige gjennom selskapets årsrapport. Dette er viktig siden det betyr at enhver ekstern analytiker i prinsippet kan gjennomføre de samme beregninger uten selskapet

medvirkning. Noen justeringer av resultatregnskap og balanse må gjennomføres. Ovenfor er det nevnt at eksperimentering med ulike avskrivningsplaner kan være aktuelt. Når det gjelder Odfjell spesielt, har avskrivingstiden blitt forlenget to ganger i perioden. Dette vil isolert sett føre til overestimering av lønnsomheten.

Når en skal måle lønnsomhet, er det videre viktig at kongruensprinsippet overholdes. Kongruensprinsippet sier at alle endringer i egenkapital (som ikke forårsakes av egenkapitaltransaksjoner) skal føres over resultatregnskapet. Etter norsk regnskapsskikk gjøres visse unntak fra kongruensprinsippet. Disse må det justeres for. For Odfjell er justeringene av mindre omfang. Nærmere redegjørelse er gitt i kapittel 4.

Utenlandsk valuta skaper problemer for enhver lønnsomhetsanalyse basert på regnskapstall. Dette gjelder spesielt for en internasjonal næring som skipsfarten. Når en skal beregne avkastning på sysselsatt kapital, er det viktig å skille mellom finansielle inntekter og kostnader. Valutatap kan f. eks. være en reduksjon i finansinntektene eller en økning av finanskostnadene. I praksis vil tapet ofte føres som en kostnad uansett opphav. Analytikeren må derfor gjøre en oppsplitting; ofte på nokså løst grunnlag. Estimering av valutapostene skaper også problemer for analysen av Odfjell og er nærmere drøftet i kapittel 4.

Valutaproblematikken kan også gjøre det vanskelig å tolke avkastningstallene. Odfjell, som mange andre norske rederier, låner i utenlandsk valuta blant annet for å sikre inntekter i samme valuta. Regnskapsmessig vil en ofte måtte ta tap på valutalån før den eventuelle økning i driftsinntekter realiseres. I analysen vil dette feilaktig tolkes som en begunstigelse av kreditorene på eiernes bekostning.

Lønnsomhetsanalysen for Odfjell er rapportert i kapittel 5 for periodene 1986-97 og 1986-99. Tallene for førstnevnte periode blir referert her. Gjennomsnittlig

avkastningskrav for egenkapital er anslått til 15,6%. Avkastning på markedsverdi er 16,4%. Regnskapsmessig avkastning (på anskaffelseskost) er rundt 13% - avhengig av den avskrivningsplan som er valgt. Akkumulert verdiskapning er omlag +300 mill. på markedsverdi og –1200 mill. på bokført verdi.

Tallene må tolkes med varsomhet. Spesielt kan det være fornuftig å vurdere avkastningskravet. Dersom en godtar beregningen av kravet, har eierne som gikk inn ved emisjonen i 1985 oppnådd en avkastning som er i overkant av det de forlanger, samtidig som den underliggende lønnsomheten i selskapet har vært for lav. Årsaken er at Odfjell var priset betydelig under bok i 1985. Ved slutten av 1997 var pris/bok betydelig høyere, men falt igjen frem til 1999.

Dersom en mener at avkastningskravet på 15,6% er for høyt, blir tolkningen annerledes. Med et gjennomsnittskrav på f. eks. 13% er den underliggende lønnsomheten akseptabel. I så fall må imidlertid dette ha kommet som en overraskelse på de eksterne eierne. Disse har følgelig oppnådd en avkastning betydelig høyere enn kravet.

For perioden 1986-99 er lønnsomhetsbilde betydelig forverret. Målt ved regnskapsmessige verdier synker gjennomsnittsavkastningen med ca 1,5 prosentpeong mens det gjennomsnittlige kravet bare er 0,3 prosentpoeng lavere. Årsaken er svak inntjeningen i 1998 og 1999. Målt ved markedsverdier synker lønnsomheten mer dramatisk – fra 16,5% til 12,4%. Årsaken til dette må være at aksjemarkedet ved slutten av 1999 forventet at den dårlige lønnsomheten skulle vedvare.

Avkastning på sysselsatt kapital (ROCE) og avkastning på driftsrelatert kapital (ROOC), jamført med egenkapitalavkastning, forteller om kostnad for gjeld og avkastning på finansielle eiendeler avviker fra avkastningskravet. I det lange løp burde avvikene være beskjedne så lenge de relevante markedene er rimelig

effektive. For Odfjell viser tallene at både gjeldskostnaden og avkastningen på finansielle eiendeler er ca 1,5 prosentpoeng over avkastningskravet. Dette fører blant annet til at verdiskapningen til sysselsatt kapital er positiv (i motsetning til egenkapitalens).

En fortolkning av ROCE er at verdiskapningen på sysselsatt kapital er tilfredsstillende, men at fordelingen har vært til fordel for kreditorene. Det er viktig å understreke at denne konklusjonen er usikker. For det første er den avhengig av at avkastningskravet er presist beregnet. Videre er det, som nevnt ovenfor, problemer forbundet med å måle avkastning/kostnader på finansielle poster. Problemene er først og fremst knyttet til vinning og tap på utenlandsk valuta. Analyser viser at valutapostene i stor grad kan forklare ekstraordinære utslag i ROCE og ROOC. En mulig forklaring på det gunstige utfall for kreditorenes del er den høye kursen på US$ ved slutten av perioden. Opplåning i US$ for å sikre fremtidige inntekter gir høye gjeldskostnader når US$ er sterk. De tilsvarende inntektene vil derimot ikke reflekteres i regnskapet før de er opptjent.

1. Introduction

In many situations it is of interest to measure financial performance ex post for a period of time. One objective may be to evaluate a decision made in the past in order to hold decision makers accountable. Evaluations of past performance may also be relevant information with respect to new, similar decisions to be made in the future.

A decision is profitable if the (marginal) net present value is positive, or in other words if the internal rate of return is greater than the cost of capital. Ex post i. e. at some later point in time - t - the decision may be evaluated by calculating the net present value using the realised cash flows and the estimated remaining value at the time t. In practice it is, however, more convenient to calculate net values at t rather then values at the time of the decision. Equivalently the ex post rate of return may be calculated, and compared with the cost of capital. Thus financial performance evaluation is essentially valuation (or capital budgeting) performed ex post (Peasnell, 1982).

The capital values used in the calculations may take different forms. One important distinction is between book values (cost) and market values (present values). Book values under historical cost accounting (in principle) equal the value of resources committed to the project or the firm less some measure of depreciation. Market values on the other hand are equal to the present value of (the market's expected) future inflows to the firm or the project. If one invests in something that is traded in an efficient market - such as a share in a quoted corporation - book value equals market value at the time of investment. In most other cases present values and book values are not equal. The (cash) flows on the other hand are usually objectively determined and do not depend on the method of valuation. In cash flow accounting only cash flows are reported. Values are identically zero. For a single project this may be fine if the period is chosen appropriately. For a going concern, net cash flows for a limited period contain almost no information.

The procedures used to calculate the financial performance measures do not depend on the valuation method. Valuation determines the interpretation of the performance numbers, not the mechanics of their calculation. In a similar vein performance may be measured in the same way for a single project with a finite life, or for a firm with an indeterminate life in which new projects are undertaken all the time. The next section therefore explores the mathematics of financial performance measurement without going into the details of interpretation. The reader should keep in mind that the math is intended to cover circumstances that are quite diverse.

The empirical part of this paper will focus on the financial performance of business firms. For this particular setting the choice between book and market values (valuation method) is a crucial one. Additionally there are different concepts of capital that may be chosen as the unit of analysis. Equity is probably the most popular one. Adding interest-bearing debt to equity yields capital employed. Operational capital employed is calculated by deducting non-operational capital (financial capital) from capital employed. There are good reasons (that will be discussed later) to focus performance evaluation on the latter capital concepts in addition to or instead of equity. However, once again the mechanics of performance evaluation does not depend on the concept of capital.

The remainder of this paper is organized as follows. Section 2 reviews the theory of financial performance evaluation. Section 3 focuses on two essential ingredients of the analysis: the required return and the depreciation plan used to derive accounting values. Required return and depreciation will be discussed with special reference to the Norwegian shipping industry to which the case company Odfjell ASA belongs. In section 4 Odfjell and its accounting are introduced, and section 5 presents the analysis of performance. Section 6 contains concluding remarks.

2. The theory of financial performance evaluation

The mathematics

Initially some notation will be defined. Today is the end of period t. The data series of performance measures begins at the end of period t - n. The decisions to be evaluated may have been made at (the end of) period t-n, but for a going concern it is reasonable to assume that decisions are made more or less continuously. Value, cash flow and earnings are denoted V, C and E respectively with subscript indicating time. The cost of capital is denoted k. When performance is evaluated for a longer period of time, the cost of capital will typically vary. Allowing for time-dependent rates of return makes the formulas which follow more complicated than they otherwise would have been.

Perhaps the easiest way of evaluating a decision is to redo the net present value calculation performed at time t-k using the information known at t (today) i. e. C_{t-n+1}, ... C_t, are actual values. V_t is an updated value. V_{t-n} is fixed and will never be updated beyond t - n. This net present value will be denoted N_{t-n}.[1]

One period performance evaluation is well known. However, it is convenient to start with the case of n = 1. Next the two-period case will be addressed. The general case is presented in an appendix to this section.

