An extensive comparison of operating-lease capitalisation approaches and their unavoidable assumptions: Are further disclosures desirable?

Empirical evidence from the Netherlands

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Abstract

Previous research of Imhoff, Lipe and Wright (1991), Beattie, Edwards and Goodacre (1998) and others has shown that the capitalisation of operating leases on the balance sheet has a major impact on the accounting ratios. This empirical study expands previous research on two issues. First, we refine the capitalisation methods that have been developed by previous researchers. Second, we expand the focus from the *relevance* criteria of operating-lease information to the completeness-criterion of decision-making usefulness as defined by the Conceptual Frameworks. The results show that in our dataset of Dutch non-financial listed companies during the period 2000-2004 only a small part did not report operating leases. Of the remaining companies, a major part (minimum 36%) did not comply with the accounting standards. The information is therefore not only incomplete, but also impractical in terms of facilitating a fair comparison with other companies. For the companies reporting operating leases, the operating leases appear to be meaningful and relevant. Also the information is essential when comparing companies. Further we conclude that the information required by the accounting standards is not complete while financial statement analysis is sensitive to assumptions with regard to discount rates, total and remaining lives. Also the different capitalisation approaches lead to significantly different capitalisation results. Based on our results we advise standard setters to require further disclosures in the notes.

Keywords: operating leases, off-balance-sheet financing, accounting ratios, capitalisation approach, disclosure.

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1 Introduction

Current accounting regulations require companies to disclose their non-cancellable, financial obligations occurring from operating leases in the footnotes of the annual report (IAS17, SFAS13, RJ292). Previous studies in the US (Imhoff *et al.* (1991)), the UK (Beattie *et al.* (1998)), Australia (Ely (1995)) and New Zealand (Bennet and Bradbury (2003)) have shown that were these obligations to be capitalised on the balance sheet, this would have a major impact on the accounting ratios derived thereof. Consequently, since accounting ratios are a major input in decision making, this might change the decisions made by the individual users of the annual accounts. This concerns the information relevance criterion of decision-usefulness as defined by the IASB (IASB (2003)).

Since previous studies have focussed on this relevance criterion of operating-lease information, we will expand our focus to the completeness criteria of decision-usefulness as defined by the IASB. This study explores the relevance and completeness criteria by analysing the operating-lease disclosures of 119 Dutch listed companies, during the period 2000-2004. Our approach has several merits. First, no such study has yet been done in the Netherlands, and this will make comparison with other international studies valuable. Second, leasing has become a major source of financing in the Netherlands. Previous research (Lückerath (2004)) has shown that the nominal disclosed operating leases for a stable group of 95 listed Dutch companies increased from approximately 7 billion Euro in 1996 to approx. 35 billion Euro in 2003. Also the Dutch accounting standards with respect to operating leases (Guideline 292) are identical to IAS17, which makes the analysis comparable with countries also reporting according to IAS17. And last but not least, descriptive evidence that the unavoidable assumptions in lease

capitalisation leads to significantly different outcomes might be useful to standard setters to require further disclosures to be provided in the footnotes. This would be a useful intermediate step for standard setters to consider, until they are able to promulgate a more comprehensive standard to eliminate the off balance sheet liabilities all together (if desirable).

The study proceeds as follows. Section two describes the purpose of operating-lease capitalisation and will extensively compare seven different approaches on the assumptions they make. Section three describes the contribution and the research questions of this study. Section four shows the results of several empirical tests in order to answer the research questions. When appropriate, these results are compared to previous international studies. Section five concludes.

2 The disclosure and capitalisation of operating leases

2.1 Purpose of capitalisation and previous evidence

Constructive capitalisation requires the estimation of the amount of debt and assets that would be reported on the balance sheet if the operating leases had been treated as capital leases from their inception (Imhoff *et al.* (1991), UBSWarburg (2001), Standard and Poor's (2001)). Comparability should thus improve for highly leased companies with companies having limited or no leases. One of the first attempts to investigate the effects of lease capitalisation on accounting ratios was Nelson (1963). Nelson suggested two purposes for investigating the effect on accounting ratios: first, to determine whether capitalisation would make these ratios more meaningful, and second, to analyse whether decision making would be improved. Nelson argued that the usefulness of many important financial ratios is limited by reporting practices. His argumentation is similar to the more recent argumentation of the opponents of the current accounting regulation with respect to leasing (for example, McGregor (1996) and Lennard and Nailor (2000)). According to Nelson, the limitations do not come from weaknesses in the

ratios, but from faulty procedures for reporting leases that are primarily financial in nature. Capitalisation is therefore meant to overcome this weakness in lease reporting, as it reflects the financial impact of leasing in the financial statements. Because capitalisation recognizes leasing for what it really is (a means of financing), the financial ratios, which are computed from statements containing capitalised lease, are meaningful. Nelson argues that operating-lease information is relevant, and that reliability improves when the operating-lease obligations are capitalised. Ashton (1985) conducted comparable research based on similar motives: namely, testing whether lease capitalisation had a significant effect on the main indicators of financial performance, and whether the decisions of the companies in the sample to voluntarily capitalise leases was dictated by the economic consequences. Ashton (1985) found that only the leverage ratios changed significantly. Imhoff *et al.* (1991) analysed 14 pairs of US companies, each pair of which consisted of a high- and low-leasing company. Their conclusion: the results suggest that constructive capitalisation of material long-term operating-lease commitments may be necessary before an accurate evaluation of financial results within or across firms and industries can be performed. Beattie *et al.* (1998) found in their analysis of 232 UK companies that capitalisation had a major impact on the profit margin, return on assets, asset turnover and three leverage ratios. Bennet and Bradbury (2003) found evidence that the capitalisation of operating leases not only negatively impacts leverage ratios, but also decreases liquidity and profitability for the 38 companies in their sample.

Lennard and Nailor (2000) argue that constructive operating-lease capitalisation by investment analysts and other users (such as credit-rating agencies) appears to be commonplace, suggesting that the present accounting treatment of operating leases is not the most relevant of the choices available. If operating-lease capitalisation is warranted for financial analysis, then capitalisation by financial statement preparers should be preferred to constructive capitalisation by financial statement users; after all, only users can estimate (with limited accuracy)

information held by preparers in calculating the balance-sheet effects and profit- and loss effects of operating leases. Due to the inevitable assumptions users have to make, Lennard and Nailor therefore doubt the completeness of the disclosed operating-lease information.

Users of financial statements should be able to compare the financial statements of an enterprise through time and with different enterprises in order to evaluate their relative position, performance, and changes therein. The measurement and display of the financial effects of transactions and events must therefore be carried out in a consistent way, over time, throughout an enterprise, and in a consistent way for different companies. The disclosed operating-lease information should be consistent, which would make the information between companies comparable. Previous studies (Kamp (2001), Wilkins and Zimmer (1983), Abdel-Khalik (1981)) have proved that it is still not commonplace for users to make adjustments to the annual accounts for off-balance lease obligations. Also empirical studies investigating the determinants of operating leasing choice often rely on rules of thumb to measure the relative usage of operating leases (see for example, El-Gazzar, Lilien and Pastena (1986) and Duke, Franz, Hunt and Toy (2002)). Duke et al. argue that although a present value calculation would be the best measure to calculate the leases intensity, they found this 'problematic'. Therefore they choose to only take into account the nominal lease commitments due in the next five years.

Different capitalisation procedures might lead to divergent outcomes, also caused by the unavoidable assumptions a user has to make to capitalise the leases, this would also pose a threat to the comparability and completeness criterion of decisions usefulness.

2.2 Theoretical value of operating leases

The theoretical value of a (operating) lease has been discussed extensively in finance literature by authors discussing the lease-or-buy/borrow decision at inception of the lease (see Myers, Dill and Bautista (1976), Franks and Hodges (1978), Ang and Peterson (1984), Lewellen and Emery (1980), Trigeorgis (1996) and others).

Myers, Dill and Bautista (1976) initiated the discussion on the valuation and they presented a lease valuation formula. This formula has since been clarified and extended by several authors but in essence has stayed the same. Myers et al. (1976) define the value of lease contracts as the advantage of leasing versus debt financing. In theory, a lessee decides to lease at t=0, when the present value of a lease compared to normal debt financing is positive. Myers et al. therefore calculate the present value of a lease by considering all changes in cash flows due to the decision to lease. Although many agree with the basics of this equation, some argue that the equation is not complete. For example, Trigeorgis (1996) added to the equation the valuation of the incorporated options in the lease that can be valued using theoretical option valuation models. Here we concentrate on the Myers et al. equation, while it will relate closely to the hereafter described capitalisation approaches. Myers et al. calculate the value of the lease at inception by deducting from the initial investment, a) the present value of the lease payments, b)the tax disadvantage of no depreciation and adding c) the after tax interest advantage of no debt. The Myers et al.-equation takes the following form:

$$V_0 = \mathrm{I} - \underbrace{\sum_{t=1}^{TL} \frac{\mathrm{CF}_t.(1-\mathrm{T})}{(1+i)^t}}_{(a)} - \underbrace{\sum_{t=1}^{TL} \frac{\mathrm{depr}_t.\mathrm{T}}{(1+i)^t}}_{(b)} + \underbrace{\sum_{t=1}^{TL} \frac{i.\mathrm{T}.\mathrm{D}_{t-1}}{(1+i)^t}}_{(c)} \qquad (1)$$

whereas,

V_0 = the value of the lease at inception,

TL = the total term of the lease, which is most or all of the asset's economic life,

I = the orginal investment in the leased asset,

CF_t = the lease payment during year t,

T = the marginal corporate income tax rate,

i = the firm's marginal borrowing rate,

$depr_t$ = the depreciation in year t,

D_{t-1} = the debt displaced by the asset leased.

