CHAPTER 10

CASH FLOW APPROACHES TO PRICE ESTIMATION

Every action is a speculation, i.e., guided by a definite opinion concerning the uncertain conditions of the future. Even in short-run activities this uncertainty prevails. Nobody can know whether some unexpected fact will not render vain all that he has provided for the next day or the next hour.

Ludwig von Mises, *The Ultimate Foundation of Economic Science, p 51.*

CHAPTER OVERVIEW

This chapter is divided into the following parts:

Part I introduces some terms and provides a general picture of the capitalisation process using a case study and stresses the necessity to verify the data used.

Part II illustrates how even sparse sales data can be converted into a considerable volume of useful information. The measures presented throw light on bases for comparative analysis and portray financial and other characteristics of income buildings which reveal their different investment features. The measures reviewed should be incorporated in the valuer's database.

In Part III the phenomenon of rental change is brought into the discussion in the form of the term and reversion problem. The term income runs at a constant level until the next rent review (or lease renewal) takes place. Thereafter, the reversionary income is received-presumed to be different from the term income.

It is shown that the traditional methods used in addressing this problem are mathematically flawed and should not be used.

The flaw is overcome by using the modified discounted cash flow method with which the Part is largely concerned.

Notwithstanding this, the review points to other problems and defines the conditions under which the valuation models reviewed break down as the financial characteristics of the subject property depart from those of the sold properties relied upon.

The conclusion is that the use of full discounted cash flow methods in the valuation of income-earning properties is unavoidable either as the major valuation method the circumstances will allow or as a check against the results of applying another method.

Part IV comprises a comprehensive treatment of the discounted cash flow approach to the valuation of income–earning properties. One of the points stressed is that the analysis should not be confined to just one set of assumptions. Rather, these should be varied and the impact such variations have on estimated price should be taken into account.

Part V extends the treatment in Part IV to the after–tax position and concludes with a presentation of measures useful in the study of liquidity and risk together with some designed to test whether or not the assumptions incorporated in the analysis seem sensible.

Part VI is a treatment of the valuation of development projects. The traditional residual method, sometimes referred to as the "static" or "hypothetical method", is shown to be mathematically flawed and should not be used.

Part 1 – Direct Capitalisation

INTRODUCTION

When a property generates an income, or is capable of doing so, the valuer has available another method of estimating the price it will probably fetch.

This applies when the market associates productivity with the property's income stream and the items making up the property's productivity are organised to that end-or largely so.

Properties which fall into this category are office buildings, shopping centres, rental shops and flats, land subdivisions and other development projects-in fact, anything that produces a flow of cash over time. Investors regard such properties as cash–generating vehicles and tend to assess them as they would any other investment such as equities. For this reason, methods of valuing these properties tend to have much in common with techniques for analysing investments in general.

A possible exception to this is the evaluation of development projects. As their cash flow patterns tend to set them apart, consideration of development project valuation will be deferred to Part VI of this chapter.

In Chapter 7 a short discussion was directed to computing the present value of a perpetuity (Ap) using equation 14 which is now reproduced for convenience:

$$A\rho = \frac{R}{i}$$

EQUATION 14

This method of estimating the value of a building which produces a net annual income of $R, where investors require a yield of i per cent, is frequently referred to as "direct capitalisation". The yield (i) is commonly known as the capitalisation rate, the all risks yield or the overall rate–the last two being abbreviated as ARY and OAR respectively.

An easy way to remember and apply the formula is given by the following diagram:

R	
I	V

where R and i are as previously defined and V, now, represents present value (what up until now has been given the symbols Ap).

If any two are known, the third can be computed by covering it from view. For example, to find V, cover it and the diagram instructs the division of R by i. If R is unknown, cover it from view and proceed as shown in the diagram: multiply V by the yield (i).

Although simple to apply, this pricing model is very sensitive to data errors and a misreading of the capitalisation rate (i per cent).

In considering its components, take first the case of a building that has established an investment history. The space is leased (or nearly all is taken by tenants), operating costs can be estimated with reasonable accuracy and its future seems as stable as one can expect in a real estate environment. Under these conditions, R can be regarded as being quite stable over the foreseeable period–five years, say.

In assessing its value, the next component of equation 14 is the required yield. Most textbooks simply assume that the value of i can be derived from market data and leave it at that. The situation, however, is far from simple because of the very characteristics of real estate and the real estate market reviewed in Chapters 1 and 2. Not only is there the difficulty of locating recently sold properties that are similar but there is the added problem of assessing accurately their net annual income.

We shall see later that the valuer must invest considerable effort and time in reviewing the financial facts of the building to be valued–and for which data can be made available. To attempt to collect and audit data of a similar scope and quality for the sold properties is extremely difficult.

It follows, therefore, that the valuer needs to devote a great deal of downtime energy in data collection and verification. The most reliable sources will be from other assignments and such information as may be provided by colleagues. The valuation of income–earning buildings is a very

specialised aspect of professional practice, partly because of the paucity of reliable data, the cost of assembling it and of placing an interpretation on the yield figures that is meaningful. On a given assignment, it may take a valuer a week to assemble verified data for only four or five buildings. Hence, an efficient means of data collection and verification is important to develop as part of the need to keep office overheads down to a reasonable level and to extend a responsible service to clients.

Now consider, secondly the case where the building is still renting up. What is R? The conventional practice is estimate what the stabilised income will be when the building has "settled down" and use this.

To the difficulties had with the first case, the second case entails further uncertainty in estimating stabilised gross annual income and the level of operating costs in face of a lack of history for the building itself. One then has to resort to data from comparable buildings where differences in building materials, quality of equipment and finishes, lease structures and management practices can themselves bring about significant changes in the level of annual outgoings.

These issues are raised at the outset because they characterise some of the challenges that have to be met in this kind of assignment. As the chapter unfolds, they and others will be systematically addressed.

GENERAL STRUCTURE

The first step in the valuation of an income earning property is to set out the financial data provided and then verify it. Such as assignment should not be undertaken for a building that is already generating an income (even as to part) unless audited accounts are made available. These accounts should span, where appropriate, a sufficient number of years to establish the salient features of the building's operating history.

While details vary from building owner to building owner and from valuer to valuer, certain elements tend to be the norm. To understand them, it will be necessary to explain some terms commonly employed. The definitions follow the American Institute of Real Estate Appraisers (1984).

> *Potential gross income (PGI):* "The total income attributable to real property at full occupancy."

It is the rent actually passing between tenant and landlord plus the estimated current market rent of any space vacant at the time. As will be seen below, passing rent may not be the same as current market rent-especially where leases have been in place for some time.

> *Effective gross income (EGI):* "The anticipated income from all operations of real property adjusted for vacancy and credit losses."

A credit loss would be represented by a tenant in default of rent payment, for example.

> *Net operating income (NOI):* "The actual or anticipated net income remaining after deducting all operating expenses from effective gross income, but before deducting mortgage debt service."

Armed with these concepts, it is now possible to present a set of headings typically used to partition the cash items pertaining to an income earning property for valuation purposes:

Potential gross rents plus other income

= potential gross income

less vacancy and credit losses

= effective gross income

less operating expenses

= net operating income

The dissection can be taken further to record mortgage payments, before–tax and after–tax cash flows; these will be considered later.

Because different owners have a different tax status, valuations are usually based on net operating income.

Furthermore, in a valuation, operating expenses are detailed to facilitate comparisons and to make auditing of the entries possible.

Table 10.1 below sets out financial information for an office building in the central area of an Australian capital city. At the time the figures were collected, all space was fully leased so no vacancy allowance is shown. As discussed below, such an allowance would certainly be made in assessing the building's value.

EXAMPLE

The data in Table 10.1 will be used to illustrate price estimation using the method of direct capitalisation–an application of equation 14.

First, the valuer would need to verify the accuracy of the reported data and then check it against such standards as are available.

Note that there are two issues here: accuracy of the report and whether or not the values are typical. The former requirement should be met if the data are made available by way of a set of accounts certified by an auditor. The second is one of testing, in effect, the efficiency of building management. Whether or not the reported figures are actually being incurred, the onus is on the valuer always to be satisfied that they are consistent with those for comparable buildings. Differences and the reasons for them should be reported.

Note that the figure for the insurance premium covers (or should cover) payments for various kinds of insurance. Examples include public liability, plate glass, workers' compensation (on account of the resident caretaker, for example), fire and others. These should be separately ascertained so that premiums and extent of cover can be checked for competitiveness and sufficiency.

If, for instance, lift, fire protection and air–conditioning maintenance costs are higher than those incurred for similar buildings, the valuer should ascertain reasons for the difference–an informed buyer certainly would. Usually such work is contracted out to specialist firms and the actual maintenance contract should be inspected. Perhaps the discrepancy is due to the provision of services above those considered normal in the market place or perhaps it is an example of non–competitive pricing. This can arise where the contractor is a subsidiary of the building owner and it becomes a profit centre for that entity but one which is not available to the buyer. The valuer would adjust the figure to comply with the standard for the market.

Table 10.1
Typical Expense Statement for a CBD Office Building

	$	$	$
Gross rental payments			1,116,656
Car Parking			27,000
Cleaning and outgoings contributed by tenants			111,952
GROSS INCOME			1,255,608
Vacancy and collection loss*			–
EFFECTIVE GROSS INCOME			**1,255,608**
Operating expenses:			
Property taxes			
Municipal rates	30,768		
Water, sewerage, drainage rates	50,053		
State land tax	24,427	105,248	
Insurance		9,613	
Lift maintenance and repairs		20,046	
Airconditioning maintenance and repairs		9,778	
Electricity		47,470	
Oil		10,510	
Fire protection		2,694	
Landscape maintenance		920	
Security and repairs		4,537	
Caretaker's wages		14,259	
Cleaning		41,860	
General repairs		7,995	
Management contract		10,000	284,930
NET OPERATING INCOME			970,678

*** See text.**

Above normal electricity and oil costs could be incurred for a number of reasons. For example, more than the required number of lifts may be in service during non–peak hour periods. Perhaps an efficient energy plan for the building has not been drawn up or, if it exists, perhaps it is not being fully implemented.