For n = 1:

$$(1) \qquad N_{t-1} = \frac{V_t + C_t}{1 + k_t} - V_{t-1}$$

In practice it is usually more convenient to use t as a point of reference for the valuation. Multiplying the equation by $(1 + k_t)$ accomplishes this:

[1] As all evaluations are performed as of time t, there is no need for notation indicating this fact.

(2) $$N_t = (1+k_t)N_{t-1} = V_t + C_t - (1+k_t)V_{t-1}$$

Residual income is a popular performance measure. It is defined as accounting earnings minus a charge for the use of capital. In fact, in the one-period case N_t is equal to residual income RI_t.

(3) $$V_t + C_t - (1+k_t)V_{t-1} = C_t - (V_{t-1} - V_t) - k_t V_{t-1} = E_t - k_t V_{t-1} = RI_t$$

If no new investments have been made in period t, the change in value may be interpreted as depreciation. However, the formula applies equally well when there are new investments. [2]

N_t may be expressed in yet another way which will become useful in the multiperiod case:

(4) $$N_t = V_t - [(1+k_t)V_{t-1} - C_t]$$

In this expression the value at the end of period t is compared with the term in the square brackets. The venture has been profitable (so far) if and only if the value at t exceeds the bracketed term. This term may therefore be view as a benchmark. The benchmark value is the amount invested (at t-1) plus subsequent contributions (net) including interest. In other words it is the amount of capital still invested at time t.

Finally, ex post profitability may be calculated using the rate of return method just like ex ante profitability is measured by the (expected) internal rate of return. Setting N_t equal to 0 and solving for r_t, yields.

(5) $$N_t = 0 = E_t - r_t V_{t-1} \Rightarrow r_t = \frac{E_t}{V_{t-1}}$$

[2] Cash for new investment are deducted from C_t and added to V_t. Hence E_t , N_t and RI_t are unaffected.

If accounting earnings and book values are used, ex post return coincides with the familiar accounting rate of return – ARR – in the one-period case.

Generalising to more than one period is conceptually easy, but computationally messy. For n = 2:[3]

(1') $$N_{t-2} = \frac{C_{t-1}}{1+k_t} + \frac{C_t}{(1+k_{t-1})(1+k_t)} + \frac{V_t}{(1+k_{t-1})(1+k_t)} - V_{t-2}$$

(2') $$N_t = (1+k_{t-1})(1+k_t)N_{t-2} = C_{t-1}(1+k_t) + C_t + V_t - (1+k_{t-1})(1+k_t)V_{t-2}$$

(3') $$N_t = C_{t-1}(1+k_t) + C_t - (V_{t-2} - V_t) - [(1+k_{t-1})(1+k_t) - 1]V_{t-2}$$

(4') $$N_t = V_t - [(1+k_{t-1})(1+k_t)V_{t-2} - C_{t-1}(1+k_t) - C_t]$$

(5') $$0 = \frac{C_{t-1}}{1+r} + \frac{C_t}{(1+r)^2} + \frac{V_t}{(1+r)^2} - V_{t-2}$$

In expressions (1') - (5') it is important to keep track of the flows C_t and C_{t-1} - amounts as well as timing. The timing of flows is important for the interest calculations - see e.g. the bracketed benchmark in (4'). In addition to periodic flows beginning and ending values enter the calculations. The intermediate value V_{t-1} is not relevant. Introducing an intermediate value it is possible to calculate earnings, residual income and return for each sub period, and express the profitability of the longer period in terms of these. In practice this may be a convenient way to proceed as periodic measures of profitability are routinely calculated in any case. However, it is of absolute importance to keep in mind that intermediate values only determine the allocation of profits to sub periods leaving total

[3] General versions of expressions (1) through (5) are presented as (A1) to (A5) in the appendix.

profitability unaffected. (3') and (2') may be expressed in terms of earnings and residual income:

$$(6') \qquad \begin{aligned} N_t &= C_{t-1} - (V_{t-2} - V_{t-1}) + C_t - (V_{t-1} - V_t) - [((1+k_{t-1})(1+k_t)-1)V_{t-2} - k_t C_{t-1}] \\ &= E_{t-1} + E_t - [((1+k_{t-1})(1+k_t)-1)V_{t-2} - k_t C_{t-1}] \end{aligned}$$

$$(7') \qquad \begin{aligned} N_t &= (C_{t-1} - (V_{t-2} - V_{t-1}) - k_{t-1}V_{t-2})(1+k_t) + (C_t - (V_{t-1} - V_t) - k_t V_{t-1}) \\ &= RI_{t-1}(1+k_t) + RI_t \end{aligned}$$

(7') is a familiar theorem stating that net present value (or rather net terminal value) equals the present value (terminal value) of residual income. (6') is less well known. It states that the sum of earnings (undiscounted) may be compared to a benchmark that equals required (two-period) return on beginning value corrected for required return on intermediate cash flow.

It is also possible to express the rate of return, calculated in (5') as a weighted sum of single period returns (see Gjesdal and Johnsen, 1999 or Peasnell, 1982).

Application and interpretation

The procedures of financial performance evaluation are the same regardless of the concepts of capital (operational versus financial/equity versus capital employed) or the valuation method (present/market values or accounting values) used. However, interpretations may be rather different. In the discussion, which follows, concepts of capital are addressed first. Then valuation methods are discussed.

Concepts of capital

Equity

Analysis of performance may focus on assets (groups of assets) or equity/liabilities. When measuring the financial performance of firms, the focus is usually on equity. After all equity owners are the residual claimants, and their claims are the most difficult to value. The analysis of equity is comparatively simple. Accounting values are readily available. So are very often market values. Financial statements provide information on net flows to equity defined as dividends minus new issues[4]. Indeed information on inflows and outflows are available separately. Earnings are of course reported as well.

Capital employed - CE

A second concept of capital is capital employed (CE). CE is defined as equity plus interest-bearing debt. Equivalently, CE may be calculated as total assets minus non-interest bearing debt. The performance of CE has received increased attention in recent years. The reason is probably that the performance of CE normally determines the performance of equity. Financial transactions are not expected to add value on average. The higher return on equity is just compensation for risk. Required return on equity is a function of the debt/equity ratio. Return on CE (ROCE) is not.

Earnings, flows and values of capital employed are derived by adding the quantities corresponding to interest-bearing debt to those of equity.[5] In practice this is a challenging task. The main problem is to draw the line between interest bearing and non interest-bearing debt. To frame the problem a little differently: It is in practice difficult to identify earnings, flows and values that are consistent in the sense that they correspond to the same

[4] It is possible to define cash flow to equity in a different way by including changes in cash and other liquid assets. Essentially this amounts to defining equity as accounting equity minus liquid assets. In other words liquid assets are viewed as belonging to owners.

[5] In accounting terminology earnings usually means earnings to equity. Here earnings may be defined relative to any concept of capital.

concept of capital. This problem will not be discussed in any detail here. The reader is again referred to Gjesdal and Johnsen (1999).[6]

Earnings to debt is first of all interest paid (including fees etc). To this should be added net foreign exchange losses on interest bearing liabilities. In practice the problem is to identify this figure from the financial statements. Foreign exchange gains and losses are the most troublesome items as gains and losses are usually aggregated across sources (asset, liabilities etc.). Practical solutions to this problem will be discussed later.

Accounting values of debt are available in financial statements although not always specified in the most convenient way for performance evaluation. Market values for debt securities (if different from book values) may be available in footnotes. In any case the difference between accounting and market values are usually not large. Hence accounting values may be used as an approximation to market values. Net cash flow from debt may be found in the statement of changes in financial position. However, it is usually more convenient to calculate the net flow as earnings (interest etc.) minus net change in debt. This will ensure satisfaction of the "clean surplus relation" for debt.

Operational capital - OC

The third relevant concept of capital is operational capital (OC). OC is defined as equity plus interest bearing debt minus non-operational capital. Non-operational capital is mostly, but not exclusively, financial capital. (Also note that financial capital is not necessarily non-operational capital.) Nevertheless the term financial capital will be used synonymously with non-operational capital henceforth. OC may alternatively be defined as CE minus financial capital or as total assets minus financial capital minus non-interest bearing debt. The definition of OC presumes that non-interest-bearing debt is related to operational capital. Return on OC will be referred to as ROOC

[6] CE is really an accounting concept. It is the capital that receives earnings plus financial income. Hence it depends on how financial income is defined.

There are several reasons why one may wish to subtract financial capital from CE. First of all financial capital and operational capital are managed separately, and performance should be measured individually as well. The performance of financial capital should be measured by means of market values whether or not these are reported in financial statements. Accounting for financial capital varies across assets as well as between countries. If the "lower of cost or market value" principle is used for financial statement purposes, the performance of financial capital may be badly measured using accounting data. This will in turn contaminate the measurement of CE performance. This is another reason for focusing on ROOC rather than ROCE.

Earnings to OC are approximated by financial income. Values of financial capital are either cost, market value or "lower of cost or market value". The difference between book and market value may be non-existent or quite large depending on choice of accounting principles and development of market value over time. Cash flow to financial capital is conveniently measured as financial income plus decrease in value.

Valuation methods

Market values

Market values may be used in the performance evaluation of every concept of capital. In particular the three concepts that were introduced in the previous subsection (and is the focus of this paper) may be valued at market (or fair value).[7] This section addresses the implications of using market value in performance evaluation.