The value of the lease at inception (V_0) is the difference between the present value of the financial advantages and disadvantages of the lease as compared to normal debt.

Unfortunately external users of the annual report cannot use the theoretical Myers et al. equation for the capitalisation of operating lease commitments; the information necessary to calculate the theoretical value of the operating lease commitments is not available in the annual report. Table 1 shows the connection between the finance perspective and the accounting treatment using the elements of the Myers-equation. The theoretical capitalisation value of operating leases is a useful handle to become aware of which information or variables are needed to calculate the value of an operating lease. The required information might be available internally in the company, for external users this information is not available. Table 1 shows the necessary information for the theoretical capitalisation of an operating lease during the lease period and the available information according to IAS17.

<< Insert Table 1 here>>

The different capitalisation approaches differ in the assumptions made on the required variables and subsequently they differ in the refinements of the approach. The next sections therefore build upon the information required and the assumptions made. This structure will enhance the comparability of the approaches and will show where the approaches agree and where they do not.

2.3 Capitalisation approaches

In this section seven different capitalisation approaches are introduced. The seven approaches can be divided into two major distinctions: first the multiple methods (see Moody's Investor Service (1999), UBSWarburg (2001), Ely (1995), Unilever Annual Report (2002, p.129) and

second, the present value methods (see Imhoff et al. (1991), Imhoff, Lipe and Wright (1997), Beattie *et al.* (1998) and Ely (1995).

Multiple methods

The multiple methods calculate the capitalised value of an operating lease by multiplying a company's next year lease obligation with a fixed multiple. The multiple methods can be classified as simple methods or as 'rules of thumb' methods. The major distinction between the multiple methods and the in next section described present value methods is the usage of the next year's lease payment to determine the lease liability instead of all future lease payments. The multiple method can also be divided in two different approaches. First the multiple methods using a constant (for example 6- or 8-times-rent) and second, the multiple methods using a formula (UBSWarburg (2001) and Ely (1995)). The multiple methods using a constant may be a simple method; professionals also use it in practice as proved by the 2003 annual report of Unilever. In the 2003 annual report of Unilever (page 129) net debt is adjusted for lease obligations by adding five times the lease-expenses to (non-adjusted) net debt. Multiple methods using a formula (UBS Warburg (2001) and Ely (1995)) do incorporate different interest rates and operating lease terms, as opposed to the multiple methods using a constant.

Present Value Methods

The present value methods calculate the capitalised value of an operating lease by discounting all future lease obligations. The present value methods are most in line with the theoretical model of Myers et al. (1976) as described in the previous section. In this section the three different capitalisation approaches of Imhoff, Lipe and Wright (1991, 1997), Ely (1995) and Beattie et al. (1998) will be described.

Imhoff, Lipe and Wright (1991) were the first to develop a method for capitalising operating lease obligations based on present values. After their study several other studies presented an

alternative for this approach, including Imhoff, Lipe and Wright themselves in 1997, when they estimated the impact on income. The method of Imhoff, Lipe and Wright is most used in practice, by for example Standard and Poor's (2001), Moody's Investor Services (1999) and White, Sondhi and Fried (2003). Beattie et al. (1998) built upon the procedure as developed by Imhoff et al. and therefore start the description of their procedure with the assumptions of Imhoff et al.. Beattie et al.[1] use a very similar approach but their major contribution is the differentiation between the remaining and total life of the lease portfolio using the weights of each lease expiry category. Furthermore, they differentiate between two assets categories (*land and buildings* and *other*) because they have different maturities. Ely (1995) investigated whether investors view operating leases as property rights. According to Ely the user's perspective toward a lease is instrumental in determining its accounting treatment (balance sheet recognition or footnote disclosure). The main goal of Ely's study was not to investigate the impact on accounting ratios but to link the operating leases to equity risk. However, therefore she only adjusts the debt-equity ratio in her research. Ely is of the opinion (page 403) that the present value collapses to the first minimum lease payments multiplied by a constant (the multiple method). She adds between brackets that this is true when leases are entered into regularly and when the payment per lease is constant. In her research she therefore assumes that a firm enters into new leases every year and that the value of these leases is always the same.

The approach developed in this study is based on the approach of Imhoff et al. (1991) and the contribution of Beattie et al. (1998) thereon. However, we use the weights of the three different lease expiry categories to a greater extent than Beattie et al. do. In our study the (average) remaining life and total life are adjusted using the payment pattern within the lease portfolio.

[1] However, the data of Beattie et al. is substantially different than in the other described methods while they analyse UK companies disclosing according to UK SSAP21. Under SSAP 21 companies disclose only next year' operating lease payment split in three expiry periods.

Although this has no consequence for the capitalised lease liability (PVOL), it affects all other values derived thereof (for example capitalised lease asset (PVA) and net income)

2.4 Assumptions

In this section we will describe the different underlying assumptions of each method and the subsequent difference in capitalisation results. These methods will now be analysed and compared on the following items:

Implicit interest rate	(i)	2.4.1
Remaining Life and Total Life	(RL and TL)	2.4.2
Division of future leasepayments	(CFe and CFt)	2.4.3
Capitalised lease liability	(PVOL)	2.4.4
Capitalised lease asset and asset proportion	(PVA and AP)	2.4.5
Impact on other accounting items		2.4.6

Section 2.5 shows the impact of these assumptions and calculations using the 2004 KPN annual report.

2.4.1 Implicit interest rate (i)

The major purpose of the capitalisation-approaches is to distract the interest component from the disclosed operating lease commitments. The capitalised amount should be a fair indication of what should have been the amount on the balance sheet if the operating leases would have been capitalised. Each lease will have its own implicit interest rate. The implicit interest rate should be the most accurate discount rate (Moody's Investor Services (1999), White et al. (2003)) however this rate is not readily available and therefore the user needs to choose an alternative. Table 2 show the differences in assumptions on the applicable interest rates.

<<Insert Table 2 here>>

The multiple methods using a constant do not take the interest rate into account. For the multiple methods using a formula the interest rate is relevant while the implicit interest rate together with respectively the remaining (UBSWarburg) or total life (Ely) of the lease define the multiple. The formulas to calculate the multiples is described in Table 6 in section 2.4.4.

UBSWarburg and Ely argue that the estimated current borrowing rate of the company should be used to calculate the multiple. However Ely uses a fixed interest for all companies of 10%.

Accidentally the three researchers using present value approaches used an interest rate of 10% to calculate these present values. This was accidentally while all three use different arguments. Imhoff et al. found for its example (MacDonald's) a historic rate of nine percent, they used 10% to produce a conservative measure that avoids overstating the liability. Also Beattie et al. use an interest rate of 10% in their study. They selected a short-term borrowing rate, the three-month London deposit rate, as a suitable discount rate for the whole sample. Beattie et al. therefore do not use individual company's interest rates. Ely uses a 10% interest rate, while she assumes that a lease term of 25 years is representative for her sample of 212 firms and the long-term debt footnotes suggest that an interest rate of 10% is also representative.

We agree that ideally each lease should be capitalised using the implicit interest rate in each contract, or if not available the alternative cost of debt. Consequently, for the lease portfolio as a whole is should be the alternative cost of debt of the company.

2.4.2 Remaining life and total life (RL and TL)

<<Insert Table 3 here>>

Table 3 shows the different assumptions on remaining and total life of the lease portfolio. In the 8-times-rent method the remaining life and total life of the operating lease are not required to calculate the capitalised operating lease liability. The formulas of UBSWarburg and Ely use respectively the remaining life or the total life. The remaining life (RL) suggested by UBSWarburg is ideally a weighted average using annual lease payments. The weighted average remaining life of the total lease portfolio can be based on the division of future lease payments in the lease portfolio (see next section 2.4.3). A multiple calculated in this way does take into account the future lease-obligations. Table 3 shows how this weighted average is calculated.

The formula of Ely is based on the assumption that the operating leases in the portfolio of a company have all different remaining lives equally divided over the total (assumed) lease term. Ely ignores future lease payments and assumes yearly lease payments to be constant. Ely uses a fixed total life of 25-years.

In 1991 Imhoff et al. assume that the useful life of the leased assets (equipment, offices and vehicles) is 30 years. Furthermore they assume a remaining life of 15 years (50% of the lease maturity has expired). Although not described in depth, Imhoff et al. suggested a procedure where the fifth future year's minimum lease payment together with the lump sum payment of the third lease expiry category (expiring beyond year 5) is used to approximate how many years the payment would continue after year five (see formula in Table 3.)

In 1997 Imhoff et al. (p. 17) argue that the duration of future cash flows is somewhat more ambiguous than the interest rate assumption. This is even more troublesome while the lease portfolio often consists of two categories: land and buildings, and other (such as machinery and equipment). Both asset types have significant different economic lives. This was one of the major objections Beattie et al. (1998) had against the Imhoff et al. approach. They analysed the pattern of operating lease commitments and concluded that uniform total and remaining lease lives (as used by Imhoff et al.) are unable to capture the diversity of lease durations. To overcome this shortcoming Beattie et al. investigated the diversity between lease duration of assets, related to their asset category. By comparing the US and the UK disclosures of 13 companies they were able to collect additional information by combining next year's annual lease payments (UK disclosure) and the total minimum future lease payments (US disclosure). This resulted in a base estimation of different remaining lease lives and total lease lives for the two-asset categories and the three leases expiry dates. Table 4 shows these base estimations.