Repairs and maintenance costs need careful scrutiny. If available, review expenditures by type for the previous five or so years to identify recurring items that may have been due for attention in the year to which the submitted building operating figures relate.

Property taxes can be checked by making enquiries of the agencies concerned.

Property management is one of the most underrated services in the Australian property industry. Top rate property management adds value far above its cost. The trend is towards passive property management whereby a manager is appointed under a contract. The terms of the contract should be reviewed to ensure an adequate level of service is being provided to the building to maximise its revenue and capital value. Much will depend upon the type of ownership organisation concerned and the nature of the property. With smaller properties, some owners prefer an active management role, in which case ensure that the allowance for management costs includes the cost of the owner's time.

With reference to the data of Table 10.1, assume the valuer is satisfied that the items are correct and are consistent with facts ascertained for similar buildings.

Taking the view of the most probable buyer, it would be necessary to make a deduction for vacancy and credit loss. Guidelines to making allowance for these factors will be provided later in this chapter. For present purposes, however, let us assume buyers of similar properties, having regard to their view of the future, typically allow a vacancy allowance of 3 per cent of gross possible rental income. An allowance under this heading should never be omitted.

This would reduce net operating income as follows:

	$
Gross income from Table 10.1:	1,116,656
Vacancy and credit loss allowance:	33,500
Amended effective gross income:	1,083,156
Amended net operating income:	937,178

The valuer now requires an estimate of the appropriate yield. Ideally, this is derived from the market but, if there is no such information, it should be estimated by interviewing the most probable buyer types–as explained in Chapter 3.

Because the market is fairly active, the valuer is able to identify and verify yields from recent sales of comparable properties as follows:

Building 1:	0.065
Building 2:	0.069
Building 3:	0.063
Building 4:	0.075
Building 5:	0.062
Geometric mean:	0.0666

The yield disclosed by Building 4 is somewhat out of line. Without it, the geometric mean of the remainder is 0.06469. Further investigation may lead the valuer to omit this particular one and select a rate of 0.065, say.

Alternatively, it may be preferred to attach a weighting factor to each which reflects the degree of comparability as it is perceived by the valuer and compute a weighted geometric mean.

The net operating income is then capitalised in perpetuity to convert it into a present value using equation 14:

$$\$937,178 \div 0.065 = \$14,418,123$$

Note that the yield of 0.065 is a year's purchase of (1.0 — 0.065) 15.385 which, multiplied by the amended net operating income, results in the same estimated capital value (it is necessary to retain quite a few decimal places).

The valuer may adjust this estimate for other factors not present in the comparable sales but, barring this, the result would probably be r6unded to $14,500,000.

The transaction zone would be computed using the range in the yields derived from the sold properties–in this case, 0.062 to 0.069. The reported range would then be:

Lower limit: $937,178 ÷ 0.062 = $15,115,774 – say $15,120,000

Upper limit: $937,178 ÷ 0.069 = $13,582,290 – say $13,580,000

Computing the limits of the transaction zone shows how sensitive the final result is to the choice of the yield rate. *This underscores the vital importance of data verification* and the reporting of results in such a fashion as to convey to the client the degree of reliability placed on the estimate by the valuer.

The example just presented assumed a fairly active market and fairly stable conditions both in the present and in the foreseeable future. Under these conditions, the method of direct capitalisation can produce good forecasts if careful preparatory work is done.

Direct capitalisation is often regarded as an example of price estimation using inference from past transactions–as discussed in the previous chapter. Indeed, there is no reason why stabilised net operating income could not be incorporated in an adjustment grid approach using other heads of comparison deemed significant by the market.

We prefer to include it in our treatment of cash flow analysis, however, because it is essentially a cash flow based approach to estimating price. It is a cash flow in the very real sense that the valuer assumes that the stabilised net operating income is just that–stable, and that it is so in. perpetuity. In short, the estimate relies upon a projection of cash receipts and outgoings deemed to be representative for that property class over a long period of time. The gravity of this assumption may be illustrated with reference to the allowance for vacancies and credit loss.

In the example, this allowance was set at 3 per cent of gross rental income. In effect, the valuer asserts that, over the long term, vacancies and credit losses will average this figure. Yet we know that real estate markets are notoriously cyclical, making forecasts of averages extremely difficult.

Older hands in the business of real estate investment would probably regard such an allowance as being too low. When the economy is booming vacancies in well–located buildings are usually at a very low level and the booming conditions attract a lot of uninformed money into the market. This is frequently why yields are forced to relatively low levels–lower, that is, than the levels experienced investors would be content to entertain. After all, most of them remember conditions in leaner times when vacancies were easily double that used in our example. It is not uncommon for many of the newer entrants into the field to accept vacancy allowances which prove to be historically optimistic. If the market has moved into a state like that described, advice to the effect should be incorporated in the valuation report and the underlying assumptions varied to test their impact on the value estimate.

Apart from this, it is highly unlikely that the assumption of stability in forecasting will ever be met. Departure of earnings from expectation brings risk and it is risk that the market assesses in forming a collective view on the magnitude of the required yield.

It is for this reason that the yield figure is often referred to as the "all risks yield" because it irnpounds an allowance for every source of risk to which the investment is perceived to be exposed. Conceptually, one could imagine partitioning the yield into its risk components such as: the risk free rate, inflation, the course of interest rates, movements in rents, vacancies, every item of building expenses, obsolescence, sovereign risk, the risk that anticipated net proceeds from resale at the end of the holding period will not be realised (or will exceed expectations), and so on. Whilst it may assist the investment decision process to focus on sources of risk, the quantification of each element making up the overall rate is beyond our ability. We shall see in Part IV, however, that the internal rate of return can be partitioned.

The all risks yield suffers from the disadvantage that it is not a measure of profitability and of itself, it reveals no information as to whether or not the rewards from the investment will meet or exceed the investor's hurdle rate. In a corporate context this is a severe limitation and it is for this reason that other tests have to be applied. These will be taken up later in this chapter.

Related to risk is the width of the reported transaction zone. Above, this was derived from the spread in yield rates disclosed by an analysis of recent comparable sales. There may be occasions when the valuer will use other inputs than these. For example, in a soft market, the range of the zone may reflect the probability that certain competing projects will not reach the market until the subject property has been fully leased; or, it could be conditioned by the probability of certain head leases being put in place. If both eventualities are seen to be highly likely, this may help to set the upper limit of the zone, if unlikely, the lower limit. It is a question for the valuer to decide which factors are to be taken into account as determinative of the range. But taking them thoughtfully and analytically into account is imperative.

Because data verification is so important in the valuation process–and especially so in the case of income properties – we return to this topic and then move on to consider the tasks of data base compilation and management in Part II below.

DATA ASSEMBLY AND VERIFICATION

In checking a building's outgoings, some general principles should be kept in mind.

First, adopt the most probable buyer's perspective and remember that the financial facts of a building are an essential component of its productivity analysis. How is the most probable type of buyer going to react to the building's productive features as well as its financial characteristics?

Secondly, understand that the objective is to assess accurately the building's earning capacity and the figures supplied may be constructed so as to present a picture which is more favourable than realistic.

Thirdly, prudent owners establish a reserve for replacement of equipment having a short life and this reserve is sometimes transferred with the building. The purpose of these funds is to replace items such as lobby furniture, kitchen facilities, common area carpets, fluorescent tubes, fuses and the like. If the reserve is insufficient to meet expenditure due in the near future, an allowance for this should be made in the final value figure. An intending buyer would do so and it is the valuer's task to forecast what the most probable buyer will pay for the property.

Fourthly, and as mentioned above, a common practice is to defer maintenance once the decision to sell has been taken – or even before then if the owner has a liquidity problem or simply skimps on maintenance. This fault should be detected as part of the productivity analysis as expounded in Chapter 5. Check the quality of the carpets, painting, electrical and mechanical equipment. The latter are highly technical components of modern buildings. If the valuer has any doubts about the status of such components, the instructing party should be requested to authorise a technical survey by an engineer who specialises in this work. Failure to secure such authorisation should be documented in the valuation report. Where such is procured, the valuer should state that it has been relied upon and permission should be secured to include a copy as an exhibit.

Fifthly, examine the building from the point of view of its ability to remain competitive. As a building ages, its competitive standing in the marketplace slips as newer structures are added to supply. Not only are they "shinier" but they also (usually) incorporate the latest advances in design and provision of those technological services which the subject property may not offer. Such obsolescence can be cured only by injecting considerable capital. Physical obsolescence, on the other hand, may need substantial capital expenditure to overcome also. Included in this category could be items such as water leaks around windows or to the roof, concrete "cancer" and the like.

Sixthly, the allowance in the submitted accounts for vacancy and credit losses may be inadequate or absent (as in Table 10.1 above).

Seventhly, leases in place should be studied. Ensure that the leases provided for inspection tally with the occupants actually present in the building. There is little joy to be had if a floor or more is said to be producing a satisfactory level of rent if that rent is not secured by a lease or, what is worse, that the occupier is a dummy planted there until the building is sold. Further comment will be directed to the important topic of lease analysis later in this chapter.

All this checking and testing simply points to the imperative of having a timely database with all the information that is readily available–as stressed in the previous chapter when dealing with the data requirements for inference from past transactions. It is in this respect that contacts with property management professionals are of great significance for they have accurate and direct knowledge of rents and building expenditures.