When capital is valued at market, return for any period (as well as earnings and residual income) is measured relative to beginning market value. Beginning market value is

[7] In this paper market value, fair value and present value are used synonymously. Note that market value refers to market value of aggregated capital – not individual assets.

determined by expected cash flows and the required (=expected) rate of return. If realized cash flows turn out to be close to expectations (which may be reasonable at least for a large portfolio of stocks) ex post return will be close to the required return. The realized return on market value is measured relative to the market's expectations and may carry little information about the return on capital invested in the operations of the firm.[8] There is no concept of ex ante return on market value. Ex ante return on market value would be equal to the required return (per definition).

The return on a portfolio of stocks for a multiyear (n-year) period is often calculated as a geometric average of single period returns, using the following formula:

$$(8) \qquad (1+r)^n = \prod_{i=0}^{n-1}(1+r_{t-i})$$

The solution to (8) will differ from that of (A5). (8) in effect assumes that dividends are reinvested in the portfolio (net dividends equal 0), whereas (A5) calculates the return on the basis of the actual portfolio.

The net terminal value in (A4) is an alternative to the rate of return as a measure of the performance of a stock or a portfolio of stocks. O'Hanlon an Peasnell (2001) refer to the net terminal value as "excess value created". According to expression (7') "excess value created" is the accumulated value of the periodic residual incomes. One may ask whether a simple average of periodic residual returns is not a better measure of performance.[9]

[8] It is often claimed that acquisition cost and market value should be equal at least at the inception of the project or the firm unless there are market failure and/or accounting biases. The point taken here is that infra-marginal projects do exist, and that this does not violate equilibrium (under uncertainty).

[9] Stewart (1991) has introduced the concept "market value added". This is the difference between market value and book value at time t. O'Hanlon and Peasnell (2001) also point out that "market value added" is just one component of "excess value created".

Accounting values

A multi period accounting rate of return (ARR) or accumulated residual income may be calculated using formulas (A1) to (A5) and accounting book values. The accounting rate of return - "return on cost" is conceptually different from "return on value".[10] It measures the return on the resources committed to the firm. It does not depend on the required rate of return (except indirectly). It is well known that for every investment project there exists a unique series of book values (or a depreciation plan) which produces an accounting rate of return for every period (long or short) that equals the internal rate of return on the project (IRR). For a firm with many projects with different returns this series of book values will produce a weighted average return. Below book values which produce accounting rates of return equal to internal rates, will be denoted V_t^*, V_{t-1}^* etc.

Accounting values will depend on the choice of accounting principles and estimates and may not be equal to those that produce the internal rate of return. In general two different sets of valuations - say (V_{t-n}, V_t) and (W_{t-n}, W_t) - may or may not produce the same rates of return. Let the corresponding rates of return be denoted r_V and r_w respectively and define $e_t = V_t - W_t$ and $e_{t-n} = V_{t-n} - W_{t-n}$. Then using (5'), r_V and r_W may be expressed implicitly as follows:

$$0 = \frac{C_{t-1}}{1+r_V} + \frac{C_t}{(1+r_V)^2} + \frac{V_t}{(1+r_V)^2} - V_{t-2}$$

$$0 = \frac{C_{t-1}}{1+r_W} + \frac{C_t}{(1+r_W)^2} + \frac{V_t}{(1+r_W)^2} - V_{t-2} - \frac{e_t}{(1+r_W)^2} + e_{t-2}$$

The latter expression may be reformulated as follows using g to denote the growth rate in e:

[10] The terms "return on cost" and "return on value" have been introduced by Fama and French, 1998

$$(9) \qquad \frac{e_{t-2}(1+g)^2}{(1+r_W)^2} - e_{t-2} = (\frac{(1+g)^2}{(1+r_W)^2} - 1)e_{t-2} = \frac{C_{t-1}}{1+r_W} + \frac{C_t}{(1+r_W)^2} + \frac{V_t}{(1+r_W)^2} - V_{t-2}$$

Assuming that $e_{t-n} > 0$, $r_W > (<) r_V$ if $g < (>) r_W$. Conversely $e_{t-n} < 0$, implies that $r_W > (<) r_V$ if $g > (<) r_W$. Both sets of valuations yield the same accounting rate of return if the valuation difference grows at a rate, which equals the common rate of return. A sufficient condition for the valuation differences to grow at the rate of return is that both sets of values grow at this rate, in other words that they are proportional.

From the previous argument it follows that the ARR may be identical to IRR in a period even if book values differ from those that makes ARR = IRR for every sub period. To show this let (W_{t-n}, W_t) equal (V^*_{t-n}, V^*_t). (V_{t-n}, V_t) will yield the same ARR as (W_{t-n}, W_t) if e grows at a rate equal to the IRR.[11]

One may ask whether it is possible to mix valuation methods - for example by using market value at t and book value at t - n. Assume that a project is initiated at t – n. The return derived by combining cost and market values equals the return to an investor who buys in at cost at t - n, and sells at market at t. However, this return will only be an unbiased estimate of the project IRR if it equals the cost of capital.

On the other hand calculating ex post net (terminal) value using (A1) – (A4), it is appropriate to value terminal capital at market. This calculation will deliver an updated version of the net value created by the total project. Accounting values will allocate net value created to the periods (t-n, t) and (t+1, ∞).

[11] In steady state growth and with arbitrary, but fixed depreciation plans, accounting values are proportional (see Stauffer (1972) or Gjesdal and Johnsen, (1999)). $e_{t-n} < 0$, implies that valuation V is more conservative than valuations W. It follows from (9) that $r_W < (>) r_V$ if $g < (>) r_W$ - a well known result form steady state theory.

Replacement cost and sales values

The accounting rate of return measures the (weighted average) profitability of current investment projects current in the period. The decisions to implement (or terminate) those projects may have been taken in that same period or earlier. Thus it is not necessarily appropriate to use the ARR to evaluate decision-making in the period. Management in charge during the period may have inherited particularly good or bad projects from their predecessors.

To evaluate specific decisions capital should be valued at opportunity cost. Opportunity cost will depend on the decision and may equal replacement cost, realizable value or present value in use as the case may be. In the shipping business, which is the focus of the case study, which follows, there is often an active market in second-hand assets. Hence optimal timing of purchases and sales of used as well as new ships may be crucial for managerial success in this business. The present value of ships in use must be continually compared with current market price (replacement cost = sales price). Valuing assets at net realizable values at t - n and (corresponding) book values at t, produces the return from operating (and investing) from t - n to t and beyond. This provides a more appropriate measure of current management performance.

Evaluation of specific decisions of these types will not be discussed in this report. For the theory the reader is referred to Edwards, Kay and Mayer (1987. Gjesdal and Johnsen (1999) contains a brief summary.

Appendix

This appendix presents generalizations of (1') - (5'). The following convention is adopted in the formulas: $\prod_{j=1}^{0} = 1$

(A1) $$N_{t-n} = \sum_{i=1}^{n} \frac{C_{t-n+i}}{\prod_{j=1}^{i}(1+k_{t-n+j})} + \frac{V_t}{\prod_{i=1}^{n}(1+k_{t-n+i})} - V_{t-n}$$

(A2) $$N_t = N_{t-n}\prod_{i=1}^{n}(1+k_{t-n+i}) = \sum_{i=1}^{n} C_{t-n+i}\prod_{j=1}^{n-i}(1+k_{t-n+i+j}) + V_t - V_{t-n}\prod_{i=1}^{n}(1+k_{t-n+i})$$

(A3) $$N_t = \sum_{i=1}^{n} C_{t-n+i}\prod_{j=1}^{n-i}(1+k_{t-n+i+j}) - (V_{t-n} - V_t) - (\prod_{i=1}^{n}(1+k_{t-n+i}) - 1)V_{t-n}$$

(A4) $$N_t = V_t - [(\prod_{i=1}^{n}(1+k_{t-n+i}))V_{t-n} - \sum_{i=1}^{n} C_{t-n+i}\prod_{j=1}^{n-i}(1+k_{t-n+i+j})]$$

(A5) $$0 = \sum_{i=1}^{n} C_{t-n+i}(1+r)^{n-i} + V_t - V_{t-n}(1+r)^n$$

3. Required rates of return and depreciation in the shipping industry

Introduction

The previous section discussed financial performance evaluation in general terms. This paper will feature an analysis of profitability in a shipping company. To perform such an analysis in practice the required rate of return must first of all be calculated. The required return is used as a benchmark or to calculate a benchmark for financial performance. Because of the particular tax rules that are applicable to the shipping business in Norway, the required rate of return must be addressed with reference to the industry as well as the specific time period involved. Secondly to analyse performance using accounting values a depreciation plan must be determined. A depreciation plan is asset specific. In the following depreciation of merchant ships will be discussed. In the next subsections the required rate of return is addressed first. Then the depreciation plan is discussed.

The required rate of return for Norwegian shipping companies 1986-97

The return on invested capital consists of interest paid as well as (equity) earnings. In Norway, as in most other countries, interest accrued is deductible at the firm level. The receiver pays the tax. It follows that the required rate of return for debt capital at the firm level is a before tax return.

Return on equity is a more complicated issue. In general equity income may be taxed at the firm level (profit tax, dividend tax) or at the investor level (capital gains tax, dividend tax). Who pays the tax is not a material issues as long as it is paid once and only once. The timing of the tax payments and the question of double taxation are the important issues. In the Norwegian shipping industry there have been three tax regimes in the period 1986-99. The main features of these regimes are described next[12].