<<Insert Table 4 here>>

Table 4 was used in their sample of 232 UK companies to calculate the weighted average remaining and total lives for each separate company. The formula used for the weights (w_e) of each lease expiry category (*e*) is shown in Table 3. The weight for each lease expiry category is subsequently used to calculate the weighted average remaining (RL_i) and total lives (TL_i) of the lease portfolio. The weighted remaining life used by Beattie et al. refines the depreciation charge incorporated in the annual lease payment, while from the assumptions of Beattie et al. it can be derived that depreciation should be calculated using the average remaining life.

We agree with Beattie et al. that the maturity pattern of the future lease obligations should be taken into account when calculating the remaining and total life of the lease portfolio. However we differ in the calculation of the weighted remaining life. Our approach calculates the weighted remaining life of the whole lease portfolio as follows. The weight of each lease expiry category is calculated by dividing the commitment of that particular expiry category by the total commitment. This results in three weights, w_1, w_2, and w_3. We use these weights to calculate the weighted average remaining life, by multiplying each weight with the remaining life of each corresponding lease expiry category. The remaining life of the first lease expiry category is one year and for the second we use an average of three years (which agrees with Beattie et al. base estimated). The remaining life of the third lease expiry category is more complex. We choose an approach comparable with that of Imhoff et al. This differentiates between companies with different payment schedules, instead of using the fixed base estimates of Beattie et al. for this lease expiry category. The calculation of w_e and RL is shown in Table 3. The total life is assumed to be twice the weighted remaining life (see Imhoff et al.). While this is an unfounded assumption, we will test whether the capitalisation results are sensitive to this assumption.

2.4.3 Division of lease payments over years (CFe and CFt)

Table 5 shows the assumptions on the division of the lease obligations over the years.

<<Insert Table 5 here>>

The division of lease payments over future calendar years is not relevant for the multiple methods using a constant while only next year's annual lease payment is required. The lease commitments for the first lease expiry category ($CF_{e=1}$, leases expiring within one year) are equal to the lease commitments of that year (CF_1). The commitments for the years after t=1 are ignored. UBSWarburg assume in three different papers an equal payment during the remaining life of the lease, which they assume is known (UBSWarburg (2001; (2002; (2003). For the calculation of the multiple of Ely, no division of lease payments over future years is necessary.

Also Imhoff et al. assume equal lease payments after year 5. Therefore the latter part of the remaining-life formula is used to calculate the minimum lease payments for the years 6 till the end of the remaining life. This is shown in Table 5.

As Beattie et al. analysed UK-companies with SSAP 21 disclosure, they use the next year's operating lease commitments and divide these into the three expiry categories by using the remaining lives derived from the US-disclosure. This result in three different annuities (for each lease expiry category) with each a different base remaining life (see Table 4). For example for lease expiry category 3, leases expiring after year five, Beattie et al. assume a remaining life of 16 years for the category: 'land and building' and 7 years for the category: 'other'. However this analysis is based on annuities payments derived form next year's operating lease commitments. This is therefore not applicable to companies disclosing according to IAS 17. From the article of Beattie et al. it appears that they use the equal division of lease payments as described by Imhoff et al. also for the US data-set.

Ely assumes a continue process of lease commitments over the total life of the lease portfolio. She assumes a pattern of decreasing lease payments. The minimum lease payments after year 5 for year t (thus t>5) are calculated as shown in Table 5. This equation results in a decreasing pattern of lease commitments as opposed to the equal division of lease payments as used by Imhoff et al. and Beattie et al. In our study we also use the equal division of lease payments as calculated by Imhoff et al.

2.4.4 Capitalised Lease liability (PVOL)

<<Insert Table 6 here>>

The multiple methods multiply the annual lease payment, the next year's lease obligation, with a multiple. This multiple is either a constant (8-rent) or calculated by a formula (see Table 6).

The present value methods all calculate the capitalised lease liability (PVOL) by discounting the future obligations. The differences mainly occur from the assumptions made on the implicit interest rate, the remaining and total life and the division of lease payments. Furthermore a difference arises from the different way of disclosure between the FAS13 (Imhoff et al. and Ely) and SSAP21 (Beattie et al.). For FAS13 (and IAS17 or RJ292) the lease commitments can be discounted using a present value formula for different cash flows on different timings. Under SSAP 21 the disclosed lease obligations can be split into three annuities (for each lease expiry period) with three different remaining lives, for which the present value can be calculated using the present value formula for annuities. All PVOL calculations come down to the same principles, the only differences lies within the input (see Table 6). To calculate PVOL Ely uses the same formula, the difference arises from the calculations of cash flows after year five (see above). Also, Ely assumes that the company enter into new leases every year and that the value of these leases is always the same, $PVOL_{t=0}$. In our study we also use the present value formula to calculate PVOL. While Imhoff et al. , Beattie et al. and this study do not differ

in the division of the lease payments after year 5 and not in the total remaining life (we do differ in the *weighted* remaining life), PVOL will be the same for all three methods.

2.4.5 Capitalised lease asset and asset proportion (PVA and AP)

When PVOL has been calculated this will be capitalised on the balance sheet as a long-term liability and some accounting ratios will be adjusted accordingly. However, attached to the liability of the lease, the leased asset should also be capitalised on the asset-side of the balance sheet. This capitalised leased asset (PVA) does not get as much attention as the capitalised lease liability (PVOL). Some of the methods even do not mention the adjustment of the leases asset on the balance sheet and it may be assumed that the capitalised leased asset is equal to the capitalised leased liability. Table 7 shows the differences in methodology.

<<Insert Table 7 here >>

Neither of the multiple methods describes how the leased asset should be capitalised. In that case, the capitalised lease asset (PVA) is assumed to be equal to the capitalised lease liability.

Imhoff et al. do not limit their study to the effects on the liability side of the balance sheet when capitalising operating leases, but also the effects on the asset-side of the balance sheet. They estimated the associated unrecorded asset (PVA), in order to fully address the overall balance sheet effects of constructive capitalisation. The unrecorded asset measurement depends on the scheduled lease commitments, the interest rate and the remaining life of the lease. Therefore, three new assumptions were introduced. First, the assumed depreciation method for the leased assets is the straight-line depreciation method. Second, it is assumed that at the inception of the leases both the unrecorded asset as the unrecorded liability equal 100 percent of the present value of the future lease-payment. Third, at the end of the lease-period both the unrecorded asset as the unrecorded liability is zero. These assumptions are comparable with normal (100%) debt financing based on annuities and a related asset that is depreciated in straight line. Within the first annuity of the loan the repayment part is smaller than the first depreciation of the asset,

while interest takes a bigger part in the annuity. However at the end of the loan and the life of the asset, the loan is fully repaid and the asset is fully depreciated. This relation is shown in Figure 1.

<<<Insert Figure 1>>>

The difference between the capitalised operating lease liability (PVOL) and the capitalised operating lease asset (PVA) can be calculated using the asset proportion (AP). The AP defines the relation between PVA and PVOL. Although Imhoff et al. use in their study a fixed AP of 70% in 1991 and 75% in 1997, it is a function of interest rate and the remaining and total life.

Beattie et al.'s purpose of refinement of the Imhoff et al.-approach was to take the company specific duration of the lease portfolio into account. Therefore, although they use the same formulas as Imhoff et al. to calculate the asset proportion, the difference arises from the usage of the *weighted* remaining and total life (see section 2.4.2). Also Ely describes that the asset proportion is a function of PVOL. In the appendix she describes the calculation of the asset proportion. However as described before, Ely uses some specific assumptions (interest is 10%, total life is 25 year and entry into new lease every year), and therefore the asset proportion can fixed at 72.5%. The formula of Ely is however sensitive to these assumptions and will lead to an AP of more then 100% when the interest rate is high and total life is low.

In this study we use the same formula as Imhoff et al. and Beattie et al. but also using the weighted remaining life and total life. While our assumptions regarding the weighted remaining and total life differ from Beattie et al., we differ consequently in the AP and in PVA

2.4.6 Impact on other accounting variables

The differences between the methods of the capitalised lease liability and lease asset, PVOL and PVA, results in an impact on other accounting variables. The impact on equity and net income is addressed in this section and summarised in Table 8.

<<Insert Table 8 here>>

While PVOL always exceeds PVA, this will negatively impact equity. However, due to the existence of taxes some part of the difference between the PVOL and PVA will have also an impact on the deferred tax liability on the balance sheet. In the calculation of the debt-equity ratio, Ely only adjust debt and not equity. However while Ely does assume PVA is not equal to PVOL, equity will be affected.

The reasoning behind Figure 1, the difference between repayment and depreciation, is also causing an effect on net income. The annual lease payments of operating leases are fully deductible from pre-tax income, whereas for capitalised lease obligations the interest and depreciation can be deducted. UBSWarburg, Imhoff et al., Beattie et al. and our study adjust net income because of these differences. The net income effect is calculated by adding to net income the tax impact of rent expense and deducting the tax impact of depreciation and interest expense. The differences between the four abovementioned methods come from the difference in the value of the leases asset (PVA) and in the remaining life used to depreciate the leased asset. In this study we depreciate the PVA by using the weights of each lease expiry category. The weighted remaining life as used by Beattie refines the depreciation charge incorporated in the annual lease payment. Imhoff et al. fully ignore the expiring pattern of the lease portfolio, and depreciate the assets in a straight line over the total remaining life. Beattie et al. depreciate the asset in a straight line over the weighted remaining life. This is an improvement of the Imhoff method. However, the disadvantage of using a weighted average remaining life is that the assets will be fully depreciated before the total remaining life has ended. This study depreciates the leased assets using the weights of the different lease-expiry categories. This seems to follow more accurately the remaining lives of all assets in the lease portfolio. Net income in this study will therefore be adjusted as shown in Table 8.