Merely filing items in a database is of little use because the data must be converted into information that the valuer can use in going about various professional tasks. As valuation has much to do with comparison, we take up in the next section some suggestions as to the kinds of analyses that are worth performing and which should be an integral part of database management. Indeed, the various ratios can be computed automatically using many standard software packages.

Part II – Income Property Sales Analysis

INTRODUCTION

It is vital to adopt a uniform classification system for the recording of kinds of income and types of outgoing to ensure valid comparisons between buildings. To this end the Building Owners' and Managers' Association's recommended chart of accounts will provide a useful start point.

Having classified the data, the items of outgoing should be converted to percentages of their total and also of total income. The entries in Table 10.1 are reproduced in the recommended percentage format in Table 10.2.

A frequently quoted statistic is the percentage of outgoings to potential gross income:

$$\$(284{,}930 \div 1{,}255{,}608) = 0.2269$$

or 22.69 per cent, which is the total of the second column of the Table (rounding error excepted).

Such percentages portray the profile of a building's financial facts in a form which permits comparison with others–provided the classification is constant. Aberrations can then be more readily identified and investigated. The process is akin to the analysis of company revenue accounts and balance sheets. It adds considerable depth to the analysis if the valuer is able to compare the profiles referred to over a time period; that way one is better able to assess how the building has been performing relative to the market. Any divergence in trends for the various items should be carefully investigated, along with abrupt trend changes for the subject property.

From a relatively small amount of data it is possible to deduce a wide variety of information of use in effecting comparisons and, when collected over a period, to aid in understanding both how the market is moving and how classes of buildings perform as they age.

Table 10.2
Typical expense statement for a CBD Office Building in Percentage Units

Item	*Per cent of all Outgoings*	*Per cent of Potential Gross Income*
Municipal rates	10.80	2.45
Water etc, rates	17.57	3.99
Land tax	8.57	1.95
All property taxes	36.94	8.39
Insurance	3.37	0.77
Lift maintenance	7.04	1.60
Air–conditioning	3.43	0.78
Electricity	16.66	3.78
Oil	3.69	0.84
Fire protection	0.95	0.21
Landscape maintenance	0.32	0.07
Security and repairs	1.59	0.36
Caretaker's wages	5.00	1.14
Cleaning	14.69	3.33
General repairs	2.81	0.64
Management	3.51	0.80
Total	100.00	22.71

EXAMPLE ANALYSIS

To illustrate, consider another example. The following relates to a block of rental apartments:

Price realised: $3,800,000

Land value estimate: $1,400,000

Financing:

Because the market was quite soft, the vendor granted a mortgage of $2,650,000 with monthly repayments over 25 years at 8 per cent interest per annum. The current rate over the same term is 11 per cent. The mortgage is subject to a balloon repayment at the end of five years.

Description of building:

Nine–storey building, 25 years old:

Gross building area: 6,624 square metres.

Accommodation: 108 units, 207 rooms.

Car parking provision: 62 covered bays.

Site area: 7,747 square metres.

Communal laundries: seven.

Financial data:

Potential gross income: $498,420

Effective gross income: $483,717

Outgoings: $180,478

Reproduction cost new:

Construction costs and professional fees are estimated at $850 per square metre.

With this limited amount of data, a great deal of information can be derived, as now illustrated. For this purpose, it will be useful to classify the derived measures into a number of groups.

Cash equivalent price

This may be computed in the same way as set out in the previous chapter. To add some variety, however, an alternative is illustrated here. The monthly payment for the mortgage given by the vendor is obtained from equation 15 and is $20,453.13. Annualising the payment, we have $20,453.13 x 12 = $245,437.56.

Equation 15 is used with the market interest rate (11 per cent, or 11 ÷ 12 per month), for the same number of periods (300) and a present value of $1.

The result is 0.009801131 monthly or 0.117613572 per annum. This is the annual debt service constant (K) or rate to the mortgage. We now use the mnemonic given above, V = R ÷ i and divide K into the annual repayment (R) to obtain the value of the mortgage (V):

$$\$245,437.56 \div 0.117613572 = \$2,086,813.30$$

Add deposit paid:	$1,150,000.00
Cash equivalent price:	**$3,236,813.30**

say $3,237,000.

Capital value statistics

	per sq m	per unit	per room
Land value:	$1,400,000	$1,400,000	$1,400,000
	7,747	108	207
	= $180.72	= $12,962.96	= $6,761.29
Property value:	$3,237,000	$3,237,000	$3,237,000
	6,624	108	207
	= $488.68	= $29,972.22	= $15,637.68

Land to property value: $\frac{\$1,400,000}{\$3,237,000} = 43.25\%$

Building to property value: $\frac{\$3,237,000 - \$1,400,000}{\$3,237,000} = 56.75\%$

These ratios are sometimes useful comparative indices. The relatively large land to property value ratio suggests the site is currently underimproved.

Note that it is the cash equivalent price that is used as the measure of property value.

Income and expense ratios

Potential gross income multiplier: $\frac{\$1,400,000}{\$3,237,000} = 6.50$

Effective gross income multiplier: $\frac{\$1,400,000}{\$3,237,000} = 6.69$

Net operating income:	
effective gross income	$483,717
less operating expenses	$180,478
Net operating income	$303,329

Uses for gross rent multipliers have been illustrated in the previous chapter and in Chapter 3.

Vacancy and credit loss ratios

Vacancy and credit loss ratio: $\frac{PGI - EGI}{PGI} = \frac{\text{Vacancy \& credit loss}}{PGI}$

Vacancy and credit loss ratio: $\frac{\$498,420 - \$483,717}{\$498,420} = 2.95\%$

This is a key statistic in the analysis of income–earning properties and it is one that is usually underestimated.

Effective gross rent ratio:	
PGI =	100.00%
Vacancy rate =	2.95%
	97.05%

This is sometimes referred to as the occupancy rate:

$$\frac{PGI}{EGI} = \frac{\$483,717}{\$498,420} = 97.05\%$$

The measure may be partitioned into the two components now set forth:

Expense ratio to PG1:	$180,478 / $498,420	= 36.21%
Expense ratio to PG1:	$303,239 / $498,420	= 60.84%
Total:	97.05%	= occupancy rate
Net operating income to PG1:	$303,239 / $483,717	= 62.69%

The higher the last ratio, the more favourable is the expense to gross income position.

Income ratios per physical unit

	per sq m	per unit	per room
PGI	$498,420	$498,420	$498,420
	6,624	108	207
	= $75.25	= $4,615.00	= $2,407.83
EGI	$483,717	$483,717	$483,717
	6,624	108	207
	= $73.03	= $4,478.86	= $2,336.80
NOI	$303,239	$303,239	$303,239
	6,624	108	207
	= $45.78	= $2,807.77	= $1,464.92

Once again, these can be quite useful comparative measures.

Mortgage statistics

Annual debt service: $20,453 x 12 = $245,437.56 (as above).

Annual debt service constant:

as financed:	$245,438 / $2,650,000	= 0.092618113
at market:	$245,438 / $2,086,813	= 0.117613797 (as above)

The lender requires a return on the loan made as well as the repayment of the principal. The repayment element is the sinking fund factor at the mortgage rate and is calculated as follows:

Mortgage constant at the market rate:	0. 117613797
Mortgage interest rate:	0.110000000
Available for principal repayment:	0.007613797

This is the periodic payment at the mortgage interest rate which will accumulate to $1 over 300 payments. To check the result, equation 19 is used with 300 periods, an interest rate of (11 ÷ 12) per period and a future value of $1. The result is 0.000634483 which, annualised, is $0.007613797.

Solvency measures

These measures were introduced in Chapter 6.

Loan to value ratio:	$2,086,813 / $3,237,000	= 64.47%

This indicates the lender's margin available to recover the mortgage if the property is to be sold in face of default. Much depends, of course, on whether the denominator represents the most probable price that will' be paid by the most probable type of buyer given loan failure. Note that the numerator is the mortgage available at market–not as advanced by the vendor.

Debt cover ratio: $\frac{\text{Net operating income}}{\text{Debt service}}$

$$\frac{\$303,239}{\$245,438} = 1.24$$

After meeting debt service, 0.24 of net operating income is available to service the equity position or to act as a buffer against increases in operating costs or vacancies before mortgage default takes place. If DCR is unity, no funds are available for equity dividend and there is no margin to meet financial vicissitudes.

Default ratio: $\frac{\text{Operating costs + debt service}}{\text{Effective gross income}}$

$$\frac{\$180,478 + \$245,438}{\$483,717} = 0.88$$

The ratio is sometimes expressed as a percentage. In the present case, 12 cents out of every dollar of income is available to meet increases in vacancies and/or to service the equity investment. Expressed equivalently, 88 cents out of every dollar of income is absorbed by the present level of operating costs, vacancies and debt service. The complement of 12 cents may be regarded as a cushion against increases in vacancies and outgoings – at the expense of dividend payments.

Solvency measures represent a lender's view of the property but must be considered by equity investors also because, as noted, they provide clues as to the amount of margin available to meet risk before equity returns are eroded. They do not present an entire picture of risk, however. For example, while the present ratios are probably "healthy" enough, we shall see that the economic life of the property does not counsel a long position being taken by a lender.

Depreciation

Measuring depreciation in improvements is extraordinarily difficult and further comment on this will be made in Chapter 11. It should be noted here that separating a transaction price into its land and improvement components is illogical but this convention is sometimes adopted in order to form a rudimentary idea of the possible extent of depreciation.

Reproduction cost new: 6,624 sq m x $850 per sq m = $5,630,400

Building's share of cash equivalent price:

Cash equivalent price – land value

$3,237,000 – $1,400,000 = $1,837,000

Depreciation: Cost new – building's share of price

$5,630,000 – $1,837,000 = $3,793,400

Average yearly rate of depreciation: Depreciation ÷ building age

$3,793,400 ÷ 25 = $151,736 per annum

This is an estimate of depreciation from all sources and assumes a straight–line effect. Other assumptions regarding the incidence of depreciation (such as declining balance) will lead to a different estimate.