[12] The analysis will focus on Norwegian investors. To the extent that foreign investors are marginal and they are taxed differently, this is a flaw.

From 1986-91 there was a tax on profit (rate equal to about (50%)). However, tax rules regulating depreciation, accrued maintenance costs and gains on disposal of assets were fairly generous. Hence growing shipping companies did not have to pay income tax unless they paid dividends. Dividends, however, could only be paid from taxed income. In effect the income tax was more like a dividend tax. There was also a short-term capital gains tax (holding periods less than four years).

In the appendix to this section it is shown that investors turning over their holdings annually will have to pay full tax even if there is no tax on income or dividends. Conversely investors with long holding periods will in the limit pay no taxes if they receive no dividends, and companies do not pay taxes on profits.

The 1986-91 tax regime implies that short term equity investors demanded a rate of return from the firm that equalled their full before tax required rate (just like bond-holders). Long-term investors on the other hand would demand a lower rate (in the limit their after tax required return). It is often assumed that firms raising capital in public markets will have to satisfy all investors - including short-term investors. In other words the marginal investor expect to trade frequently. If that is the case the firms' required rate of return on equity capital equals the before tax required return for the risk in question.

The 1992 tax reform reduced the tax rate to 28% (for all industries). At the same time most generous tax allowances were eliminated. The idea was to leave the total tax burden unchanged on the average. A 28% capital gains tax was introduced for all gains irrespective of holding periods. However, to avoid double taxation taxes paid on profits were deducted from capital gains taxes. Hence short-term investors would reap the full benefit of the reduced tax rate. It follows that companies should use investors' (before tax) required rate of return as their cost of capital (applied to before-tax cash flows or earnings). For investors with longer expected holding periods, corporate taxes would matter as deductions would not become effective until capital gains were realized. On the

other hand the new capital gains tax would have little effect for this group. Firms only attracting long-term investors should use investors' after-tax required rate of return as their cost of capital (applied to after-tax cash flows or earnings).

The 1992 tax reform implied that heavier taxes would eventually have to be paid on (some) equity capital in shipping companies. The industry demanded and was given a new tax reform effective from 1996 eliminating the income tax altogether.[13] A dividend tax was introduced (payable by the firm). The capital gains tax was retained. The 1996 tax reform, although very generous on the face of it, was in fact fairly similar in its effects to the before-1992 regime (with the exception of the lower capital gains tax rate).

From this historical review it follows that the key tax on equity investments in the shipping industry is the capital gains tax. Since 1992 the tax rate has been a flat 28%. Before 1992 the rate varied considerably across investors. In the analysis below it will be assumed that the same average expected rate applied to marginal investors in the pre-1992 period as well. In keeping with the assumption that short-term investors must be satisfied, the required rate of return for shipping companies in the 1986-99 period is a pre-tax return. This cost of capital should be compared to ARR before any income and dividend taxes paid.

The current tax regime (and hindsight) justifies another convenient shortcut: It means that or analytical purposes deferred income taxes may be ignored. In other word deferred taxes may be reclassified as equity (for the whole period). Changes in deferred taxes may also be eliminated from tax expense.

The before tax required return on equity capital - k - is constructed as follows:

k = real risk free return (after tax) + inflation term + risk term + tax term

[13] Only income from shipping was tax-exempt. Income from other sources (such as financial income) was taxed as before. Financial expenses were proportionally deductible.

The real return after tax is set somewhat arbitrarily to 1%. Following Gjesdal and Johnsen (1999) the market risk premium is assumed to equal 6,5%, and the systematic risk for shipping companies (β, which seems to have been variable over time) is assumed to be 1. Hence the risk term is 6,5% for a well-diversified investor.

To calculate the inflation term there are two possibilities. One is to use the expected rate of inflation implicit in short-term interest rate. Alternatively actual inflation (measured by the change in the Norwegian consumer price index) may be used to calculate the inflation term. The latter procedure seems more consistent with the objectives of the analysis. The required rate of return is used as a benchmark in the analysis of financial performance. The nominal realized return on investments in operational capital is a function of inflation. Inflation is not controllable by management. Hence the benchmark is made flexible by using actual rather than expected inflation. Also note that a flexible nominal rate is equivalent to fixed real rate.[14]

Finally the tax term is found by dividing the first three terms in the expression by 1 minus the tax rate (1 - 0.28 = 0.72).

The required rate of return on debt is equal to the equity rate minus the risk term ($\beta = 0$ for debt) with the tax term adjusted accordingly. This procedure implies that unexpected inflation will make the required return differ from the actual cost of debt. It follows that value added on debt may be non-zero ex post. It is negative if actual inflation exceeds expected inflation. Since return on OC is assumed unaffected by inflation, value created on equity will increase with the rate of inflation. Conversely value added on equity will tend to be lower if inflation falls short of expectations.[15] The required rates on CE and OC equal the proper weighted average of equity and debt returns.

[14] Assuming that real cash flows are independent of inflation is clearly heroic. The best one can hope for is that it holds as an average.

[15] If debt is denominated in foreign currency the cost of debt (= return on debt) will vary with rates of exchange. More will be said about this issue below.

The required return on debt plays a dual role in the analysis. It is also the required return on financial capital. Setting these two rates equal to each other ignores the cost of financial intermediation. Adding 1 - 1.5% to the return calculated above to account for the cost of lending institutions including expected loan losses, would perhaps give a more accurate estimate on the cost of bank loans. This should be kept in mind in the analysis below.

Choice of depreciation plan

A major objective of this paper is to study the effects of depreciation plans on financial performance measures. In the case study this will be accomplished by varying the plan and analysing the effects. In this section the theory of depreciation will be briefly reviewed and then applied to investments in cargo ships.

It is well known that for an investment project there exists one and only one depreciation plan which produces an accounting return equal to the internal rate of return in every period (usually referred to as the IRR depreciation plan). However, ARR is usually measured at the firm level. The firm is a collection of projects. The ARR for the firm equals a weighted average of the project ARRs. In steady state growth the relationship between ARR, IRR, growth and depreciation is known. One celebrated result in this area implies that ARR equals IRR for all depreciation plans whenever the growth rate is equal to the IRR. For other growth rates it may be possible to identify the sign of the bias in ARR as a measure of IRR. Outside steady state it may not be so easy to say anything about the relationship between ARR and IRR.

Another criticism of the theory is that firms usually consist of investment projects that are not independent. Profitability and hence depreciation plans for individual projects may not be well defined. Perhaps the most serious shortcoming of the received theory is the assumption of certainty. It is not obvious how the theory should be generalised. This paper

takes a simplistic approach: An investment project generates an expected cash flow. The expected cash flow implies an IRR. A depreciation plan, which produces an ARR that equals IRR whenever cash flows equal their expected values, is said to be an IRR depreciation plan.[16]

A shipping company consists of individually identifiable projects - the vessels. The major cost items may be traced to each ships. Although ships are operated in pools, it will be assumed that revenues may also be allocated to vessels with sufficient accuracy. Hence a shipping company may be viewed as collection of individual investment project. A shipping company thus fits the definition of a firm as used in depreciation theory, better than most businesses. This is one reason for choosing this particular industry for a study of depreciation and financial performance.

Currently accounting depreciation for merchant ships in Norway is usually linear over an economic life of (about) 25 years. What would the IRR depreciation schedule look like for such an investment? IRR depreciation depends on the cash flow profile. Linear depreciation equals IRR-depreciation if cash flows decline linearly at a rate, which is equal to annual depreciation multiplied by the IRR. The expected cash flow profile, which implies linear depreciation on an investment of 100 mill at an IRR of 2.5%, is illustrated in fig. 1. It starts at 6.5 and decreases by 0.1 annually ($0.025 \cdot 100/25$) to reach 4.1 in year 25. For comparison a constant cash flow producing the same return is also drawn. This constant cash flow is 5.43 mill. The IRR depreciation plan corresponding to a constant cash flow is also well known. It is increasing over time and is sometimes referred to as an annuity method (with interest rate = IRR)[17].

[16] This concept of depreciation is simplistic because no account is taken of new information about cash flows.

[17] The terminology used in depreciation theory is not always clear. Note that the annuity method as defined here is a family of depreciation plans indexed by the rate of interest. IRR depreciation coincides with one member of this family if and only if cash flow is constant over time.