The differences between Imhoff et al., Beattie et al. and this study come from the depreciation part of the leases asset (PVA). The method of Imhoff *et al.* 1991 depreciates the leased assets over a straight line until the end of the remaining life, resulting in a correct assessment of depreciation duration. The method, however, either over- or underestimates the real expiry of the leases and the related assets. Beattie *et al*. (1998) do make an adjustment that weights the duration of the lease and the related asset, but the asset is (linear) depreciated before the remaining life has actually ended. The depreciation in this study depreciates the asset over the remaining life of the assets, but does take into consideration the real expiry pattern of the lease and the related asset. It is important to realise that the capitalisation of the lease commitments concerns several assets in one lease portfolio. If only one asset was under consideration, it could be linearly depreciated. In the annual report however, information is available only for the entire lease portfolio. By weighting the depreciation with the expiry pattern of all leases in the portfolio, we follow the duration of the lease liabilities.

Ely does not make an adjustment to net income but only the earnings before interest and tax (EBIT). Although Ely assumes the PVA not equal to PVOL, she does not differentiate between repayment and depreciation. Therefore net income does not change in Ely's study. Ely does adjust earnings-before-interest (EBIT) by adding the interest part of the lease rental.

2.5 Illustrative example of difference in lease capitalisation approaches

The 2004 annual report of Royal Dutch KPN ("KPN") serves as real example for lease capitalisation. This example has been chosen for two reasons. First, KPN discloses nothing more and nothing less than the minimum required by RJ 292 and/or IAS 17. The operating lease obligations are disclosed for each of the three lease expiry categories $e_{1,}$, e_2 and e_3, expiring within one year, between one and five years, and beyond five years. Second, KPN has total nominal operating leases obligations of 2,224 million Euros, that is in nominal terms 10% of their total assets (21,519 million Euro). This is a relative high lease propensity, but not

exceptional for Dutch listed companies. The financial situation of KPN is given in Table 9 as it will be used as input for the comparison of the capitalisation approaches. Table 9 also shows the disclosed operating lease information and the thereof calculated weight per lease expiry category.

<<<Insert Table 9>>>

From Table 9 it can be seen that the calculated weights for each lease expiry category are respectively 0.15, 0.42 and 0.55. This means that 15% of the lease liability (PVOL) expires next year. We are therefore of the opinion that also 15% of the lease asset (PVA) should be depreciated next year. Both Imhoff et al. as Beattie et al. depreciate in a straight line (using respectively the total remaining life and the weighted remaining life). The differences this causes in the deprecation charge of the leased assets is shown in Table 10. Furthermore, Table 10 shows the differences in capitalisation for all seven approaches. Also the subsequent change in five accounting ratios are shown for illustrative purposes.

<<<Insert Table 10 here>>>

Whether these differences are statistically significant will be tested in the next section which section will present the empirical results.

3 Research questions and research design

3.1 Contribution of this study

Previous research on the capitalisation of operating leases concentrated on the impact on accounting ratios. Accounting ratios are indeed an important input in the analysis of corporate performance. When the impact of capitalisation on accounting ratios is significant, the information on operating leases becomes relevant in decision-making, and is therefore classified as useful. However the capitalisation is subject to the method used and the assumptions made. This study expands on previous studies on the two topics described above (capitalisation method of operating leases, and the usefulness of information). The paper first refined (in section 2.3 and 2.4) the capitalisation approach as developed by Imhoff *et al.*

(1991,1997) and Beattie *et al.* (1998). Second, the paper extends the focus on the impact on the accounting ratio (relevance) to whether the information disclosed is sufficiently complete.

The following research questions are therefore the subject of this study:

RQ1 Do firms that have operating lease comply with the required footnote disclosure rules?

RQ2 Are the amounts meaningful?

RQ3 Are key financial ratios affected?

RQ4 Is the required information sufficient to permit informed users to estimate the consequences of operating leases?

3.2 Sample and Research method

Companies

The sample consists of all non-financial listed companies at the Amsterdam Stock Exchange during the period 2000-2004. The financial institutions are excluded because they often act both as lessee and lessor, while leasing is a financial product. Nine firms were eliminated due to lack of data and five due to the reporting year ending being not equal to December 31st and this has consequences for the data collecting and analysis. The final sample consists of 584 firm year observations.

Accounting ratios

The study investigates the impact on several accounting ratios once the capitalisation of the operating-lease commitments has been carried out. Table 11 shows the different ratios analysed in this study, and the impact of the lease capitalisation on each particular ratio. The choice for these ratios follows from the previous studies on the impact of operating-lease capitalisation on facilitating comparison.

<<Insert Table 11 here >>

Lease data

The operating-lease data were manually extracted from the 2000-2004 annual reports of the companies in the sample.

Interest rate

Due to the fact that an individual interest rate for each company was not available (and also appeared to be unreliable), we chose as an alternative to compute the cost of borrowing the capitalisation using a fixed 6% interest rate for all companies. This six percent was derived from the 98 companies of the 2003-sample that disclosed an interest rate in some way. The average interest rate in 2003 of the 98 companies available was 5.8% (median: 5.6%). To be on the safe side (prudence), we rounded this off to 6%, which is also a reasonable estimate of the long-term debt rate in the Netherlands. We therefore used a fixed interest rate of 6% for all methods, and tested the sensitivity to this assumption by varying the interest rate by +/- 2%.

Statistical tests

To test whether the lease commitments are meaningful, we investigated the impact on accounting ratios. The comparison of accounting ratios before and after capitalisation can be conducted using two measures: either the arithmetic mean or the median. The mean is affected by extreme values, whereas the median is not (it takes into account only the rank order of the observations). Although both tests have been used in previous studies to determine how lease capitalisation impacts accounting ratios, this study chose to use both the mean- and median-test. The mean-test makes some demands on the statistical properties of the data, such as equal intervals, normal distribution and homogeneity of variances. Accounting data often do not have a normal distribution (Barnes (1987)), and this was also the case for our dataset. This requirement may be relaxed for large datasets (i.e. more than 30-40 observations). In addition to the t-test, we also conducted the non-parametric statistical test of differences (Wilcoxon-test based on medians). The t-test remains interesting, due to the size of the dataset, and due to the fact that most previous research focused on the differences in mean values.

4 Results

The operating-lease disclosures of the entire sample were gathered from the annual reports. It immediately became clear that the disclosure of operating leases would be impossible to enter into one basic format in a database: we came across at least eight different formats of lease disclosures. Table 12 shows these eight different formats, together with an example of a company using this format in 2003.

<< Insert Table 12 here>>

The format disclosing the most information is displayed on top, and each next format discloses less information than the preceding format. For example, the most informative format of operating-lease disclosure is the requirement according to FAS13 (type 1), which requires companies to disclose operating-lease commitments separately for each of the next five years and cumulatively for subsequent years. The requirements of IAS17 (format 3) are less informative, while under IAS17 the commitments of years two through five are summed. Some companies disclose less than is required under FAS13, but disclose more than they would under IAS 17, and this disclosure format (format 2) is therefore placed in-between these two disclosure types. Formats 4–8 are not in line with the requirements of IAS17. Although format 4 discloses the present value of the lease commitments, and PVOL no longer has to be calculated; this format is not allowed under IAS17.

Table 13 shows whether the total sample of 584 observations comply with the IAS17 requirements during the research period. Of the 95 companies in 2000 that disclose operating leases, 56 companies (59%) do not disclose according to the requirements of IAS17. In the years 2001 till 2003 this number drops, but in 2004 this is still 37 (36%) companies out of 102. For these companies, no capitalisation of the commitments can be performed while the necessary information is unavailable.

<< Insert Table 13 here>>

Our conclusion: that for more than one third of the companies in the period 2000-2004, the disclosed operating-lease information, as a consequence of being not complete, is neither reliable nor comparable. Moreover, the analysis of whether the operating leases of these companies are meaningful remains inconclusive.

Capitalisation results

Since not all companies disclose as required by IAS17, it is not possible to capitalise the operating-lease commitments for these companies using the present value approaches. Only for the remaining companies, therefore, we calculated the present value of the lease commitments. Table 14 shows the mean and median values of PVOL and PVA, both divided by Total Asset to control for size differences. Also the impact (percentage change) on Total Debt, Long-term Debt, Total Assets and Net Income is also reported. The values in Table 14 are reported for each capitalisation approach.

<< Insert Table 14 here>>

Focusing on the results of this study, Table 14 shows that the capitalisation of the operating leases has a major impact on especially long-term and total debt. For the medians, the long-term and total debt for more than 50% of the companies increases by 18.1% and 15.6%, respectively. The mean values show far greater increases, but these are influenced by several outliers.