Depreciation Rate:	Average annual rate ÷ cost new $151,736 ÷ $5,630,400 = 2.69% per annum
Total economic life:	Cost new ÷ average yearly depreciation $5,630,400 + $151,736 ~37 years or: 100 ÷ 2.69 ~ 37 years
Remaining economic life:	Total economic life – age 37 – 25 = 12 years

The estimated economic life of 12 years doubtless is one reason why the mortgage to the, vendor has a five–year balloon repayment.

Return measures

Yield; all risks yield; overall rate: $\frac{\text{Net operating income}}{\text{Cash equivalent price}}$

$$\frac{\$303,239}{\$3,237,000} = 9.37\%$$

This is a key statistic and is generally calculated in the manner just illustrated. There are other ways of computing it which are useful to know under circumstances where the data just used is not directly available.

Sometimes only certain ratios are reported. If based on net operating income and either of the potential gross income or the effective gross income, the overall rate can be calculated.

Take, first, the case of ratios based on the potential gross income.

The net operating income ratio to potential gross income was computed above and is 0.6084 (as a decimal). The potential gross income multiplier, from above, is 6.50. The ratio of the two is 0.6084 ÷ 6.50 = 9.37 per cent as above.

Next, take the ratios computed with reference to effective gross income.

The net operating income ratio to effective gross income is 0.6269 and the effective gross income multiplier is 6.69 – both were computed above. Their ratio is 0.6269 ÷6.69 = 9.37 per cent.

A little algebraic manipulation shows why both reduce to net operating income divided by price.

It is also possible to compute the yield from the debt coverage ratio, the loan to value ratio and the mortgage constant:

$$\begin{aligned}\text{Yield} &= \text{DCR} \times \text{LTV} \times \text{K} \\ &= 1.24 \times 0.6447 \times 0.117613797 \\ &= 9.37\%\end{aligned}$$

To see why this is so, substitute the ratios for the components on the right hand side:

$$\frac{\text{NOI}}{\text{DS}} \quad \text{X} \quad \frac{\text{Loan}}{\text{Price}} \quad \text{X} \quad \frac{\text{DS}}{\text{Loan}}$$

Terms cancel to leave the usual form of computation.

These alternative ways to calculating the yield are useful mechanisms when direct information is not available. If the ratios referred to are reported, all is far from lost.

Furthermore, the yield or overall rate can be partitioned into returns notionally paid to land and buildings. The word "notionally" is used advisedly since, as remarked above, the two cannot be separated for the reasons discussed in Chapter 5. The procedure now illustrated is common in the orthodox North American literature.

Let the return on the land component be R_L and the return on the buildings R_B. Land is not a wasting asset but the buildings are. Hence R_B includes a component for a return of capital sunk earlier in the buildings.

From the earlier depreciation calculations, it has been deduced that the undepreciated improvements are assessed at $1,837,000. It was also shown that the annual depreciation rate was 2.69 per cent. As a proportion of the undepreciated amount, that percentage is assumed to represent that component of net operating income which is the retirement of the buildings part of the investment. Hence:

Net operating income:		$303,239.00
Building component times the depreciation rate:	$1,837,000 x .0269	= $ 49,415.30
Return on land and buildings:		**$253,823.70**

The last–derived figure, the return on land and buildings, excludes any allowance for the return of capital invested in the buildings–the wasting component of the asset.

That part of the overall return excluding the return of capital invested in the buildings is, therefore:

$$\frac{\text{Return on land and buildings}}{\text{Cash equivalent selling price}}$$

$$\frac{\$253,823}{\$3,237,000} = 0.0784$$

We have now arrived at the following:

Return of land and buildings including depreciation allowance: 0.0937

Return on land and buildings excluding depreciation allowance: 0.0784

Now consider the improvements part of the investment, the buildings. We have the result that the return on that component is 0.0784 and that the depreciation rate is 0.0269 (from the previous section). Thus:

R_B = return *on* capital invested + return *of* capital invested
= 0.0784 + 0.0269
= 0.1053.

The return *of* capital component is referred to in the North American literature as "recapture".

We are now in a position to show how the overall rate is partitioned mathematically into the return to land and buildings separately. To do so, it suffices to take a weighted average:

$$\frac{\text{Land value}}{\text{Price}} \text{ X } R_L = 0.4325 \text{ X } 0.0784 = 0.0339$$

$$\frac{\text{Building}}{\text{Price}} \text{ X } R_B = 0.5675 \text{ x } 0.1053 = \underline{0.0598}$$

Overall Rate 0.0937

It will readily be seen that the depreciation rate is central to the whole procedure; as that assumption is varied, so the results will differ.

There is a view that investors who place their cash in a property which has a wasting component (the land improvements) expect to be able to replace that wasting asset over its life as well as achieving a return on the funds invested. One always hopes, of course, that appreciation in land value will more than offset depreciation in the improvements – but life is not without its surprises.

This view was commonly held in the period between the two World Wars when economic conditions were more deflationary than inflationary – the conditions discussed in Part III of this chapter. Because of the impossibility of forecasting redevelopment costs and land value when the building nears the end of its useful life, the recapture allowance is not now made (with the possible exception of improvements on leasehold land). Rather the redevelopment decision is now regarded as a new investment competing with other opportunities available at the time. It is properly regarded as a problem for capital budgeting.

Ratcliff (1950) argued, correctly, that splitting net income between land and buildings is illogical as the capital combinations form "an undifferentiated entity" (op cit, p 172). It was pointed out in Chapter 5 that the separate contribution of any capital item to total productivity cannot be assessed. Therefore, the split illustrated above is a mathematical artifice.

Nevertheless, much of property analysis consists of splitting income into financial components. This is logical and can be revealing. We now illustrate a valid way of doing so.

Return on equity: $\dfrac{\text{Net operating income– debt service}}{\text{Equity}}$

$$\frac{\$303,239 - \$245,438}{\$1,150,000} = 5.03\%$$

Equity is the down payment made by the buyer. Sometimes the numerator in the equation just given is referred to as "cash flow". We shall see later, however, that this is not a very apt term.

The return on equity can also be approached using the band of investment. This is a weighted average of the rates earned by the various components of an investment.

Working in proportions:

1.0000 x all risks yield of 0.0937	= 0.937
Less:	
0.6447 mortgage x constant 0.117613797	= 0.075825615
0.3553 x return on equity	= 0.017874385

from which return on equity is 5.03 per cent as above (0.017874385 ÷ 0.3553).

ACCRUAL ACCOUNTING AND ESTIMATING CASH FLOWS

It was noted above that the valuer should seek and be provided with audited accounts for the income property being valued. To this end it is important to understand that the accounting and valuation professions have different views of the world. This important issue has been considered by Gibson (1987) and Johnson (1984, 1985), amongst others.

The fundamental difference is that valuers and property investment decision–makers base their assessments on a cash flow basis while accountants accrue and match costs and revenues over a period deemed relevant.

It will be convenient to use the example of how the two professions would treat a simple lease. Assume space in an office building has been rented for

$350 per square metre per annum for a five–year term with a two–year rent–free period. Leasing commission of $20,000 is negotiated and paid by the landlord and we assume further that the lessor provides a capital sum of $50,000 to the lessee for fitout costs. The area leased is 750 square metres.

The cash flows are set out as follows:

	Year 1	Year 2	Year 3	Year 4	Year 5
Rent	0	0	262,500	262,500	262,500
Commission	20,000				
Fitout	50,000				
Net	(70,000)	0	262,500	262,500	262,500
Present value at 12%	(62,500)	0	186,842	166,823	148,950
Total present value	$440,115				

For convenience, end of year discounting is adopted at a rate of 12 per cent to give a total present value of the cash flows of $440,115.

The accrual representation of transactions spreads receipts and expenditures over the term of concern–here, five years. The following sets out the accrual version of the same data.

	Year 1	Year 2	Year 3	Year 4	Year 5
Rent	157,500	157,500	157,500	157,500	157,500
Commission	(4,000)	(4,000)	(4,000)	(4,000)	(4,000)
Fitout	(10,000)	(10,000)	(10,000)	(10,000)	(10,000)
Net	143,500	143,500	143,500	143,500	143,500
Present value at 12%	128,125	114,397	102,141	91,197	81,426
Total present value	$517,286				

Because accrual data representation dampens the entries over the term of the lease and because significant outgoings take place early on in this case, it leads to a substantially higher present value than that disclosed under a cash flow representation.

Let us now suppose we are at the beginning of Year 3 – that is, just after the landlord's expenses have been incurred. Under the cash flow view, the present value of the three payments of $262,500 each at the same interest rate as before is $630,481. The accrual view of the last three payments set out above results in a present value of $344,663.

This example of a single lease is repeated martyfold in a large office building or shopping centre. It may be seen therefore that the valuer needs to be able to translate accrual records into a cash flow format because the task is to assess the present value of future payments and costs *as they are incurred.*

As Gibson observes:

> "the appraiser starts his estimate of net operating income with historical accounting records completed on an accrual basis. To adjust for non–cash entries, the appraiser must deduct from income any revenue recognised as an accrual, add to income any cash revenue not included in the profit and loss statement, and then, similarly, add to income any accrued expenses and deduct any cash expenses not recognised" (op cit, p11).

He adds:

> "The accountant attempts to match revenues and expenditures over a lease period while the appraiser tries to simulate how a prospective purchaser would value existing encumbrances" (op cit, pp 13–14).

A general model relating accrual to cash flow bases in the case of equity working capital is set forth by Kroll (1985).