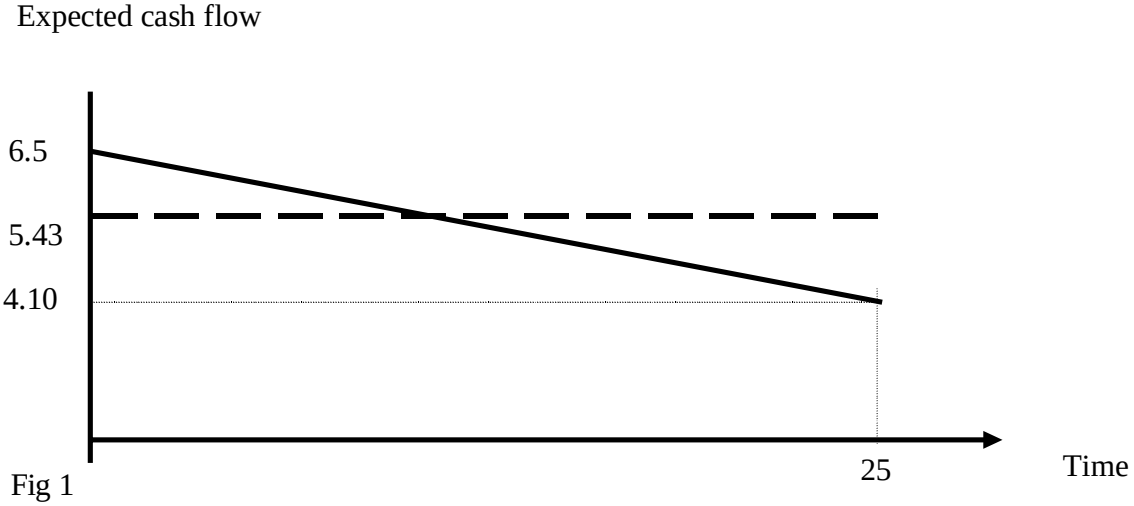

Fig 1

For assets with long lives, in particular, the accounting rate of return is very sensitive with respect to the choice of depreciation. To illustrate assume that expected cash flow is really constant, but linear depreciation is nonetheless chosen by the firm. Then the accounting rate of return will increase from 1.43% in the first year to 35% in the final year.

One may ask how the actual expected cash flow profile looks relative to the profiles reproduced in figure 1. Little empirical evidence is available on this issue. Intuitively a 25 year economic life and decreasing *real* cash flows do not seem unreasonable. There are at least two reasons why older ships may earn smaller cash flows than newer ones. First of all maintenance expenses may be expected to increase over time. Secondly, revenues may drop as technological progress drives real freight rates downwards in the market. Older ships do not experience a corresponding decrease in operating costs.

Introspection does not provide much more insight into the slope of the cash flow profile. However, the 40% decrease in cash flow over the life of the vessel implied by linear depreciation, seems excessive even i n real terms.[18] If that is the case, linear depreciation over a 25 year estimated lifetime would be on the conservative side.

[18] A higher return on investment would imply an even larger fall in cash flow over the life of the asset.

The above argument is couched in terms of real cash flows and real IRRs. As financial statements report nominal cash flows and nominal rates of return, the logic may not seem entirely persuasive. Under inflation nominal freight rates may increase even though real rates are falling.[19] Furthermore nominal project IRRs may not be the most informative performance measures, as the corresponding benchmark required returns are not readily available. Such benchmark returns must be calculated as weighted averages of annual required returns.

Indeed what is needed is an annual ARR that is comparable to the required annual rates of return derived previously. Such an ARR would be (roughly) equal to the real project IRR plus the actual rate of inflation for the period. To obtain such a measure the IRR depreciation corresponding to the expected, real cash flow must be adjusted for inflation. Assuming unadjusted (real) IRR depreciation is linear, adjusted depreciation in period j - $\hat{a}_j$ - may be calculated recursively as follows (p_j is the rate of inflation, J is the economic life, and $\hat{B}_j$ denotes (adjusted) book values):

$$\hat{a}_j = \hat{B}_{j-1}(1+p_j)/(J-j+1) - p_j\hat{B}_{j-1}$$

As usual book value at the end of the period equals beginning value minus adjusted depreciation. The price index used in the adjustment is a general index. Real changes in output prices (relative prices) are reflected in real cash flows. The adjusted book value should not be confused with replacement cost.[20]

Another simplifying assumption that has been used so far is that ships are bought new and held until retirement. In fact the second hand market for many kinds of ships are quite active. If IRR depreciation is used, and the IRR exactly equals the cost of capital,

[19] The main point here is not that replacement cost or cash flows are actually increasing over time. However, world inflation will tend to push prices and cash flows upwards (ceteris paribus).

[20] The assumption here is that real (unadjusted) IRR depreciation is linear. In theory it is perfectly possible that adjusted depreciation is linear. This would be the case if real depreciation is declining balance with a rate that happens to be equal to the (constant) rate of inflation.

transactions in used vessels do not matter. If, however, investments are strictly profitable and the second hand market is efficient, the seller will book a capital gain in the period. In this period the ARR will exceed the IRR derived from the operation of the ship over its lifetime. The (average) ARR for the holding period will exceed the IRR as well. The buyer will experience a return that is lower than the actual IRR.

Accounting gains upon sale of assets may also result from accounting that is conservative (relative to IRR depreciation). In this case ARR *in the period* will exceed the IRR. This represents a compensation for ARRs that have been too low in prior periods. The (weighted) average ARR in the holding period will equal the IRR (if the project is marginal). The underlying return in the shipping business is derived from the operations of the ships. Assuming all operators are equally efficient, asset play is a zero-sum game. Such activities may be a great source of value for some companies, but any value created will come at the expense of some trading partner. For individual firms gains and losses from buying and selling ships are as relevant as any other item. If, however, the objective of the analysis is to measure the underlying return in the business, such gains and loss will represent noise.

Appendix

Required rate of return in a regime with dividend tax, capital gains tax, but no corporate income tax.

This appendix takes a closer look at the required rate of return on equity in a regime with dividend tax, capital gains tax, but no corporate income tax**.** These are the main features of the post-1996 tax regime for Norwegian shipping companies. It is argued that if investors do not trade, dividend policy influences the cost of capital. On the other hand if investors trade frequently, dividend policy is of no importance. Under no circumstances is there double taxation.

Dividend taxation will be modelled as follows. The firm invests $1 in a project with a return of x% per period. Return is reinvested at this rate until the horizon T when the accumulated return is paid to investors, and the dividend tax is due at a rate s = 0.28. The horizon T represents the dividend policy. Investors have a required rate of return equal to k after tax. The present value of the project is calculated in the usual way. Setting present value equal to zero, and solving for x, yields the firms' pre-tax cost of capital, which is denoted κ. In other words pre-tax cost of capital is the return before tax of a marginal project:

$$1 = \frac{(1+\kappa)^T - 0,28\left[(1+\kappa)^T - 1\right]}{(1+k)^T} = 0,72\frac{(1+\kappa)^T}{(1+k)^T} + \frac{0,28}{(1+k)^T}$$

From the equation it is easy to see that $k < \kappa(T) \leq k/0.72$. The first inequality is intuitive; the firm's pre-tax return must be greater than investors' after tax return as long as investors pay tax. On the other hand κ is decreasing in T and will approach k if taxes are deferred long enough. κ(1) is the maximal value of κ = k/0.72. The following table presents selected values of the κ(T) function, assuming k = 7,2%:

T	1	5	10	15	20	25	30
κ	0,1	0,0954	0,0913	0,0882	0,0858	0,0840	0,0825

The assumption that investors hold shares and receive their return in the form of dividends, is one extreme. The opposite extreme is to assume that investors trade at the end of every period. In this case dividend policy (i.e. T) is of no importance for investors and does not affect the required rate of return. κ = k/0,72 for all T. This result may be proved by induction. Let P_t be the market value of the claim at the end of period t. Assume that the return is $\kappa = k/0.72$.

First calculate P_{T-1}

$$P_{T-1} = \frac{(1+\kappa)^T - 0,28\left[(1+\kappa)^T - 1\right] + 0,28\left[P_{T-1} - 1\right]}{(1+k)} = \frac{0,72(1+\kappa)^T + 0,28 + 0,28(P_{T-1} - 1)}{(1+k)}$$

$$(1+k)P_{T-1} - 0,28P_{T-1} = 0,72(1+\kappa)^T$$

$$P_{T-1} = \frac{(1+\kappa)^T}{1+k/0,72} = (1+\kappa)^{T-1}$$

Next calculate P_t for arbitrary t, assuming that the relationship holds for P_{t+1}:

$$P_t = \frac{0,72[P_{t+1} - P_t] + P_t}{(1+k)} = \frac{0,72[(1+\kappa)^{t+1} - P_t] + P_t}{(1+k)}$$

$$(1+k)P_t - 0,28P_t = 0,72(1+\kappa)^{t+1}$$

$$P_t = \frac{(1+\kappa)^{t+1}}{1+k/0,72} = (1+\kappa)^t$$

The final expression implies in particular the $P_0 = 1$. Hence the investment is marginal when κ = k/0.72; the firm's cost of equity capital equals k/0.72 before tax. The share price grows at the pre-tax rate of return since investors pay full tax on return.

The previous argument also demonstrates the absence of double taxation. Dividends paid correspond to a reduction in market value, which neutralizes the dividend tax. In general the tax burden is determined by the timing of tax payments. In the current regime the tax is paid when dividends are received or when capital gains are realized whichever comes first. In the old regime tax was paid when profits were earned or when gains were realized whichever came first. When trading is frequent, there is no difference.

The fact that investor behaviour influences the cost of capital complicates the discussion. Long-term owners are nice since they have a lower required return. However, a quoted company may have to attract marginal, short-term investors as well. In that case the cost of capital equals k/0.72 even if the firm does not pay income taxes, and there are no dividends.

4. The case company: Odfjell ASA (formerly Storli ASA) 1986-95

The company

Odfjell ASA (henceforth Odfjell) has been quoted on the Oslo Stock Exchange since 1985. The Odfjell family. still owns close to 50% of the company directly or indirectly. Odfjell operates as of 1999 a fleet of 50 tankers built to transports chemicals. The company owns 60% of the vessels, 20 % by partners and the rest chartered. Chemical tankers are technologically quite advanced and expensive. The newest vessel built in 1999 cost US$ 70 mill. Odfjell has grown by about 15% annually since 1985 in part by acquiring used tankers and partly by building new ones. The corporation is now among the top two in terms of global market share. Odfjell also owns and operates terminals.