When we compare the results with the outcomes of the six alternative capitalisation approaches, we see that the 8-rent method shows the highest capitalisation values. Differences between the results of this study and those of Imhoff et al, and Beattie et al., occur with the calculation of the leased asset and the impact on net income. This is a consequence of the differences in remaining life and the depreciation of the leased asset. Imhoff et al's method results in the highest difference between the repayment and depreciation part of the lease.

The main conclusion: as a consequence of current accounting regulations a substantial part of the companies' commitments is not recognised on the balance sheet. This will probably strongly affect the accounting ratios derived thereof. The impact on the accounting ratios will however differ when different capitalisation approaches are used.

Table 15 shows the accounting ratios analysed in this study. For each ratio, the mean and median are shown before ('pre') and after capitalisation ('post'). The absolute difference and the percentage change of the mean and median are also reported. The table also indicates whether the difference between the mean and median before and after capitalisation is significant.

<< Insert Table 15 here >>

With the mean-test, six out of eleven accounting ratios appear to be significantly affected by the capitalisation of the operating leases. Based on the median-test, all accounting ratios change significantly after capitalisation. The mean-test indicates that the operating-lease information is meaningful information, since the accounting ratios change significantly. Use of the median-test allows us to conclude that the information disclosed on operating leases should be taken into account when comparing companies, since the ranking of the companies' changes significantly after capitalisation.

Table 16 compares the present study with the outcomes of previous studies on lease capitalisation. Unfortunately, not every study used the same methodology. Imhoff, Lipe and Wright (1995) focussed on the median, instead of means, because of the impact of extreme observations. Ely (1995) analysed the sensitivities to certain assumptions by using both the Pearson and Spearman correlations, but did not perform a differences-analysis. Beattie *et al.* (1998) focus on the differences in mean between the pre- and post-capitalisation ratios, and

they report only the results of the paired t-test. They do acknowledge, however, the non-normal distribution of many ratios (see footnote on p.245), and mention that the Wilcoxon non-parametric test produced results of greater significance. Goodacre (2001) conducted a similar study based on the Beattie study, and focussed on the differences in medians and the significance according to the Wilcoxon-test instead of the paired t-test. Bennet and Bradbury (2003) report only descriptive values of mean and median, and do not perform a statistical test of significance in differences.

<<Insert Table 16here >>

Our study, which is most in line with Goodacre (2001) study while he reports both mean and median tests, shows similar results with the Goodacre-study.

Sensitivity

We finally tested whether compliance with the requirements is sufficient to satisfy the completeness criterion. We tested whether the capitalisation of the operating leases is sensitive to the capitalisation approach used and whether the results are sensitive to the assumptions of Interest Rate, Total Life and Remaining life which are not disclosed in the annual report. All sensitivities are calculated by comparing the results of this study (Table 14) with the results of the different approaches and the results after changing the assumptions on interest rate and the maturity of the lease-portfolio. Comparable with Table 14, Table 17 shows the median and mean of PVOL/TA and PVA/TA, and displays the results of the variations in i) interest rate, ii) the relation total life as opposed to remaining life and iii) calculation of the remaining life. First, the interest rate used in the foregoing analyses of 6% was varied by +/- 2% (i.e. 4% and 8%). Second, the base model uses a relation between total life and remaining life as TL= 2*RL, meaning the lease portfolio is 50% expired and 50% still outstanding. This assumption is varied by using a relation of a) TL= 1.33 * RL (meaning 25% of the lease has expired, 75% still outstanding) and b) TL=3 * RL (meaning 67% of the lease has expired, 33% still outstanding).

Third, the remaining lives of the lease portfolio of each individual company were varied by +/- 2 years (remaining lives). The results are reported in Panel A of Table 17.

Panel B shows the sensitivity of PVOL/TA and PVA/TA using seven different capitalisation approaches. The results of each capitalisation approach is compared with the six other capitalisation approaches. Panel B shows t-values (comparison of means) and z-values (comparison of medians) of the differences between the methods.

<<Insert Table 17 here>>

The outcome of the sensitivity analysis: it does indeed matter which discount rate is used, how the remaining and total lives are estimated, and which capitalisation method is used. The information that is disclosed on operating leases is therefore not sufficiently complete.

5 Conclusion

This article investigated whether the information disclosed on operating leases -complies with the accounting requirements, -whether the information is meaningful, -if key accounting ratios are significantly affected and -if the disclosed information is sufficiently complete. Section two described why an on-balance-sheet equivalent of operating leases must be calculated in order to facilitate a fair comparison of companies and their accounting ratios. Section two also ameliorates, to our opinion, previous capitalisation approaches. Section three described the research method. Eleven accounting ratios were chosen and the capitalisation of the operating leases was conducted for the dataset of 584 firm-year observations during the period 2000-2004. The results are described in section four. In the period 2000 till 2004 more than one third of the companies with operating leases did not comply with the IAS17 requirements. The reliability is therefore at stake for these 37 companies, since for these companies the information is incomplete, and no fair estimation of an on-balance-sheet equivalent of the lease commitments can be calculated. The incompleteness of the information provided by these

companies also hinders fair comparison with other companies, and we cannot conclude whether their commitments would be relevant.

Our study tested whether the information disclosed is meaningful by testing the impact on accounting ratios. Based on the t-test of differences in means, the study concludes that particularly the leverage ratios are significantly affected by the capitalisation of operating leases. The profitability measures seem to be affected less, and are not significant. The Wilcoxon-test of differences in medians reveals that all accounting ratios have a significant impact on the ranking of the companies before and after capitalisation. The results indicate that companies cannot be compared with each other when the operating leases are ignored— which is, of course, especially unfair to the non-leasing companies. All tests indicate that when operating leases are not capitalised the comparability between companies, and the relevance of the accounting ratios, are at stake.

Finally, the study tested the sensitivity of the results to the assumptions on interest rate, and total and remaining life to determine whether the incomplete information in the annual report is of any importance when capitalising operating leases. Also the impact of the chosen capitalisation method was investigated. All of these aspects change the capitalised value of the lease liability and the leased asset, and this will have a significant impact on the changes in debt, total assets, equity and net income.

The above results allow us to conclude that the disclosed operating-lease commitments are to a great extent incomplete, although they are often of a material amount and appear to be relevant. This results in misleading comparisons between companies— both when leases are not capitalised for all companies, and when they are capitalised but using different assumptions or different capitalisation methods. Supervision requirements, with which the current lease

regulations must comply, together with an extension of the regulation with the obligation to disclose the alternative cost of borrowing and the remaining life of the lease portfolio, could improve the decision usefulness of the information on operating leases. Also the (voluntary) inclusion in the notes of the present value of the lease commitments, or alternatively, disclosure of discount rates and the remaining and total lives, would solve at least several of the above-mentioned issues.

Imhoff *et al.* (1995) suggest in the conclusion to their paper that companies whose off-balance-sheet lease obligations are severely overstated by the 8-rent method may wish to disclose the actual present value of these obligations voluntarily. We agree with this conclusion but not only because of the shortcomings of the 8-rent method but because all methods and assumptions differ between each other.

Table 1 Comparison of necessary information (finance theory) and available information (accounting practice) for lease valuation

Finance Theory	Accounting Practice	
Information necessary (for each separate lease contract)	***Information available in annual report (for whole of lease portfolio)***	***Assumptions to be made***
i, implicit interest rate/or alternative costs of debt	Not disclosed	Estimation
TL, Total Lease Life	Not disclosed	While the Myers-equation is at inception of the lease, and the accounting implications have to be calculated on an annual basis, assumptions have to be made on what the original lease period was (**TL**) and how far this lease period has pasted already (**RL**).
RL, Remaining Life	Not disclosed	
$\mathbf{CF_t}$ Lease payments for year t	Lease payments are disclosed into three lease expiring categories CF_e, e=1, 2 or 3. e=1: lease commitments expiring within next year, e=2: expiring between one and five years, and e=3: expiring after year five.	The lease commitments in the three lease expiry categories, $\mathbf{CF_{e=1}}$, $\mathbf{CF_{e=2}}$ **and** $\mathbf{CF_{e=3}}$ have to be divided over the years (t) to come to annual lease payments, $\mathbf{CF_t}$, until the end of the lease term.
$\mathbf{V_0}$,Initial value of the lease itself	Not disclosed	Capitalisation approach to calculate the present value of the lease liability (**PVOL**)
I, Initial value of leased asset	Not disclosed	Assume how the value of the lease asset (**PVA**) relates to lease liability (**PVOL**): the asset proportion (**AP**).
T, company's marginal tax rate	Not disclosed	Estimation
depr, annual depreciation of asset	Not disclosed	The depreciation of the assets (PVA) depends on the remaining life and/or the expiry pattern of the lease portfolio

Table 2 Assumption on interest rate

Capitalisation approach	Interest rate
Multiple Methods	
8-times rent	No interest rate required
UBSWarburg	Estimated current borrowing rate of each company
Multiple Ely	10% derived from footnotes representative for whole sample
Present Value Methods	
Imhoff, Lipe and Wright	Interest rate implicit in financial lease, fixed at 10% for whole sample
Beattie, Edwards and Goodacre	Short term borrowing rate, fixed at 10% for whole sample
PV Ely	10% derived from footnotes representative for whole sample
This study	Alternative cost of debt, fixed for whole sample