Part III–The Modified Discounted Cash Flow Method

INTRODUCTION

The central area office building example presented in Part I of this chapter incorporated the assumption that the rents passing were at full market value as at the date of valuation. As pointed out in the earlier discussion, that is a highly unlikely state of affairs.

The method of valuation used in that example is typical of the tools inherited from the past when they were appropriate to conditions of those times. In an era of little inflation in capital values and rents, direct capitalisation gave acceptable price predictions.

Conditions over the last 30 years have changed profoundly and different investors are now trading income–earning properties. As noted earlier, these are investors who regard income properties much as they would any other cash–generating investment. Furthermore, they use pricing methods which enable valid comparisons with other investment vehicles.

Thirty and more years ago, property investors were concerned to obtain a net rental from secure tenants locked into the longer term so as to avoid vacancies. It was common for leases to be for a term of 20 years or even longer. Since there was little or no inflation, there were no provisions for rent to be reviewed. The objective was stability over a long term, the return over many years of the wasting part of the asset (discussed above) and a return on total capital invested. At the end of the economic life of the improvements, the land would be available for reuse and the cycle repeated. This process underlies the valuation models used at the time.

Because of its relative illiquidity, capitalisation rates for well located and let properties were traditionally 1 to 2 per cent higher than the yield obtainable from long term government bonds. To a great extent, both types of investment were comparable: long term, an assured income but no growth in income. The major difference was the illiquidity of property and certain onerous aspects in its management.

Under those conditions, comparisons between investments could be made on the basis of the all risks yield. Hence, long–term bonds might show, for example, a yield of 3 per cent. At the same time, well–located property on long lease to secure tenants would show a yield of around 5 per cent. Gradually, of course, these crept up but the difference was in the direction indicated–that is, prime property–leading bonds by 1 to 2 per cent.

Similarly, the gap between government bonds and blue chip equity shares was such that the latter were some 2 per cent above the former. This reflected the comparative risks then prevailing along with little capital growth expectations from equities. As Fraser (1984) explains with reference to the United Kingdom scene:

> "In the inter–war depression (a period when profit was hard to earn and bankruptcies frequent), the guaranteed interest payment on gilts was particularly valuable, especially as the

deflationary conditions between 1920–35 caused the purchasing power of the fixed income to rise" (op cit, p75).

Much the same situation prevailed in Australia.

Under the conditions described, it is important to note that the all risks yield and the internal rate of return are identical. To illustrate, take the following:

Year	1	2	3	4	5	6	7	8	9	10
–100	4	4	4	4	4	4	4	4	4	104

A fixed interest security is purchased for $100 at a yield of 4 per cent and is held to the end of its ten – year term. The all risks yield is $4.00 – $100.00, or 4 per cent. The reader should verify that this is the rate which discounts all the interest payments and the return of capital to the initial outlay – that is, the internal rate of return.

When the face value of $100 is repaid, it is available for reinvestment at the then market rate–a rate which, under the conditions specified, would probably be little different.

An investment in property was viewed in much the same way. Over the life of the building, its portion of the initial investment was recaptured and the lump sum paid at the end would be the site value–again, assumed to be little different from its value at the beginning of the investment. Under those circumstances, the all risks yield and the internal rate of return were the same. This meant that the two kinds of investment could be compared directly. Indeed, the long–term bond rate set the yield required by investors in prime property.

We now come to the post–World War II era–especially the years after the mid–1950s.

This period saw the beginning of inflation in world economies. Inflation erodes the purchasing power of incomes and causes investors to seek higher off–setting interest rates. Higher yields had to be offered to attract funds into government bonds to finance the work of government.

In a parallel fashion, equity investors looked for higher dividends to offset the impact of inflation. Economic expansion meant that the corporate sector was able to meet these expectations, there were fewer company failures and continued expansion lead to considerable growth in share values which, in turn, tended to keep yields down–that is, investors were prepared to pay a premium to participate in the anticipated growth in share prices.

The result of these changed circumstances was to bring about a phenomenon called the "reverse yield gap". In short, yields from government bonds now exceeded the yields paid on the acquisition of blue chip stocks and, of importance to our discussion, prime property.

Does this mean investors were earning less from equities than from government bonds? Not necessarily. The difficulty was that the all risks yield was no longer a comparative measure.

To illustrate further, consider the fixed interest security introduced a few paragraphs previously. Its time profile was still that of a level annuity which was in no way altered in inflationary times–the only difference was that the yield would have been higher–say, 14 per cent.

At the same time, the yield from blue chip equities may have been, say, 4 per cent. The difference was that the time profile was no longer the same as for the fixed interest investment illustrated above because annual payments to shareholders were now subject to growth. It was the prospect of growth in dividends and, hence, growth in share prices (see Equation 37, p 230), that attracted funds from private and institutional investors.

The internal rate of return from equity investments might, therefore, have been 16 per cent compared with the same measure from secure long–term fixed interest securities of, in our example, 14 per cent. So, with equities, the all risks yield and the internal rate of return were now different numbers.

Note that the yield and the internal rate of return from fixed interest investments held to maturity were still the same'. But because periodic payments issuing from equities and property were now an increasing annuity, their initial yield and the internal rate of return were different magnitudes.

The difference arose because the internal rate of return was measuring the usual sources of risk *plus capital growth* whereas the all risks yield on a non-fixed income impounds all these elements into it but in a way that does not make the growth component explicit. Recall from the discussion in

Chapter 8 that a market–derived rate always includes a component allowing for income growth or decline.

The effect of the reverse yield gap was to make inherited valuation models inappropriate. Investors who relied upon them soon found that they were of little assistance in helping to select from a range of different kinds of investment. To make comparisons, investors' attention now shifted to measures which were comparable such as the internal rate of return.

It was many years before the valuation profession developed methods appropriate to the new financial circumstances. Considerable pioneering work was done in the United Kingdom, much of which was collated and evaluated by Trott (1980) in a report which deserves much wider circulation than it has received. The contribution of Sykes (1981), which should be read in conjunction with McIntosh and Sykes (1982), is also significant.

An overview and practical exposition of the "new" methods which are better suited to contemporary needs is presented in Baum and Crosby (1988) and in the third edition of Baum and Mackmin (1989). The first of these is especially important and provides a thoughtful review of the issues which have been resolved and which still await resolution in this fascinating area of property studies. In what follows, a considerable intellectual debt is owed to Professor Baum and his co–authors–a debt pleasurably acknowledged.

SOME TERMINOLOGY

The contributions referred to have led to the introduction of terms to describe the basis upon which rates of return are calculated.

The *yield* (capitalisation rate or all risks yield) is price divided by net income. In the case of, property, the income must be current market rent (or its equivalent).

As explained above, the passing rent may be different from current market rental value. If this is so, price divided by rent actually passing is known as the *initial yield*. Such property is sometimes referred to as being *underlet*.

If current market rent is different from passing rent, full rental value will apply when the lease expires or when the next rent review takes place. The yield on that new figure is the *reversionary* yield: the yield attained when the property reverts to full rental payment. It is then said to be *rack rented* or fully *let*. The related yield is sometimes known as the *rack rented capitalisation rate*.

The internal rate of return computed from an income stream which is not adjusted for inflation or deflation is termed the *equivalent yield*.

The internal rate of return computed from an income stream that has been adjusted for change is termed the *equated yield*.

Enever (1977) explains the difference between equivalent and equated yields thus:

> "The equivalent yield calculation ignores future changes in incomes or values due to inflationary or 'real value' changes. It should, therefore, be distinguished from equated yield (with growth) ... which makes specific allowances for growth" (op cit, p121).

To illustrate, consider the following investments, A and B:

	A	**B**
	$	**$**
Year		
0	–200	–200
1	77.49	12
2	77.49	25
3	77.49	50
4	77.49	300
IRR	20.16%	20.16%

If A were to cost more or if the periodic payment was less than that shown, B would be preferred, all other things being equal. In this case the equivalent yield for A is the same as the equated yield for B. Although B shows an initial yield of only 6 per cent, the price of $200 is paid because, given the anticipated growth in receipts, the equated yield is competitive.

The internal rate of return from A is referred to as an "equivalent yield" because all the cash flows are expressed in terms of present dollars. As the course of future income has been assessed for B, its internal rate of return is referred to as an "equated yield". The former is a real return, the latter is a nominal return–these terms were introduced in Chapter 8 in the discussion of inflation and cash flow analysis.

It would be reasonable for the reader to wonder why the earlier terms, ','real" and "nominal", are not retained here. They could well be but, as the literature associated with the present topic uses its own terminology, one needs to engage with it. The confusion surrounding the use of these terms is heightened by referring to a popular valuation model as the "equivalent yield model" wherein the yield used is not the equivalent yield as just defined (see below).

TRADITIONAL METHODS OF VALUING INCOME PROPERTIES

Fully let freeholds

Example 1

A shop has just been leased as follows:

Rent: $14,000 per annum.

Rent reviews: every three years.

A similar shop let at the same time for a rent of $12,000 was just sold for $150,000 which is a yield of 8 per cent.

To assess the value of the shop let for $14,000, the valuer simply divides this income by the yield to arrive at a value of $175,000.

This procedure requires that the sold property and the subject property are directly comparable: both are rented at full current market rental value, rent review frequencies are the same and they are physically and locationally similar.

Note that the yield, being a market–derived rate, includes a growth component which, it is assumed, applies equally to both properties.

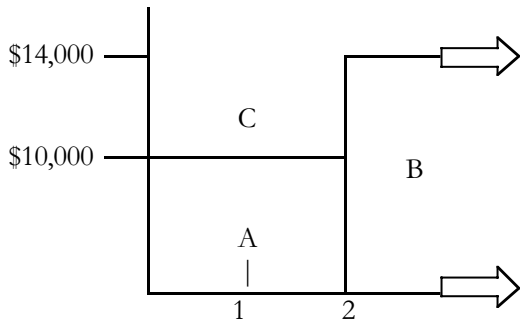
Underlet freeholds – traditional valuation methods

Example 2

This is the same kind of shop as in Example 1 except that it has two years to run before the next rent review. Rent review frequency is the same but the tenant is currently paying only $10,000 per annum rent.