Odfjell accounting

The format of the income statement and the balance sheet has undergone two major changes in the period; both are related to tax reporting and are common in the industry . From 1986-91 Odfjell reported the accumulated difference between net (accounting) income and tax income in the balance sheet as "untaxed reserves". As mentioned earlier the tax authorities' generosity towards the shipping industry in this period took the form of large allowances for depreciation and future maintenance as well as deferral of income particularly capital gains. Hence untaxed reserves were quite large (21% of total assets at the start of 1986). In 1992 the deferred tax model was introduced in Norway. Essentially deferred taxes were determined by allocating 28% of untaxed reserves to deferred taxes and the rest to equity. Since 1996 corporate profits derived from shipping operations have not been subject to taxes in Norway. Consequently, Odfjell like most Norwegian shipping companies reduced deferred taxes to negligible amounts. In the above section on financial performance measurement and taxes it was argued that taxes should be ignored and the analysis conducted on a pre-tax basis. Hence deferred taxes as well as untaxed reserves are classified as equity. Therefore the changing format of tax reporting does not matter.

Norwegian financial statements do not always satisfy the clean surplus relation. Dirty surplus may create problems for an analysis of financial performance for longer periods. In the analysis which follows the clean surplus relation is automatically satisfied as earnings are essentially derived from the balance sheet rather than the income statement; earnings are defined as dividends plus retained earnings. This implies that any charges against equity and other equity adjustments have been reversed. Such items include translation gains and losses (which have been accounted for as equity adjustments in accordance with US-GAAP), pensions liabilities (arising from a change in accounting principles) charged against equity, and, in a single instance, goodwill written down against equity. The goodwill amounted to more that NOK 120 mill and was for that reason capitalized (rather than written off against income) and depreciated linearly over a period of 10 years. What is referred to as adjusted financial statements below, incorporates these changes. Any other violations of clean surplus are believed to be immaterial.

Two further issues relating to Odfjell financial statements require special attention. Those are foreign currency gains and losses and depreciation. They will be discussed in turn.

Foreign exchange gains and losses

Foreign exchange gains and losses arising from financial assets and liabilities denominated in foreign currencies (not to be confused with translation gains and losses) are important in the Norwegian shipping industry. The business is global. Costs and revenues are mostly denominated in foreign currencies. To hedge currency risk, liabilities are often denominated in foreign currencies as well. Foreign currency denominated financial assets are also common.

Foreign currencies raise conceptual as well as practical problems. First of all financial performance may depend on the currency in which it is measured. It is not clear which currency is the relevant one as many owners may live outside Norway or may conduct

business abroad. In this case study this particular issue will be ignored, and financial performance is measured in NOK.[21]

Another conceptual issue relates to hedging. It is far from clear how effective liabilities in foreign currencies are as hedges of risks related to foreign operations. However, assume for the sake of the argument that liabilities hedge operational as well as financial assets. The return on equity will automatically reflect this hedging relationship at least in the long run. ROCE and return on OC do not in themselves capture hedging as one side of the relationship - gains or losses on liabilities - are excluded. To reflect hedging the benchmark cost of capital must be adjusted for movements in the exchange rate. In the analysis in this case study this is done to the extent that the required rate of return on debt is adjusted for inflation. One would expect foreign exchange rates and inflations rates to be closely related at least in the long run.

Finally it should be noted that unrealised foreign currency gains and losses have been accounted for in different ways during the period. Towards the end of the period current rate methods gradually gained acceptance. Earlier "the lower of cost or market" principle was the norm although modifications were required to reflect hedging relationships etc.

The practical problems arising from foreign currency gains and losses concern ROCE only. This is the only measure of return that includes financial income but excludes financial expenses. The problem then is to identify gains and losses relating to financial assets, which should be included in financial income, and at the same time exclude those items that relate to debt. Odfjell follows common practice and reports foreign exchange gains and losses net. To complicate matters the net gain or loss may also include the return on forward contracts relating to operational revenues.

To allocate net foreign exchange gains and losses footnote disclosures are used as the primary source of information. Usually currency losses on foreign currency debt are

[21] As of 2000 Odfjell publishes financial statements in US$ only.

disclosed. If footnote disclosures are not available, the ratio of net foreign exchange loss to net interest expense is calculated, and the former is allocated to assets and liabilities on that basis. Note that using this procedure, errors in financial income and expenses will be perfectly positively correlated.

Depreciation

Odfjell uses linear depreciation. Estimated useful lives have been changed twice during the relevant period. In 1987 lives were increased from 14 to 20 years. In 1995 a further increase to 25 years took place. This policy follows industry practice. Prior to 1984 ships were carried at tax values in the balance sheet. More realistic asset values have emerged in recent years resulting from separation of tax and financial accounting.

Linear depreciation is here interpreted as linear allocation over remaining estimated lives. Hence depreciation will be abnormally low in the periods following an extension - in particular this will be the case for older ships. Also the changes were not imposed uniformly. Rather similar ships of different vintages were assumed to have identical remaining lives. Changes in depreciation significantly affect accounting profitability. Comparing rates of return as well as residual incomes over time may not necessarily be a meaningful exercise under the circumstances. For that reason two sets of adjustments have been made.

First of all linear depreciation has been recalculated using 25 year lives uniformly over the period. Since the years of acquisition (and for most newer ships even the month) are disclosed, this may be done with reasonable accuracy using information available in financial statements. The main problem is to allocate the aggregate beginning balance to individual ships. An initial estimate was made based on available information. The values were then calibrated to obtain the known aggregate value. For vessels acquired after 1985 the cost is usually available from footnote information. When several ships are bought in the same year an allocation has been made using information about individual ships (in

most cases the ships are quite similar). Once year and cost of acquisition have been established, depreciation and book values are easily calculated for any depreciation plan using a spreadsheet.

Inflation adjusted depreciation and book values were calculated using the method discussed above. A 25 year linear plan was used as the (real) basis. The calculations were done recursively by adjusting beginning book value for the year's inflation. Gross depreciation is then calculated from the previous year's cost in the same way (equivalently the adjusted book value may be depreciated linearly over the remaining life). Net adjusted depreciation is defined as the gross amount minus the adjustment to beginning book value (inflation gain). The same spreadsheet used for recalculating linear depreciation was used for inflation-adjusted depreciation as well.

Market data seems to indicate that nominal freight rates during the nineties have fluctuated around a trend that is reasonably flat. Hence expected net cash flows are stable or decreasing slightly (as some operating costs are increasing). For that reason annuity depreciation has also been calculated (rate of interest equals 12%). If expected cash flows are decreasing over time (but not too steeply), linear and annuity depreciation will produce ARRs that provide bounds on the IRR (given some regularity conditions).

5. Empirical results

In this section the financial performance of Odfjell is analysed. The three different concepts of capital are addressed in turn.

Equity

The financial performance of Odfjell equity capital for the years 1986 through 1999 is a function of net dividend flow, beginning and ending capital values as well as investors' required returns. Annual flows and required returns are reported in table 1.

Table 1
Dividends, share issues (NOK millions) and required return on equity, 1986 - 99

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Dividend	3	4	4	5	0	0	11	16	33	44	66	87	87	87
Issues	0	0	0	375	0	0	0	0	0	0	0	0	0	0
Net flow	3	4	4	-370	0	0	11	16	33	44	66	87	87	87
R. return	20,4	22,6	19,7	16,8	16,1	15,2	13,7	13,6	12,4	13,8	12,2	14,0	13,6	13,6

Required returns are calculated according to the methods discussed in section 3

Table 2 reports capital values, returns (ROEs) from (A5) and accumulated residual income (RI_E) calculated using a general version of (7'). In table 2 capital is valued at market as well as book. Book values are calculated using the four different depreciation methods discussed in previous sections – reported, uniform linear, annuity and inflation adjusted. Values from 1985, 1997 and 1999 are shown in the table with performance measures for the 1986-97 and 1986-99 periods. The 1985 market value is the price set for the public offering in the spring of 1985 rather than the year-end value. (The value at the end of 1985 was just 190 mill.) The last row shows the (geometric) average required return for the respective periods.

Table 2
EQUITY; return and residual income (NOK mill.), 1985-97/99, different valuation methods

	1985	1997			1999		
Valuation	Capital	Capital	ROE	RI_E	Capital	ROE	RI_E
Market	310	2791	16,4	299	2165	12,4	-862
Book	460	2769	13,5	-596	2833	12,1	-1320
25-Lin	639	3144	12,2	-1266	3104	10,7	-2398
Annuity	793	4073	13,0	-1232	4290	11,8	-2366
Inflation	1089	3815	9,8	-3216	3845	8,8	-5037
R return			15,6			15,3	

Market value: Based on end of year stock price for 1997 and 1999, for 1985 IPO price
Book value: Reported equity adjusted as discussed in section 4
25-Lin: Linear depreciation with 25-year economic life uniformly applied
Annuity: Annuity method with 25-year economic life, 12% interest rate
Inflation: Linear depreciation with 25-year economic life adjusted for inflation as explained in section 3
Required return is the geometric average of annual returns in table 1.