Table 3 Assumptions on remaining and total lives

Capitalisation approach	Remaining Life (RL)	Total Life (TL)
Multiple Methods		
8-times rent	Irrelevant	Irrelevant
UBSWarburg	Ideally the weighted average remaining life, $RL_{UBS} = \frac{\sum_{t=1}^{n} t * CF_t}{\sum_{t=1}^{n} CF_t}$	Irrelevant
Multiple Ely	Irrelevant	Fixed at 25 years
Present Value Methods		
Imhoff, Lipe and Wright	$RL_{ILW} = 5 + \frac{CF_{e=3}}{CF_5}$ rounded up to the next full year	2* RL
Beattie, Edwards and Goodacre	Remaining and Total Lives distinguished for asset categories 'Land and buildings' and 'Other' $RL_{BEG} = \sum_{e=1}^{3} w_e * RL_{base}$ $w_e = \sum_{e=1}^{3} \left(\frac{\sum_{t=1997}^{2002} CF_t}{\sum_{e=1}^{3} \sum_{t=1997}^{2002} CF_{t.e}} \right)$	$TLi_{,BEG} = \sum_{e=1}^{3} w_e * TL_{base}$
PV Ely	Irrelevant	Fixed at 25 years
This study	$w_e = \frac{CF_e}{\sum_{e=1}^{3} CF_e}$ $RL = w_1 * 1 + w_2 * 3 + w_3 * (5 + \frac{CF_{e=3}}{CF_5})$	2*RL

Table 4 Base estimates of remaining and total lease lives

Beattie, Edwards and Goodacre (1998), p. 243

	Remaining lease life (RL_{base})		Total lease life (TL_{base})	
Lease expiry category (e)	Land and Buildings	Other	Land and Buildings	Other
Less then one	1	1	1	1
One to five	3	3	5	5
More than five	16	7	25	10

Table 5 Assumptions on division of lease payments over future years

Capitalisation approach	
Multiple Methods	
8-times rent	Irrelevant, only annual lease payment used
UBSWarburg	Assuming equal lease payments after year 5, however no suggestions given.
Ely	Irrelevant, only annual lease payment used
Present Value Methods	
Imhoff, Lipe and Wright	Equal annual lease payments after year 5: $CF_t = \frac{CF_{e=3}}{RL_{ILW} - 5}$, for t>5
Beattie, Edwards and Goodacre	For IAS17 companies as Imhoff et al.
Ely	Decreasing annual lease payments after year 5: $CF_{t>5,Ely} = (TL - (t-1)) * \frac{2 * CF_{e=3}}{(TL-5)(TL-4)}$
This study	As Imhoff et al.

Table 6 Capitalised lease liability (PVOL)

Capitalisation approach	
Multiple Methods	
8-times rent	$PVOL = constant * CF_1$
UBSWarburg	$PVOL = multiple * CF_1 \quad Multiple_{UBS} = \frac{1 - \frac{1}{(1+i)^{RL}}}{i}$
Ely	$PVOL = multiple * CF_1 \quad Multiple_{Ely} = \frac{\sum_{t=1}^{TL} \frac{1 - \frac{1}{(1+i)^{(TL-t)}}}{i}}{TL}$
Present Value Methods	
Imhoff, Lipe and Wright	$PVOL = \sum_{t=1}^{n} \frac{CF_t}{(1+i)^t}$
Beattie, Edwards and Goodacre	$PVOL = \sum_{e=1}^{3} \left[CF_{1,e} * \frac{1 - \frac{1}{(1+i)^{RLbase,e}}}{i} \right]$ for SSAP21 disclosures. (as Imhoff et al for IAS17 disclosures)
Ely	$PVOL_{Ely} = \sum_{t=1}^{n} \frac{CF_t}{(1+i)^t}$
This study	As Imhoff et al.

Figure 1. The relation between the unrecorded operating leases asset and the unrecorded operating lease liability
(Figure 1 of ILW91, page 57)

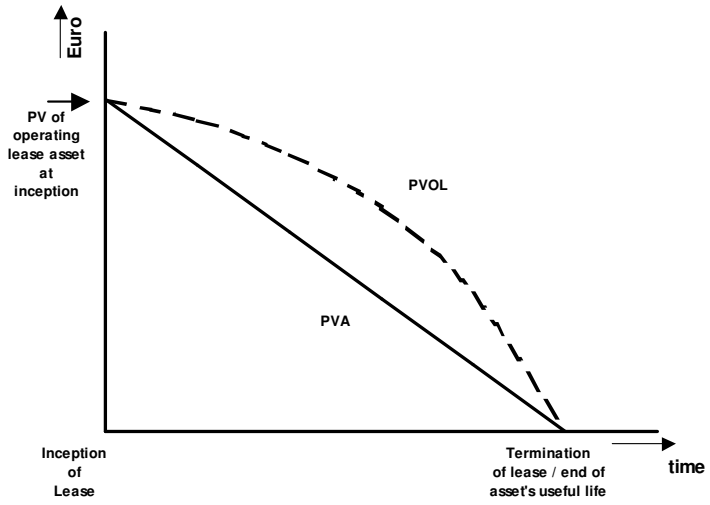

Table 7 Capitalised of leased asset (PVA) and asset proportion (AP)

Capitalisation approach	
Multiple Methods	
8-times rent	PVA =PVOL
UBSWarburg	PVA =PVOL
Ely	See below
Present Value Methods	
Imhoff, Lipe and Wright	$AP = \frac{\text{UA}}{\text{UL}} = \frac{\text{RL} * \left(\frac{1-(1/(1+i)^{TL})}{i} \right)}{\text{TL} * \left(\frac{1-(1/(1+i)^{RL})}{i} \right)}$, PVA = AP * PVOL
Beattie, Edwards and Goodacre	As Imhoff et al.
Ely	$\text{AP}_{Ely} = \frac{\text{TL}-1}{2} * \frac{1-\frac{1}{(1+i)^{TL}}}{\sum_{t=1}^{TL} 1-\frac{1}{(1+i)^{(TL-t)}}}$, PVA =AP * PVOL
This study	As Imhoff et al.

Table 8 Impact on equity and net income

Capitalisation approach	Equity	Net Income
Multiple Methods		
8-times rent	No change	No change
UBSWarburg	No change	$\text{NetIncome} + (1-\text{t}) * (\text{CF}_1 - \frac{\text{PVOL}}{\text{RL}} - i * \text{PVOL})$
Ely	No change	See below
Present Value Methods		
Imhoff, Lipe and Wright	Equity = (1-t) * (PVOL- PVA)	$\text{NetIncome} + (1-\text{t}) * (\text{CF}_1 - \frac{\text{PVA}}{\text{RL}} - i * \text{PVOL})$
Beattie, Edwards and Goodacre	As Imhoff et al.	$\text{NetIncome} + (1-t) * (\text{CF}_1 - \frac{\text{PVA}}{\text{weighted RL}} - i * \text{PVOL})$
Ely	No change	No change in net income, only in earnings before interest and tax: $\text{EBIT}_{post} = \text{EBIT} + i * \text{PVOL}$
This study	As Imhoff et al.	$\text{NetIncome} + (1-t) * (\text{CF}_1 - w_1 * PVA - i * \text{PVOL})$

Table 9 KPN 2004 financial statement data and leasing footnote

In million Euro's

	2004
Balance Sheet	
Total assets	21,519
Total debt	9,442
Long-term debt	7,792
Equity	6,821
Income Statement	
Net Sales	11,731
EBIT	2,542
Net Income	1,511
Financial Ratio's	
Return on assets	7.0%
EBIT/Total assets	11.8%
Total debt to total assets	0.44
Long term debt to capital employed	0.53
Total debt to equity	1.38

Operating lease footnote (p. 166, annual report 2004)

Lease expiry category *e*	CF_e
1	324
2	931
3	969
Total	***2,224***

Weights per lease expiry category *e*	*weight*
1	0.15
2	0.42
3	0.44
	1.00

Table 10 Capitalisation results of seven different approaches

CAPITALISATION RESULTS		8-rent	UBSWarburg	Mulitple-Ely	ILW	BEG	PV-ELY	This study
multiple		8.0	3.9	8.1	n/a	n/a	n/a	n/a
PVOL		2,592	1,267	2,624	1,677	1,677	1,557	1,677
RL		n/a	10.0	n/a	10.0	10.0	n/a	10
TL		n/a	n/a	25	20.0	n/a	25	20
wRL		n/a	4.6	n/a	n/a	6.4	n/a	5.8
wTL		n/a	n/a	n/a	n/a	9.9	n/a	11.5
AP		n/a	n/a	n/a	0.78	0.91	0.48	0.86
PVA		2,592	1,267	2,624	1,306	1,528	747	1,438
Depreciation next year		n/a	276	n/a	131	238	n/a	209
Interest		156	76	157	101	101	93	101
Effect on net income		n/a	-18	n/a	60	-10	n/a	9
Effect on EBIT		n/a	248	167	223	223	231	223
IMPACT ON RATIOS	**reported**	**8-rent**	**UBS-Warburg**	**Mulitple-Ely**	**ILW**	**BEG**	**PV-ELY**	**This study**
ROA	7.02%	6.27%	6.55%	6.26%	6.88%	6.51%	6.79%	6.62%
EBITTA	11.81%	10.54%	12.24%	11.22%	12.12%	12.00%	12.45%	12.05%
TDTA	0.44	0.50	0.47	0.50	0.49	0.48	0.49	0.48
LTDCE	0.53	0.61	0.58	0.60	0.59	0.58	0.60	0.59
TDE	1.38	1.76	1.57	1.77	1.69	1.65	1.75	1.67
change in ROA		-10.8%	-6.7%	-10.9%	-2.0%	-7.2%	-3.4%	-5.7%
change in EBITTA		-10.8%	3.7%	-5.0%	2.6%	1.6%	5.4%	2.0%
change in TDTA		13.8%	7.1%	13.9%	11.0%	9.9%	12.6%	10.4%
change in LTDCE		14.5%	8.5%	13.3%	10.6%	9.7%	12.1%	10.1%
change in TDE		27.5%	13.4%	27.8%	22.1%	19.4%	26.2%	20.5%