In this case it would be incorrect to apply the 8 per cent yield because the passing rent is less than market rent and income will not increase for another two years.

This is an example of the term and reversion problem. The term is the rent due from the present time to the next rent review (or lease renewal). The reversion is to full rental value two years hence–the rent being expressed in current dollars. This pattern is illustrated in the following diagram:



There are four major ways in which this kind of income pattern has been traditionally valued: term and reversion, layer, rent forgone and modified layer. Each is now illustrated.

In the diagram, the part labelled A is the term income. That labelled B is the reversion and the part marked C represents the rent forgone.

Term and reversion approach

The term income is discounted to present valued (PV) at the all risks yield. The reversion is capitalised at the same rate and deferred for the period of the term. The calculations are as follows:

Term	$10,000	
PV 2 years at 8%		$17,833
Reversion	$14,000	
PV perpetuity at 8%: $175,000 deferred 2 years at 8%		$150,034
		$167,867

Layer approach

This method consists in capitalising the term rent in perpetuity at the all risks yield. The rental increment due in two years' time (called the "top slice') is capitalised at the same rate in perpetuity and is deferred for the period of the term:

Layer	$10,000	
PV perpetuity at 8%		$125,000
Top slice	$ 4,000	
PV perpetuity at 8%: $50,000 deferred 2 years at 8%		$ 42,867
		$167,867

Rent forgone approach

Here the full rental value is capitalised in perpetuity. From this is subtracted the present value of the rent forgone. The all risks yield is used throughout.

PV $14,000 in perpetuity at 8%	$175,000
less	
PV $4,000, 2 years at 8%	$ 7,133
	$167,867

Because the same rate was used for each component of the income stream, all three approaches give the same result.

Use of different interest rates

Sometimes different rates are applied, depending upon the valuer's view of the security of the particular income component.

In the term and reversion approach, it may be argued that the term portion is very secure. Being less than current market rent, the lessee enjoys a profit rent (even if not realised through subletting) and this portion should be capitalised at, say, 1 per cent less than the all risks yield.

Similarly. with the layer method. the layer portion, being less than market rental value, is more likely to be received than the top slice and should be capitalised at, say, 1 per cent less. The top slice is seen as more risky in receipt than present rental levels and is capitalised at, say, 1 per cent more.

The present example is reworked on those assumptions.

Term	$10,000	
PV 2 years at 7%		$18,080
Reversion	$14,000	
PV perpetuity at 8%: $175,000 deferred 2 years at 8%		$150,034
		$168,114

Layer	$10,000	
PV perpetuity at 7%		$142,857
Top slice:	$ 4,000	
PV perpetuity at 8%: $44,444		$ 37,408
deferred 2 years at 9%		
		$180,265

Other yield measures are as follows:

	Initial Yield	*Reversionary Yield*
Term and reversion	5.95%	8.33%
Layer	5.55%	7.77%

which the reader should verify.

The use of different rates has little effect, in this example, on the term and reversion approach. The longer the term, the greater the difference.

In the layer example, the difference is significant and leads to an erroneous result. It has the effect of conferring a higher value on a property not earning its maximum rent than if it were doing so.

If the property were fully revenue earning, its value would be $14,000 capitalised in perpetuity at 8 per cent – $175,000!

One way around this spurious result is to capitalise the layer portion at the all risks yield and use a higher rate on the top slice. It is not evident how the higher rate can be derived from market evidence, however.

An alternative is to use the modified layer method, which is now illustrated.

Modified layer approach

The first step is to derive a more appropriate yield for the marginal income (top slice). To do so, the reversion is split into layer and marginal portions.

Valuation of reversion:		
Reversionary rental:	$ 14,000	
Capitalised in perpetuity at 8%:		$175,500
Valuation of layer:		
Layer rent:	$10,000	
Capitalised in perpetuity at 7%:	$142,857	
Value of marginal income:	$ 32,143	
Yield for marginal income: $4,000	÷ $32,143	= 12.44%

Now proceed as before:

Layer rent:	$10,000	
PV perpetuity at 7%:		$142,857
Marginal (top slice) rent: $4,000		
PV perpetuity at 12.44%:		
$32,154 deferred 2 years at 12.44%		$ 25,433
Total		$168,290

Problem with different interest rates

The use of different interest rates to capitalise the split income can produce inconsistent results. We have already seen this in the case of the layer method but it can also produce unpredictable results with the term and reversion method.

Take the example of term income of $10,000 per annum for three years reverting to $10,500.

Term	$10,000	
PV 3 years at 7%		$ 26,243
Reversion	$10,500	
PV perpetuity at 8%: $131,250 deferred 3 years at 8%		$104,190
		$130,433

Now extend the term to ten years

Term	
PV 10 years at 7%	$ 70,236
Reversion deferred 10 years at 8%	$ 60,794
	$131,030

In this case, the longer the property is under–let, the higher the value–which is absurd.

The equivalent yield model

Instead of using two rates, the valuer may choose to employ a single rate which produces the same result.

The interest rate to be adopted may be computed in a number of ways. Here, the method of interpolation will be used which, it will be recalled, was introduced in Chapter 7. For this illustration, assume the current problem is an actual sale at a price of $168,114.

Term and reversion approach:

Year	*Cash Flow*	*PV at 7%*	*PV at 8%*
1–2	$ 10,000	$ 18,080	$ 17,833
2	$175,000	$152,852	$150,034
Total PV		$170,932	$167,867
Less valuation		$168,114	$168,114
		$ 2,818	**–$247**

Interpolation:

$$7\% + \frac{2{,}818}{2{,}818 + 247} \times (8.0 - 7.0)$$

$$= 7.92\%$$

Layer approach:

Cash Flow	*PV Perpetuity 7%*	*PV Perpetuity 8%*
$10,000	$142,857	$125,000
$ 4,000	$ 57,142	$ 50,000
Total PV	$199,999	$175,000
Less valuation	$180,265	$180,265
	$ 19,734	–$5,265

Interpolation:

$$7\% + \frac{19{,}734}{19{,}734 + 5{,}265} \times (8.0 - 7.0)$$

$$= 7.79\%$$

If this rate is used on both components, of the income, the valuation will be the same with either model. The calculations for the term and reversion (that is, equivalent yield) approach using 7.92 per cent follow:

Term	$10,000	
PV 2 years at 7.92%		$ 17,852
Reversion	$14, 00	
PV perpetuity at 7.92%: $176,768		$151,775
deferred 2 years at 7.92%		
		$169,627

The difference $(169,627 – 168,114) of $1,513 is due to rounding error. The yield had been approximated in the interpolation process and should be 7.988669 per cent.

Because the yield measure derived as just illustrated is used in a model referred to as the equivalent yield model, the rate is commonly referred to as the "equivalent yield". This is a source of considerable confusion which has resulted in widespread practice which is erroneous. As it is of the utmost importance for readers to understand why this is so, some discussion is in order. The error turns around failure to understand that the equivalent yield used in this model incorporates a change component whereas the equivalent yield defined earlier does not. The change component is usually referred to as a growth component"–but rents don't always grow.

Referring to the continuing illustration, the passing rent and current rent estimates underpinned the price of $169,627. This sum is such as to reflect a yield which, being market derived, incorporates a change component–as discussed in Chapter 8. The yield of 7.92 per cent, being derived from a market determined price and rental estimates, therefore has a change component within it. As will be pointed out below, the use of this rate on the term portion of the income is inappropriate because that income cannot change. That it is erroneous to apply a nominal rate to an income lacking a change component was discussed and illustrated in Chapter 8.

The appellation of "equivalent yield" in the present context is probably due to the fact that it is a single rate which produces the same (equivalent) result. It should be regarded as an average.

As against this, it must be said that, of the traditional methods, the equivalent yield model avoids spurious results such as those illustrated because it uses the same rate throughout. Unfortunately, it suffers from the problem referred to as well as others noted below.

UNDERLET FREEHOLDS – MODIFIED DISCOUNTED CASH FLOW APPROACH

Let us refresh our recollection of the continuing example and start with what is known.

- All risks yield on new lettings: 8 per cent.
- Current market rent: $14,000.
- Rents are expected to grow. Hence, the rental payment is expected to exceed $14,000 on the next rent review.
- Investors expect an overall return or equated yield of 14 per cent.
- The term income is fixed.

Before being able to proceed further, it is necessary to know what change factor the market anticipates for this kind of investment. Given this, an estimate, based on market factors, can be made of the rent expected to **be paid.** two years hence.

The expected rate of change is given by equation 33 which is repeated for convenience:

$$g = \left[\frac{(i - E)\,(1 + i)n + E}{i} \right]^{1/n} - 1$$

EQUATION 33

The symbols, with quantities for the present problem, are:

g = expected change (growth if positive)

E = initial yield (0.08)

n = rent review period (3 years)

i = equated yield or target rate (0. 14).

Substituting the values results in an estimated growth rate of 6.45 per cent per annum.

The task now is to reduce all flows to present value using the appropriate rates.

First, the term income. As it has no growth component (being fixed until the next rent review), the appropriate rate is the equated yield of 14 per cent. The reason for using this rate is given in the discussion following equation 35. Using the all risks yield would be erroneous since it includes a growth component.

Secondly, the reversionary rent. Its current value is $14,000 but this has to be increased by the anticipated growth factor of 6.45 per cent to ascertain its future value (FV).

Thirdly, the escalated reversionary rent is capitalised in perpetuity at the all risks yield of 8 per cent and then deferred for two years at the equated yield. It is capitalised in perpetuity on the assumption that future lettings (or rent reviews) will be to full market value ruling at the time.