The 1986-97 annual return on market value - 16.4% - exceeds the average required return by 0.8%. The value created in the period for the shareholders who bought shares in the 1985 issue is 299 million. Viewed from 1997 hindsight allows the conclusion that the issue was priced appropriately. Two years down the road, at the end of 1999, the picture is not quite so rosy. The realized return for the 1986-99 period is 12.4% compared to an average required return of 15.3%. The reason is partly that earnings in 1998 and 1999 were disappointing, but more importantly investors' expectations with regard to the future have taken a turn for the worse as reflected in falling share prices.[22]

Table 2 also reports return on cost. Return on cost is an estimate of the return on the capital actually invested in the Odfjell shipping business. Unlike return on value it is not affected by anyone's expectations. The 1986-97 ARR varies from 13.5% to 9.8% depending on the method used to calculate book values. These figures are way below the required return on equity. Hence the accumulated residual income varies from -596 to -3216. The wide interval is due to differences in return as well as the differences in capital values (particularly 1985 values). Extending the period to 1999 the picture is even bleaker although the difference between the 1986-97 and 1986-99 periods is less dramatic using

[22] Note that the ARRs for different periods are not directly comparable as required returns change too.

book values than market values. The reason is obviously that 1999 book values do not reflect investors' growing pessimism with respect to the future.

One explanation for the difference between the return on (market) value and return on cost is that the business does not earn a sufficient return. However, shareholders by foreseeing this still manage to obtain a sufficient return on their invested capital from 1985 to 1997. Note that the ratio of market value to book value (the Price/Book ratio) increases from .61 to .89 during the period (using 25 year lives to calculate book value). One interpretation is that investors by 1997 are more optimistic with respect to Odfjell's ability to generate future value compared to 1985/86. As noted above this level of optimism did not last. At the end of 1999 Price/Book is back down below .70

These interpretations depend on required return being measured accurately. If it is assumed that the required return is lower - say around 12% - the story changes.[23] The internal rate of return is then close to required return. A return on value that is higher than required return implies that this level of realized earnings is partly unexpected. This may also explain the increase in Price/Book.

The numbers do not by themselves imply that Odfjell would have been better off selling their ships in 1985 and investing the proceeds in the capital market. Neither 1985 book values of the vessels, nor market value of equity necessarily reflect the ships' exit values. In this particular case the book value using linear depreciation over 25 years happens to be very close to the estimated fair value of the ships at that time. If it had been possible to realize the fair value by selling the ships in the market in 1985, the analysis implies that Odfjell would have been better off doing just that rather than selling shares to the public (assuming required returns greater than 12.2%).

Comparing the various versions of book value, there are clearly substantial differences - particularly at the beginning of the period. Choosing a 25-year life increases book value by

[23] If the marginal investor takes a more long-term perspective, the required return would be lower.

39% in 1985. In 1997 the difference has been reduced to 14%. The reason is obviously that the company itself increased estimates of useful lives twice during the period. These facts also explain the higher returns obtained using Odfjell's own depreciation figures.

The uniform linear and the annuity methods produce ARRs and RIs that are very close for both sub periods although depreciation schedules are quite different. This is not unexpected on the basis of steady-state theory as growth rates are close to IRRs. That the less conservative annuity method produces the higher figures is also consistent with theory as the growth for the period exceeds the IRR. [24] More generally the relationship between cash flow profiles and IRR-depreciation discussed above, indicates that when linear and annuity methods yields returns that are close, the expected IRR is likely to be close as well. In this perspective results are certainly comforting.

Interpreting inflation-adjusted returns is more difficult. The inflation-adjusted book values will always be higher than the non-adjusted values. In 1985 the adjusted values are 71% higher. This reflects the high inflation rates over the previous decade. As already noted the inflation-adjusted values in 1985 are far above estimated fair values. However, this does not necessarily imply that inflation adjusted depreciation is inappropriate. An alternative interpretation is that the investments made during the seventies and early eighties were not very profitable. Using book values (without taking write downs to reflect a lower fair value) profitability in the subsequent period will also suffer. Using IRR depreciation an unprofitable investment will generate low returns every year until retirement.

In a follow-up paper the relationship between the different book rates of return will be studied in more detail.

[24] This reasoning presumes that the asset base is close to steady state.

Capital employed

Table 3 presents interest-bearing debt, interest accrued and net inflow (net increase) of debt capital. Dividends and issues of equity are listed as well. Capital employed equals interest bearing debt plus equity. The net inflow to capital employed is the sum of the flows to equity and debt respectively.

Table 3
Interest bearing debt, interest (including foreign exchange gains and losses), net change in debt (inflow), cash flow to equity, net flow to (debt and equity) investors , NOK mill.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Debt	807	737	532	955	1283	2134	2114	2502	2678	2575	2741	2861	3971	4918	6018
Interest	0	61	20	63	151	197	149	247	282	-12	103	244	531	413	554
Inflow	0	-70	-205	423	328	851	-20	388	175	-103	166	120	1110	947	1099
Dividend	0	3	4	4	5	0	0	11	16	33	44	66	87	87	87
Issues	0	0	0	0	375	0	0	0	0	0	0	0	0	0	0
Net flow	0	134	229	-355	-546	-654	169	-130	123	123	-19	190	-491	-447	-458

Tables 4 presents values of capital employed along with ROCE and accumulated residual income (RI_{CE}) using the familiar ways of calculating equity values. Table 4 corresponds to table 2.

The 1986-97 ROCE using market values is 11.9% compared to a required return of 10.1%. The corresponding 1986-99 figures are 10.4% and 9.7%. The required return on capital employed is calculated annually as a weighted average of the cost of debt and equity using relative beginning values as weights.

Table 4
CAPITAL EMPLOYED
Return and residual income NOK mill.), 1985-97/99, different valuation methods

	1985	1997			1999		
Valuation	Capital	Capital	ROCE	RI_{CE}	Capital	ROCE	RI_{CE}
Market	1117	6762	11,9	1152	8182	10,5	704
Book	1267	6740	11,0	600	8851	10,5	739
25-Lin	1447	7115	10,6	40	9121	10,0	-203
Annuity	1600	8043	11,2	52	10307	10,6	-199
Inflation	1897	7786	9,5	-1533	9862	9,1	-2172
R return			10,1			9,7	

Market value: Based on end of year stock price for 1997 and 1999, for 1985 IPO price
Book value: Reported equity adjusted as discussed in section 4, debt at book value
25-Lin:Linear depreciation with 25-year economic life uniformly applied; debt at book value
Annuity: Annuity method with 25 year economic life, 12% interest rate; debt at book value
Inflation: Lin depreciation with 25-year life adjusted for inflation as explained in section 3; debt at book value.
Required return: Weighted average using market value of equity as explained in section 3

The value created for investors in the period until 1997, measured by residual income accumulated with interest, is 1152 million. This is 853 million more than the value created on equity. The latter figure represents 3% of debt on average. This is surprising since debt, at least in the long run, should not earn more than its cost of capital. The corresponding figures for the 1986-99 period are 704 (total value created) and 1566 (share of debt holders). The changes from 1997 to 1999 are perhaps even more remarkable than the absolute figures. In 1998 and 1999 equity has lost 1152 whereas debt has gained 713.

There are two main explanations for the value creation on debt. One is that the cost of debt is underestimated. The other is that there have been a wealth transfer from equity holders to debt holders. Measurement error is perhaps the most likely explanation. There are several potential sources of error. First of all the costs of lending institutions, including expected losses on bad debts, have been ignored. This may account for perhaps one half of the 853 millions created from 1986-97). Another source of estimation error is foreign exchange gains and losses. As noted above this item has been estimated using rather crude procedures. If net foreign currency losses on debt have been overestimated, net gains on financial assets will have been overestimated as well. This issue will be discussed in more detail below.

Another type of estimation error relates to the amount of interest-bearing debt. Debt may have been underestimated if beginning balance is not representative of average amounts. As debt levels increase over time, this is not unlikely. In addition some interest-bearing short-term debt may have been excluded from capital employed since interest-bearing short term debt is not always easy to identify from the financial statements.

In valuation exercises it is usually assumed that debt just earns its cost of capital. Ex ante this makes good sense.[25] Ex post, however, this is not necessarily so, at least in the short run, even though debt claims are fixed. Lenders gain at the expense of borrowers if inflation is lower than expected and vice versa. In the measurement model this is picked up by the flexibility of the nominal required return. Similarly wealth transfers may take place if exchange rates do not follow purchasing power parity. In fact the strengthening of the US$ in 1998 and 1999 is the main reason for the transfer of wealth from equity- to debt holders. As discussed in section 4 above, the shipping industry claims this is an accounting bias as a strong US$ also produces higher assets values which are not reflected in the financial statement until realized. Viewed from this perspective the value accruing to debtholdes is a result of hedging currency risks. The corresponding gain of equity holders has not been recognized yet.

Table 4 also reports ROCE and RI on CE using book values of equity. Keeping in mind the analysis of return on equity as well as the analysis of market value ROCE just completed, the introduction of book values does not add much insight. ARRs for CE rank in the same way as ARRs for equity (except that annuity depreciation produces the highest ARR). Accumulated RI is more positive (less negative) for capital employed than for equity. This should not be too surprising since debt is treated identically in all models. Viewed in this way it is more surprising that *the difference* between value added on capital

[25] Feltham and Ohlson, 1995 have suggested the term “net interest relation” (NIR) for this relationship.

employed and on equity differ among valuation models. In other words value added on debt appears to depend on the valuation of equity.