Table 11 Definitions of accounting ratios analysed

PVA=Capitalised lease asset, PVOL= capitalised lease liability, $PV(CF_1)$ = Present value of annual lease payment, i= applicable interest rate

Accounting Ratios		Before capitalisation	After capitalisation
PROFITABILITY			
Net profit margin	NPM	Profit after tax / Total sales	Profit after tax + change in Net Income / Total sales
Return on equity	ROE	Profit after tax / Total share capital and reserves	Profit after tax+ change in Net Income / Total share capital and reserves + change Equity
Return on assets	ROA	Profit after tax / Total assets	Profit after tax + change in Net Income / Total assets + PVA
EBIT divided Total Assets	EBITTA	Profit before tax and interest / Total assets	Profit before tax and interest + i* PVOL / Total assets + PVA
Return on capital employed	ROCE	Profit after tax / Total capital employed	Profit after tax+ change in Net Income / Total capital employed +PVOL-$PV(CF_1)$
LEVERAGE			
Long-term debt to capital employed	LTDCE	Long term debt / Total capital employed	Long-term debt + PVOL-$PV(CF_1)$ / Total capital employed + PVOL-$PV(CF_1)$
Total debt-assets ratio	TDTA	Total debt / Total assets	Total debt + PVOL / Total assets + PVA
Total debt-equity ratio	TDE	Total debt / Total share capital and reserves	Total debt + PVOL / Total share capital and reserves + change in Equity
Interest cover	IC	Profit before tax and interest / Interest	Profit before tax and interest + i*PVOL / Interest + i*PVOL
LIQUIDITY			
Current ratio	CR	Current assets / Current liabilities	Current assets / Current liabilities + $PV(CF_1)$
TURNOVER			
Total asset turnover	AT	Sales / Total assets	Sales / Total assets + PVA

1

Table 12 Different ways of disclosure of operating-lease commitments

#	Description	Example:
1	**As required by FAS 13** The future operating-lease commitments are disclosed separately for a) each of the next five years and b) cumulatively for the period beyond year five. This is in accordance with FAS 13.	**Ahold, Annual Report 2003, page 159** The aggregate amounts of minimum rental commitments to third parties as of December 28, 2003, under non-cancelable operating lease contracts for the next five years and thereafter were as follows: 2004 747 2005 689 2006 663 2007 583 2008 552 Thereafter 5,552 **Total 8,786** * million Euro
2	**Less than FAS 13 but more than IAS17** The future operating-lease commitments are disclosed separately for a) the period up to one year, b) the aggregate of years two and three, c) the aggregate of years four and five and d) the cumulative for the period beyond year five. This is less than FAS 13, but more than AS17.	**SNT, Annual Report 2003, page 29** The commitments given by the group companies can be specified as follows: 2003 Amount (x € 1,000) Total 1 year 1-3 year 3-5 year >5year Rental agreements 124,688 24,411 44,868 35,867 19,542 Operational lease 21,474 7,516 11,811 2,147 --
3	**As required by IAS17** The future operating-lease commitments are disclosed separately for a) the period up to one year, b) the aggregate of the years two until five and b) the cumulative amount for the period after year five. This is according to RJ292 and IAS17.	**Buhrmann, Annual Report 2003, page 85** **RENTAL AND OPERATIONAL LEASE COMMITMENTS** These are due as follows; Within 1 year 85 After 1 year but within 5 years 216 After 5 years 135 **436** * million Euro
4	**Present Value (PV)** The total present value of the future operating-lease commitments is disclosed with the discount rate.	**Macintosh, Annual Report 2003, page 61** The present value of existing rental and lease commitments relating to immovable property can be broken down by terms as follows: Rental Lease Due within 1 year 6,556 50,789 1 to 5 years 22,170 132,888 Due after 5 years 20,454 32,500 **49,180 216,177**
5	**Total nominal commitments (TC)** The total nominal value of the future operating-lease commitments is disclosed.	**Grontmij, Annual Report 2003, page 44** The long-term financial commitments relating to rents and operating leases amount to € 84,584,000 (2002: € 61,838,000).
6	**Annual payment plus remaining life (AP+RL)** The annual operating-lease commitments are disclosed together with the (average) remaining life of the total lease portfolio.	**Wolters Kluwer, Annual Report 2003, page 91** As at December 31, 2003 annual commitments under rental and operational lease agreements amounted to EUR 83 million (2002: EUR 79 million). The average term of these commitments is approximately 5.8 years (2002: 6.0 years).
7	**Only disclosure of annual payment (AP)** The annual operating-lease commitments are disclosed without the applicable (average) remaining life of the lease portfolio.	**Amstelland, Annual Report 2003, page 58** The instalments on lease contracts due in 2004 total € 3.7 million (in 2003: € 3.6 million). The rent commitments for 2004 total € 4.5 million (in 2003: € 4.3 million).
8	**Other** Combinations of methods.	**Ten Cate, Annual Report 2003, page 58** -Operational leases have been entered into in order to finance operating assets in an amount of € 16.6 million. € 3.5 million of this falls due in 2004, € 6.7 million in the years 2005 to 2008 and € 6.4 million in the years 2009 to 2014. -At the end of 2003 lease agreements for buildings had been entered into with an annual rent of € 1.3 million.

Table 13 Compliance with IAS17 during 2000-2004

	2000		2001		2002		2003		2004	
N	**118**		**119**		**119**		**119**		**109**	
No O/L	**23**		**22**		**15**		**11**		**6**	
With O/L	**95**		**97**		**104**		**108**		**102**	
Comply with IAS17	39	41%	46	47%	58	56%	70	65%	65	64%
No compliance with IAS17	56	59%	51	53%	46	44%	38	35%	37	36%
Nominal amount disclosed		28,142,842		34,107,939		32,577,325		33,479,815		29,445,345
excl. Ahold and Shell		19,124,325		20,316,245		24,004,147		24,377,257		23,823,445

Table 14 Percentage change of reported values after capitalisation using seven different methods

The mean and median of the size of the capitalised operating lease liabilities (PVOL) and capitalised leased asset (PVA) and the percentage change in total debt (TD), long-term debt (LTD), total assets (TA), and net income (NI). Except for PVOL and PVA also the size according to the balance sheet is given ('reported'). The percentage change is defined as the difference between the before capitalisation (reported) amount and the after capitalisation amount divided by the before capitalisation amount, i.e. $(TA_{reported} - TA_{8times\ rent})/ TA_{reported}$. For PVOL no percentage change can be calculated while no PVOL is available before capitalisation. AR means 'as reported' indicating that the values are not adjusted under this method.

	Reported	*Multiple Methods*			*Present Value Methods*			
	N	*8-Rent*	*UBSWarburg*	*Mulitple Ely*	***This study***	*ILW*	*BEG*	*ELY*
PVOL/TA	***340***							
mean		*18.0%*	*7.2%*	13.3%	***12.0%***	*as this study*	*as this study*	*8.1%*
median		9.3%	3.6%	6.8%	**4.0%**	*as this study*	*as this study*	3.9%
PVA /TA	***340***							
mean		*18.0%*	*7.2%*	6.9%	***6.7%***	*7.6%*	*4.2%*	7.6%
median		9.3%	3.6%	3.6%	**3.2%**	3.7%	2.0%	4.0%
TD ('000 E)	***320***	***Change in TD %***						
mean	1,503,576	1898%	530.5%	212.8%	**491.3%**	491.3%	491.3%	489.6%
median	131,609	32%	14.6%	23.3%	**15.6%**	15.6%	15.6%	15.2%
LTD ('000 E)	***291***	***Change in LTD %***						
mean	1,138,242	658.1%	189.4%	463.8%	**226.2%**	226.2%	226.2%	222.5%
median	114,600	47.2%	16.0%	33.9%	**18.1%**	18.1%	18.1%	18.0%
TA ('000 E)	***342***	***Change in TA %***						
mean	5,297,819	18.0%	7.1%	6.9%	**7.2%**	6.6%	7.6%	4.2%
median	*627,902*	*9.3%*	*3.6%*	3.6%	***3.5%***	*3.2%*	*3.7%*	*2.0%*
NI ('000 E)	***351***	***Change in NI %***						
mean	***8,220***	***AR***	***-0.2%***	***AR***	***-0.3%***	***0.8%***	***0.0%***	***AR***
median	227,447	AR	-1.8%	AR	**-3.0%**	15.7%	2.1%	AR

Table 15 Differences between mean and median of accounting ratios before and after capitalisation of operating leases