These steps are implemented as follows:

Term:	$
PV of $ 10,000 per annum for 2 years at 14%:	16,467
Reversionary income:	
FV of $14,000, 2 years, 6.45%: $15,864	
Capitalised in perpetuity at 8%: $198,300	
deferred 2 years at 14%:	152,585
Total present value:	169,052

This would be rounded to $170,000.

This method is treated extensively by Baum and Crosby (op cit) and is referred to as the "modified DCF method".

Comparison with traditional term and reversion approach

The modified DCF method and the traditional term and reversion method are now compared:

	Modified DCF	*Term and Reversion*
Term portion	$ 16,467	$ 17,833
Reversion	$152,585	$150,034
	$169,052	$167,867

It may be seen that the traditional method overvalues the term portion of the income and undervalues the reversion. In this case, the totals derived are similar in magnitude and both would doubtless be rounded to the same figure. Nevertheless, the longer the term, the greater the disparity between the portions as the following comparison shows:

	Modified DCF	*Term and Reversion*	*Difference*
Term: 3 years			
Term portion	$ 23,216	$ 25,771	+$2,555
Reversion	$142,497	$138,921	–$3,576
	$165,713	$164,692	–$1,021

	Modified DCF	*Term and Reversion*	*Difference*
Term: 4 years			
Term portion	$ 29,137	$ 33,121	+$3,984
Reversion	$133,065	$128,630	–$4,435
	$162,202	$161,751	–$451

Although the differences are in the opposite direction, the difference between both term and reversion portions increases as the length of the term period increases. The comparison is not entirely valid, however, since one would expect the market to adjust the all risks yield to compensate for the longer term.

DISCUSSION

We now discuss the relative merits of the models presented in this section.

The *term and reversion* model is the most venerable. As discussed above, it worked well and was logically defensible in the years when rental income lacked any great growth component (or decline for that matter).

Consider its inputs. The capitalisation rate is derived from comparable sales. Above, some discussion was directed to the problems of securing comparability. In a thin market or in one which has changed abruptly, market evidence may be too slight to impart confidence. Nevertheless, if the data is available, it is market based to that extent.

The next input is the term income. It is the rent actually passing and is ascertainable–unless there were collateral arrangements on lease signing which are shrouded in secrecy. If it was less than market rent at the time it was set, the selection of an appropriate capitalisation rate is difficult because it has a greater growth potential simply because of an accident of past management.

Hence, an element of comparability is the ratio between term income and reversionary income.

The reversion input is the current rental value and is separately estimated from transactions comparable as to lease terms (including review frequency), location, type of space use and parties with similar motivations. Again, the importance of having abundant suitable evidence is apparent. Nevertheless, the use of a capitalisation rate which contains a change component on this portion of the income is defensible.

Capitalising the term portion with a rate which includes a change component is illogical. This is the mistake of using a nominal rate on an income expressed in constant terms. This fallacy was discussed above and in Chapter 8 in relation to equation 31 which the reader should refer back to: see above, pp 232–233.

Using split rates can produce unpredictable results. The selection of the market rate less 1 per cent to capitalise the term portion of the income is arbitrary. One could perhaps suggest using a rate which bore the same proportion to the market rate as the term income bears to the reversion.

The *equivalent yield* model avoids the problem associated with split rates but is subject to the criticism of using a nominal rate of interest on the fixed term income. It is, of course, a function of the selected capitalisation rates used on the term and reversion incomes and this needs to be borne in mind in the analysis of comparable transactions. For an extended discussion see Sykes (1981, pp 21–22).

Now to the *layer* method. Here the split in the income stream is quite arbitrary and we are presented again with heightened artificiality if the term income had been set at an incentive level. In this case, the nature of the split is' meaningless in comparison with other properties. The modified layer approach uses a rate on the top slice which is not market derived and, in the circumstances just mentioned, could itself be artificial. This condition is compounded by using (in perpetuity) a capitalisation rate which includes a change component: error is unavoidable. In the result, the term is overvalued and the reversion undervalued –neither part of the method is free from error. Although 'the errors compensate to a degree, it is poor practice to adopt a procedure comprising parts which cannot be separately defended.

As between the term and reversion and the layer method, a few points can be made. The greater the difference between the term and reversion incomes, the greater the disparity in the results produced by the two methods. The term and reversion method uses a more logical split in the income stream. An advantage with the layer method is that it may be used to estimate the increase in value following a rent review and, in this sense, it attempts to partition risk. This is a doubtful accolade, however, because of the artificial nature of the split and it ignores the fact that if a tenant defaults, i211 the income is at risk.

The *modified DCF* method is more logical in that it forces the analyst to make certain assumptions explicit. Given the equated yield (or investors' target rate for the type of property concerned), the

expected growth rate (or rate of decline) is easily calculated. The magnitude and timing of cash flows can be taken into account, whereas variable magnitudes can be handled by the other models only by the use of a rate which includes change implicitly. Money rates are used throughout and the fixed term portion of the income is capitalised at a rate which investors require for income streams lacking a change component. Because assumptions are explicit, the method has greater analytical usefulness. If the project "goes wrong", it should be easier to locate the assumption which transpired to be inaccurate. This is scarcely possible with the other models.

The fact that the DCF method results in a forecast of the reversion income is no guarantee that it will be realised, of course. The forecast represents a type of market consensus because the rate used is market derived. Should the market's view change, the assessment can be reworked with little difficulty.

For all of its advantages, the modified DCF method requires the input of the equated yield. If the initial yield and growth rate are known, the equated yield can be estimated by iterating through equation 33 above for which purpose an option is available in the programme provided in Appendix I to this chapter. Usually, however, it can be ascertained only from decision–makers in the market place and is therefore subjective. Their assessment of the rate they require may be inaccurate or simply the result of wishful thinking. Nevertheless, the valuer who is in close and sensitive touch with the market should be able to derive a useful estimate of it if the market is reasonably active.

The perfect valuation model has not yet been designed but the profession has come a long way in the last 30 or so years in that the phenomenon of rental change can now be incorporated in its technical procedures. For all the advances, we still rely heavily on market evidence which is useful as to the heads of comparability we have been stressing throughout. When the evidence is sparse, the difficulties confronting the valuer will not be eased by the use of models which are illogical.

With the general term and reversion problem–that is, during periods of rental change when the passing rent is different from current rental value–the traditional models should not be used because they incorporate incorrect rates. On this score, the modified DCF method is preferable but it presents other problems which are now reviewed.

MODIFIED DCF METHOD–SENSITIVITY OF ASSUMPTIONS: FULLY LET FREEHOLDS

Earlier in this section, three aspects of comparability were noted. They are important and are now brought together. The three are:

- Same rent review frequency;
- Knowledge of the equated yield;
- Ratio of term to reversionary income.

We now examine their likely effect. A more extensive treatment may be found in Baum and Crosby (op cit, Chapter 7).

Effect of different rent review intervals

As rent review periods become more frequent, the investor reaps the benefits of income growth sooner and the all risks yield is lowered. This is illustrated in the following example.

Example 3

A warehouse has just been leased as follows:

Rent: $30,000 per annum.

Rent reviews: every four years.

Comparable sale: a building which has also just been leased with the same rent review frequency was sold at a yield of 9 per cent.

Equated yield: investors require 15 per cent.

Problem: if reviews were set at two–yearly intervals, what would have been the effect on the investment?

The first step is to calculate the implied growth rate. This may be done using equation 33 which gives a result of 6.77 per cent.

The next step is to use equation 34 which is reproduced for convenience:

$$E = i - i \left[\frac{(1+g)^n - 1}{(1+i)^n - 1} \right]$$

EQUATION 34

Symbols and values for the current problem are:

E = required capitalisation rate

g = growth rate factor (6.77 per cent)

i = equated yield (15 per cent)

n = rent review period (4).

For these inputs, E = 9.0 per cent to result in a capital value of $(30,000 ÷ 0.9) = $333,333.

Equation 34 is now re–entered with a rent review interval of two years to produce a yield of 8.48 per cent and a capital value of $353,357. The difference is, therefore, in the direction stated.

Now examine the effect of rent reviews every six years. Proceeding as above, the result is $315,798 and a yield of 9.50 per cent.

It may be seen, therefore, that with fully rented properties, the yield varies directly with the rent review interval and the capital value declines accordingly–given a constant equivalent yield.

Hence with fully rented freeholds, direct capitalisation must employ a rate derived from similar rack rented properties having the same review frequency. If similar in all respects other than rent review frequency, the capitalisation rate must be adjusted as shown above.

Effect of change in the equated yield

Using the data of Example 3, direct capitalisation results in a valuation of:

$30,000 ÷ 0.09 = $333,333 as above.

To the previous analysis, we now add equated yields of 20 and 25 per cent with a rent review interval of two years. Results are as follows:

Equated Yield	*All Risks Yield*	*Rent Review Interval*	*Implied Growth*	*Real Return*	*Capital Value*
15%	9%	2 yrs	6.25%	8.23%	$333,333
20%	9%	2 yrs	11.45%	7.68%	$333,333
25%	9%	2 yrs	16.62%	7.19%	$333,333

An increase in the equivalent yield means a significant increase in growth is required to support the initial yield of 9 per cent.

The real return was calculated from equation 38. An increase in the equated yield is accompanied, in this case, by a decrease in the real rate of return.

So, while the equated yield rises, capital value and yield are fixed, the required growth rate increases and the real return declines. The real return declines because the growth rate increases at a rate higher than the change in the equated yield. To see that this is so, the reader should substitute the relevant values in equation 38.

Despite these changes, however, the capital value was unchanged. This is because the comparable sale used exhibited precisely the same characteristics as the subject property. Under these conditions, direct capitalisation will produce the correct result–but will not reveal the same amount of information, of course.