The explanation for this apparent paradox is the variation in required rates of return produced by differences in debt to equity ratios. Alternatively RI may be accumulated at a rate equal to the cost of equity. The resulting value added is the value added on equity that would have been obtained if debt holders had only been paid their required return. Recalculating value added in this way, the difference between value added on capital employed and value added on equity is 1017 million from 1986-97 irrespective of valuation model.

Operational capital

In addition to fixed assets, Odfjell has capital invested in financial assets. It is often useful to analyse the performance of financial and operational assets separately. To do this the profitability of operational assets are first calculated. The performance of financial assets then follows by comparing ROOC and ROCE.

In the case of Odfjell financial assets are 25.7% of capital employed in 1985 decreasing to 22.9% in 1997. Financial assets are mostly liquid, and it will be assumed that they are without systematic risk ($\beta = 0$). It is then reasonable to say that financial assets are financed by debt. The required return on operational capital is a weighted average of the cost of equity and the cost of debt. The weights reflect that all equity is used to finance operational assets along with a smaller proportion of debt[26].

In table 5 the amount of financial capital is presented as well as the annual change (Δ fin cap). The accounting earnings on financial capital are also included. Debt and the flows

[26] Odfjell claims liquid assets provide the means to acquire operational assets at bargain prices when opportunity knocks. Returns of this kind will, however, show up in operating rather than financial income.

accruing to debt and equity are repeated from table 5. Financial capital and its flows are deducted from capital employed and the flows associated with capital employed.

Table 5
Interest bearing debt, financial capital, interest paid (including foreign exchange gains and losses), net change in debt, return on financial capital (including foreign exchange gains and losses), net change in financial capital, dividends, and share issues, net flow to investors in operational capital; (NOK mill.).

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Debt	807	737	532	955	1283	2134	2114	2502	2678	2575	2741	2861	3971	4918	6018
Fin cap	487	561	497	374	727	865	923	1185	1270	1115	1346	1426	1776	1793	1872
Interest	0	61	20	63	151	197	149	247	282	-12	103	244	531	413	554
Δ debt	0	-70	-205	423	328	851	-20	388	175	-103	166	120	1110	947	1099
Rtrn fin cap		52	45	38	46	49	53	151	148	-55	32	112	267	180	193
Δ fin cap		74	-64	-123	353	138	58	262	85	-156	231	80	350	17	79
Dividends	0	3	4	4	5	0	0	11	16	33	44	66	87	87	87
Issues	0	0	0	0	375	0	0	0	0	0	0	0	0	0	0
Net flow		156	119	-516	-239	-566	174	-19	60	22	180	158	-408	-610	-573

Net flow (to investors in financial capital) = Interest + dividends – return on financial capital – Δ debt – issues + Δ financial capital

The values of operational capital as well as returns are presented in table 6 using the format familiar from tables 2 and 4. It is evident from table 6 that the performance of operational capital, measured by accumulated RI, is below that of capital employed in both periods. In other words financial capital contributes positively to the return on capital employed. Using the cost of equity to accumulate residual income, the value created by financial capital is 312 million from 1986-1997 (independent of valuation method). Financial capital earns a return that is 1.5% higher than its cost (which equals the cost of debt) on average.

Table 6
OPERATIONAL CAPITAL
Return and residual income (NOK million), 1985-97/99, different valuation methods

	1985	1997			1999		
Valuation	Capital	Capital	ROOC	RI	Capital	ROOC	RI
Market	630	4986	13,5	875	6311	11,2	635
Book	780	4964	12,0	232	6979	11,2	480
25-Lin	959	5340	11,4	-363	7249	10,5	-441
Annuity	1113	6268	12,0	-352	8436	11,2	-442
Inflation	1409	6011	9,8	-2048	7990	9,2	-2599
Req. retrn			12,3			11,7	

Market value: Based on end of year stock price for 1997 and 1999, for 1985 IPO price
Book value: Reported equity adjusted as discussed in the text, debt at book value
25-Lin: Linear depreciation with 25-year economic life uniformly applied; debt at book value
Annuity: Annuity method with 25 year economic life, 12% interest rate; debt at book value
Inflation: Lin depreciation with 25-year life adjusted for inflation as explained in the text; debt at book value.
Required return: Weighted average using market value of equity and assuming that financial capital is financed with debt as explained in section 3

As with debt the contribution of financial capital may be real or may be the result of measurement error. As noted before calculation of the cost of debt ignores the costs of financial intermediation. Hence the required return is perhaps more useful as a benchmark for the return on financial assets. The difference between the actual cost of debt (3% above estimated cost) and the actual return on financial capital (1.5% over cost) is a reasonable estimate of the cost of financial intermediation.

The remaining 1.5 % abnormal return on debt and financial assets may be consistent with various explanations. However, the fact that the relative amounts are of comparable size seems significant. It may indicate that they have a common source. This will rule out measurement error in the stock of debt and financial assets. Measurement error in the cost of debt (aside from the cost of financial intermediation), on the other hand, would affect debt and financial assets proportionally.

With respect to actual returns foreign currency gains and losses may be a likely source of measurement error as well as a possible explanation for wealth transfers to holders of (foreign currency denominated) financial claims. Table 7 demonstrates that residual

returns on debt and financial assets are not only close on average. They are highly correlated as well (correlation coefficient = 0.80) from 1986-99. Furthermore they are both highly correlated with the return on US$ (correlation coefficient between residual return on debt and return on US$ = 0.70).

Table 7
Abnormal returns on financial claims: Return on financial assets and cost of debt minus calculated required return; return on US$ (annual change versus NOK).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fin.assets	-1,5	-5,1	-2,0	0,7	-0,9	-0,2	9,7	7,5	-8,0	-2,2	4,9	11,7	5,6	6,0
Debt	-3,9	-10,8	1,2	8,1	8,3	0,8	7,1	6,7	-3,8	-0,8	5,8	13,6	5,9	6,7
US$	-2,4	-15,8	5,5	0,8	-10,7	1,0	15,9	8,7	-10,1	-6,5	1,9	13,7	9,4	13,2

Table 7 confirms foreign currency gains and losses as a likely source of abnormal returns on financial assets and liabilities. Unfortunately, this does not rule out measurement error as financial statements do not allow sufficiently precise measurements of foreign currency gains and losses.

6. Concluding remarks

At the most basic level financial performance measurement is capital budgeting (or valuation) done ex post. For a single project this is very clear; expected cash flows and terminal value are replaced by realized or re-estimated flows and values. However, even for projects some new issues arise. One such issue is return on value which measures performance relative to original expectations.

Financial performance measurement for a going concern which is the focus of this paper, is more involved. Performance is a function of beginning value, realized cash flows and terminal value. Beginning values may be market determined, derived from acquisition costs or opportunity costs at the start of the period. Similar choices must be faced with respect to terminal values. The interpretation of the performance measures differ accordingly.

Performance is measured relative to a benchmark, investors' required returns. In valuation (expected) required return is usually taken to be constant. It is hard to predict how required return changes over time. In an ex post analysis the variation is known and must be incorporated. In particular changes in tax regimes are known as well as rates of inflation. In this paper it is assumed that investors have a fixed required real rate of return after tax. Hence the nominal required return depends on *actual* rates of inflation.

The analysis in this paper focuses on the shipping industry. Investor return is one focus of the analysis. However, another objective is to uncover the return on capital invested in the business - the underlying profitability. The latter task requires an allocation of invested capital to the period in question. In other words historical cost book values are relevant. The case company – Odfjell - employs linear depreciation, but has changed estimated lives over the period. In addition to the depreciation schedule used by the company, a consistent linear method, an annuity method (interest rate = 12%), and inflation adjusted linear depreciation have been used.

Returns enjoyed by Odfjell is very close to estimated required return on equity over the 1986-97 period, about 16%. However, estimated return on invested capital is smaller, in the 10% - 12% range, depending on depreciation method. This is consistent with a Price/Book ratio that has been below one for most of the period although creeping upwards. In 1998 and 1999 equity has lost value – particularly when measured by market value. As debt holders have gained, the loss to equity investors to a certain extent represents a transfer of value to creditors.

The empirical analysis also demonstrates that value added on capital employed and operational capital is above value added on equity. In other words debt as well as financial capital earns more than required returns. In an ex ante analysis this will not happen as long as financial markets are competitive. Further analysis indicates that foreign exchange gains and losses may explain this result. Whether movements in exchange rates have actually favoured holders of financial claims in the period or estimation errors are to blame, is unclear.

References

Edwards, J., J. Kay and C. Mayer, "*The Economic Analysis of Accounting Profitability*", Clarendon Press, Oxford, 1987

Fama, E. F. and K. R. French, "The Corporate Cost of Capital and the Return on Corporate Investments", Working paper, University of Chicago, 1998

Feltham, G. A. and J. A. Ohlson, "Valuation and Clean Surplus Accounting for Operating and Financial Activities", *Contemporary Accounting Research*, spring 1995

Gjesdal, F. and T. Johnsen,, *«Kravsetting, lønnsomhetsmåling og verdivurdering»,* Cappelen Akademiske Forlag, 1999

Peasnell, K. V., «Some Formal Connections between Economic Values and Yields and Accounting Numbers», *J. of Business Finance and Accounting*, 1982

O'Hanlon, J. and K. Peasnell, "Residual Income and Value-Creation: The Missing Link"; mimeo, Lancaster University, 2001

Stewart, G., "*The Quest for Value*", Harper Business, 1991