		Difference in mean						*Difference in median*					
	N	Pre	Post	Diff.	%change	t-value	sig	Pre	Post	Diff.	%change	z-value	sig
NPM	**336**	-28.4%	-28.5%	-0.1%	-0.5%	8.85	***	2.3%	2.2%	-0.1%	-4.4%	-13.80	***
ROE	**333**	-11.6%	-14.2%	-2.6%	-22.2%	-0.48	ns	9.9%	9.5%	-0.4%	-4.5%	-7.15	***
ROA	**342**	-2.9%	-2.7%	0.2%	5.6%	1.29	ns	3.5%	3.0%	-0.4%	-12.8%	-9.16	***
EBITTA	**325**	1.6%	1.9%	0.3%	18.2%	-0.85	ns	7.1%	6.8%	-0.3%	-4.4%	-4.75	***
ROCE	**338**	-4.1%	0.4%	4.4%	109.0%	-1.53	ns	6.5%	5.5%	-1.0%	-15.1%	-6.92	***
LTDCE	**337**	27.0%	33.5%	6.5%	24.2%	-2.36	**	23.5%	31.8%	8.3%	35.1%	-13.58	***
TDTA	**341**	25.9%	30.9%	5.0%	19.3%	-13.34	***	23.3%	28.6%	5.3%	22.5%	-14.09	***
TDE	**341**	130.4%	176.1%	45.7%	35.0%	-4.71	***	62.8%	91.1%	28.3%	45.1%	-13.14	***
IC	**324**	0.23	0.5	27.2%	119.2%	-0.98	ns	0.15	0.20	5.3%	36.4%	-6.91	***
CR	**326**	1.80	1.68	-0.12	-6.7%	6.30	***	1.35	1.31	-0.04	-2.7%	-15.26	***
AT	**342**	1.50	1.38	-0.12	-7.7%	9.84	***	1.32	1.27	-0.05	-3.9%	-14.03	***

Table 16 Comparison of present study with previous studies on lease capitalisation[1]

	This study		*Nelson (1963)*	*Ashton (1985)*	*Imhoff et al. (1991)*	*Imhoff et al (1995)*		*BEG (1998)*	*Goodacre (2001)*		*Bennet and Bradbury (2003)[8]*	
Country	Netherlands		US	UK	US	US		UK	UK		New Zealand	
Period	2000-2004		N/A	1983-1984	1988	1984-1990		1994	1999		1995	
N[2] =	366		11	23	14 matched pairs[6]	Separate for 51 groceries/ 29 airlines		232	102 only retailers		38	
	mean % change	***median % change***	***Impact/#. companies changed rank[7]***	***mean***	***mean % change***	***mean***	***median***	***Mean[5]***	***mean % change***	***median % change***	***mean***	***median***
Increase TD	470.0	180.0									22.9	11.7
Increase long-term debt	226.0	*18.0*						39.3				
Increase TA	7.0	3.0						6.3			8.8	5.2
Change NI	-3.0	***0.0***										
NPM[3]	-25.5***	0.0***		1.023				12.1***	51.4***	39.0***		
ROE	-94.6	-18.2***		2.85		-12.8/-267.8	2.1/-21.4	4.8**	35.1***	17.6***		
ROA	-116.1	-21.0***			-22.0	11.9 /-31.9	2.4/2.0	-10.8***	-44.8***	-2.8***		
EBITTA	-40.0	-8.9***									-8.73%	-6.80%
ROCE	41.2	-24.5***	Yes/0	0.24				-0.6	-32.8***	-19.8***		
LTDCE	29.5***	30.7***						92.8***	433.2***	1,160.7***		
DCE			Yes/9	-20.11***[4]								
TDTA	21.9***	19.0***									10.6	13.4
TDE	37.2***	38.1***	Yes/9		119.0			48.7***	295.0***	220.1***		
IC			Yes/10	2.74				-25.9	-79.3***	-7.73***		
CR	-2.8***	-3.8***	Yes/7								-14.4	-3.4
AT	-15.9***	-9.7***		-0.77				-12.5	-55.2***	-50.7***		

1.Beattie *et al.* (1998) show a similar table in their article in which they compare their results with those of Ashton (1985) and Imhoff *et al.* (1991). For the sake of completeness, these results are also reported here. 2.The present study calculated the value for the 366 observations with a known PVOL (which can be 0 if a company has no leases). The eleven companies of Nelson were all companies with leases. Aston's sample consisted of 23 companies with only financial leases. The samples of Imhoff *et al.* (1991) and Bennet and Bradbury (2003) consisted of only companies with leases. The sample of Beattie *et al.* (1998) consisted of 16% non-leasing companies. Imhoff *et al.* (1995) and Goodacre (2001) make no mention of the elimination of non-leasing companies, and they are presumably included. 3. Ashton and Beattie *et al.* calculate the operating profit margin instead of the net profit margin. 4. Ashton (1985) calculates the effect on Debt-to-Capital-Employed, and this ratio declines. Beattie *et al.* (1998) make a comment that the decline of the ratio should be a mistake while the direction of the change must be positive (Table 8, note 3). We do not agree with this comment, since the ratio calculated by Ashton will decline if the increase in capital employed exceeds the increase in (total) debt. The leverage ratio calculated in this study and also by Beattie *et al.* is long-term debt to capital employed, and the change in this ratio will indeed always be positive (while by definition the change in capital employed cannot exceed the change in long-term debt). 5. Beattie *et al.* (1998) only show the results of the mean test, but indicate that the Wilcoxon-test of differences in medians produced results of greater significance.6.Imhoff *et al.* (1991) matched seven high-leasing companies with a seven low-leasing company. Six pairs were retailers, one pair came from the transportation sector. For each of these pairs the change in return on assets and debt-equity was calculated. The mean values reported here are the average values of these 14 changes in ratios. Imhoff *et al.* (1991) do not produce any statistical tests. 7.Nelson (1963) reported for each of the eleven companies in the sample the change in 15 ratios. He concluded that the ratios change substantially, and indicated for each ratio whether capitalization would help the ratio meet its objectives (this is here indicated as 'yes'. Furthermore, he concluded that the ranking changed significantly after capitalization, indicated by the number of companies that changed in ranking after capitalization. 8.Bennet *et al.* (2003) do not produce a statistical test of significance of differences. The percentage changes in the accounting ratio were not reported in this article, but are derived from the mean and median values as reported in the article.

Table 17 Sensitivity analysis

Panel A: Sensitivity to interest rate and remaining and total lives of lease portfolio

Three sensitivities of the underlying assumptions of PVOL/TA and PVA/TA are tested: First, sensitivity to the interest rate. The interest rate in the base model was 6%. In the sensitivity test this interest rate is varied with -/+ 2%, i.e. 4% and 8%. Second, sensitivity to the total life compared to the remaining life. The base model uses a relation of total life is 2* RL, meaning the lease portfolio is 50% expired and 50% still outstanding. This assumption is varied by using a relation of a) TL= 1.33 * RL (meaning 25% of the lease has expired, 75% still outstanding) and b) TL=3 * RL (meaning 75% of the lease has expired, 25% still outstanding). Third, sensitivity to the remaining life is tested by varying the remaining life assumption with -/+ 2 years. The base model assumes that the lump sum payment after year 5 is equally divided over the future years, using the lease payment of year 5 (see equation 6)

	N	Interest				Total Life : Remaining Life				Remaining Life			
PVOL/TA	**340**	i=4%	i=6%	i=8%		TL=1.33RL	TL=2RL	TL=3RL		RL-2	RL	RL+2	
mean		12.9%	12.0%	11.2%	***	12.0%	12.0%	12.0%	ns	11.6%	12.0%	11.9%	***
median		4.0%	4.0%	4.0%	***	4.0%	4.0%	4.0%	ns	4.0%	4.0%	3.9%	***
PVA/TA	**340**												
mean		8.1%	7.2%	6.5%	***	7.9%	7.2%	6.5%	***	7.0%	7.2%	7.1%	***
median		4.0%	3.5%	3.0%	***	3.8%	3.5%	3.0%	***	3.5%	3.5%	3.4%	***a

Panel B: Sensitivity to chosen capitalisation method

Comparison of means and median between seven different capitalisation methods. Mean and median values of PVOL/TA and PVA/TA are shown in Table 16. All t- and z-values are significant at the 0.01 level except those with –ns =not significant, **=significant at 0.05 level or *=significant at 0.1 level.

	comparison of means (t-values)							comparison of medians (z-values)						
PVOL/TA	*This Study*	*8 -Rent*	*UBS Warburg*	*Mulitple Ely*	*ILW*	*BEG*	*ELY*	*This study*	*8 -Rent*	*UBS Warburg*	*Mulitple Ely*	*ILW*	*BEG*	*ELY*
This study	0	3.32	3.20	0.78ns	0ns	0ns	2.63	0	11.07	8.83	13.88	0ns	0ns	8.16
8-Rent		0	9.81	10.46	3.32	3.32	9.29		0	14.09	14.09	11.07	11.07	8.83
UBSWarburg			0	9.25	3.20	3.20	4.13			0	13.88	8.83	8.83	8.00
Mulitple Ely				0	0.78ns	0.78ns	8.01				0	13.88	13.88	12.51
ILW					0	0ns	2.63					0	0ns	8.16
BEG						0	2.63						0	8.16
ELY							0							0
PVA/TA														
This study	0	9.78	0.39ns	1.32ns	10.14	7.60	10.12	0	13.89	1.62ns	1.85*	13.87	14.08	14.06
8-Rent		0	9.81	10.46	9.85	9.58	10.10		0	14.08	14.08	13.91	13.84	14.08
UBSWarburg			0	1.51ns	2.68	2.23**	10.28			0	2.36	8.45	3.85	13.84
Mulitple Ely				0	1.01ns	2.58	8.01				0	2.55	3.84	12.51
ILW					0	10.98	10.06					0	14.08	14.06
BEG						0	10.48						0	14.08
ELY							0							0

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