This simply confirms that reliability in value estimation depends upon having sales data which is directly comparable.

To test the sensitivity of results to the lack of comparable data, we examine changes in equated yields and rent review frequencies in the next section.

Effect of change in equated yield and rent review frequency

Using the previous example, we now use equated yields of 15 per cent, 20 per cent and 25 per cent as above coupled with rent review frequencies of two years, four years and six years:

Equated yield:	*15%*	*20%*	*25%*
Review period:			
2 yrs	$353,427	$369,009	$383,615
Yield	8.49%	8.13%	7.82%
4 yrs	$333,333	$333,333	$333,333
Yield	9.00%	9.00%	9.00%
6 yrs	$315,825	$303,927	$293,945
Yield	9.50%	9.87%	10.21%

The results were obtained as above: first the data for the comparable sale was entered into equation 33 to obtain the associated growth rate for each equated yield value. Equation 34 was then used for each adopted rent review period to give the resulting capital value and all risks yield.

It may be seen that as the equated yield increases and:

1. rent reviews are more frequent than the comparable: value increases;
2. rent reviews are less frequent than the comparable: value decreases.

The all risks yield alters commensurately. Hence a higher equated yield does not always result in a lower valuation.

Where the rent review frequency is the same as that of the comparable, no problem arises.

As the equated yield rises, the dispersion in value estimates becomes wider.

Once again, we see the importance of using valuation inputs extracted from sales which are closely comparable with the subject property and the use of an equated yield which is supportable. Note, however, that the resulting capital values, while sensitive to variations in the equated yield, are even more sensitive to wide fluctuations in the all risks yield. In the results just presented, the range in capital values is $(383,615 –1 293,945) = $89,670. The range in equated yields is 10 per cent but the range in the all risks yield is (10.21 –7.82) = 2.39 percent.

This suggests that minor variations in the equated yield will not prove to be disastrous.

MODIFIED DCF METHOD–SENSITIVITY OF ASSUMPTIONS: UNDERLET FREEHOLDS

Preliminary matters

Example 4

Consider the following underlet factory:

Current (term) rent: $16,000.

Period to next rent review (that is, length of term): three years.

Market rental value (reversion) assessed at: $32,000.

Rent review frequency: seven years.

Sale price: the factory has just been sold for $550,000.

This will be used as a comparable sale for the following two valuations. For this purpose it is necessary to derive certain measures from the information just given.

First, using the programme in Appendix I to this chapter, the equivalent yield is calculated to be 5.393995 per cent.

It is now possible to use the equivalent yield model to predict the price of other properties having the same cash flow characteristics. This will be illustrated later.

To extract information for input to a, valuation by the modified DCF method is not as straightforward.

First an equated yield has to be ascertained externally to the model. Suppose this is believed, on the basis of recent interviews of investors interested in this type of property, to be between 10 per cent and 15 per cent. Take first the 10 per cent estimate.

The term portion of the investment is easy to value:

Passing rent: $16,000

PV at 10 per cent: $39,790.

The reversion is therefore worth $(550,000 – 39,790) = $510,210.

It will be convenient at this point to use the notation employed by Baum and Crosby (op cit) which is now summarised:

e: equated yield

k: rack rented capitalisation rate

g: rate of change in rental value

i: real rate of return–see equation 38.

With the equated yield known (or assumed), the valuer needs to estimate the rate of rental change (g) and the rack rented capitalisation rate (k). Both are unknown and. have to be assessed using an iterative procedure by entering equation 33 with various values of k (E in the equation). The value of the reversion is then calculated for the trial values and compared with the known answer ($510,210 in the example) until that value of k is found which, with the given rent review interval, gives the required result (to an acceptable order of accuracy).

For e = 10 percent: k =5.489405 per cent; g = 5.220628 per cent; i =4.542244 percent.

Taking the case of a 15 per cent equated yield, the term is valued at $36,532 to give an estimated reversion value of $513,468.

Then for e = 15 per cent: k = 5.566756 per cent; g = 10.75239 per cent; i = 3.835225 percent.

Now that the sale has been analysed, the resulting information may be used to predict the value of similar properties, provided certain conditions as to comparability are met. These conditions are now explored.

Assume the task is to value two properties, A and B. Details are as follows:

Property A:

Term income: $22,400 with three years to run
Full rental value: $44,800
Rent reviews: every seven years.

Property B:

Term income: $4,000 with three years to run
Full rental value: $32,000
Rent reviews: every seven years.

Term to reversion ratio same as for comparable

Note that Property A has a term: reversion ratio the same as that of the comparable sale just analysed. Property B is the same as the comparable except that the term income is $12,000 less. The rent currently passing may have been set at an incentive level in a soft market.

Property A may be valued in three ways.

Equivalent yield valuation:

	$
Term income: $22,400	
PV 3 years at 5.393995%	60,553
Reversion income: $44,800	
Perpetuity at 5.393995%: $830,553	
deferred 3 years at 5.393995%	709,447
Valuation:	770,000

Modified DCF valuations:

(a) Equated yield 10%:

	$
Term income: $22,400	
PV 3 years at 10%	55,705
Reversion income: $44,800	
Perpetuity at 5.489405%: $816,118	
deferred 3 years at 4.542244%	714,295
Valuation:	770,000

(b) Equated yield 15%

	$
Term income: $22,400	
PV 3 years at 15%	51,144
Reversion income: $44,800	
Perpetuity at 5.566756%: $804,778	
deferred 3 years at 3.835225%	718,856
Valuation:	770,000

The future value of the reversion rental in Perpetuity is calculated using the rack rented capitalisation rate (k). This is on the assumption that future lettings or rent reviews will be to full market value and the rental change component included in k is appropriate. Because the reversion rental is expressed in current dollars, the real rate of return must, be used to convert this sum to present value.

We handled this previously by inflating the reversion rental estimate (which is in current dollars) by the growth rate before capitalising at the market derived capitalisation rate. The present problem is reworked in this way to give the same result:

	$
Term (as above):	55,705
Reversionary income:	
FV of $44,800, 3 years, 5.220628%: $52,189	
Capitalised in perpetuity at 5.489405%: $950,722	
deferred three years at 10%:	714,295
Total present value:	770,000

All three approaches give the same result in this case. With Property A, the term and reversion incomes are 1.4 times the corresponding incomes of the comparable sale and one would therefore expect the capital values to have the same relationship: $550,000 x 1.4 = $770,000.

So, when the sold and subject properties are directly comparable as in this case, the method of direct comparison is to be preferred. Nevertheless, the analysis of the sale reveals useful information as to various rates of return expected in the marketplace. As sales and rental information come to hand, they should be analysed as shown because this gives the valuer insights into market sentiment and, just as importantly, changes in sentiment as sales are studied over time.

Term to reversion ratio different from comparable

We turn now to Property B.

Equivalent yield valuation:

	$
Term income: $4,000	
PV 3 years at 5.393995%	10,813
Reversion income: $32,000	
Perpetuity at 5.393995%: $593,252	
deferred 3 years at 5.393995%	506,748
Valuation:	517,561

Modified DCF valuations:

(a) Equated yield 10%:

	$
Term income: $4,000	
PV 3 years at 10%	9,947
Reversion income: $32,000	
Perpetuity at 5.489405%: $582,941	
deferred 3 years at 4.542244%	510,210
Valuation:	520,157

(a) Equated yield 15%:

	$
Term income: $4,000	
PV 3 years at 15%	9,133
Reversion income: $32,000	
Perpetuity at 5.566756%: $574,841	
deferred 3 years at 3.835225%	513,468
Valuation:	522,601

Property B and the comparable from which the equivalent yield was extracted have an identical performance at the expiration of the term period they both have a reversionary rent estimated at $32,000 and the same equivalent yield has been applied.

This enables an investigation of the equivalent yield technique.

Further investigation of the equivalent yield model

Assume the comparable, Property A and Property B are sold at the end of the term–Year 3. Take three rental change scenarios: zero growth, 5 per cent per annum growth and 10 per cent per annum growth. For each of these, compute the internal rate of return–this will be an equated yield.

The procedure is illustrated in the case of the comparable under the 5 per cent per annum growth assumption. The following cash flows result:

		$
Beginning of period:		–550,000
End of Year 1:		16,000
End of Year 2: rent escalated 5%		16,800
End of Year 3:		
rent escalated 5%	17,640	
reversion rent escalated 5% and capitalised at 5.393995%	686,764	704,404

For this cash flow, the internal rate of return is 10.522%.

Results are as follows:

Internal Rate of Return

	Comparable	*Property A*	*Property B*
0%	5.394%	5.394%	5.394%
5%	10.522%	10.522%	10.625%
10%	15.649%	15.650%	15.859%

The comparison property and Property A return the same result if equally exposed to growth. All three are identical in performance at zero growth in rents.

Assuming the equivalent yield adopted is appropriate, the performance of Property B outpaces the others–given positive rental *growth–even though its passing rent is less.*

The reason for this lies in the valuation of the term income. Their respective present values, at the equivalent yield of 5.393995 per cent, are:

Comparable: $43,252
Property B: $10,813

which leads to a lower value for B and, hence, a higher internal rate of return as rents escalate. The effect of escalation relative to the assessed value is more favourable to B. The difference in passing rent is $12,000 per year. This difference is capitalised at a rate which assumes a growth component–but this is impossible because the term income is fixed.

It appears, therefore, that the equivalent yield model undervalues Property B.

The problem is that the equivalent yield deduced from the comparable was obtained from a property which was not "comparable enough". To overcome the anomaly it is necessary to revise the equivalent yield downwards in a manner which can only be intuitive.

After reviewing a similar example, Baum and Crosby conclude:

> "This illustrates that the equivalent yield model operates under a no growth assumption; but low initial yields imply growth, so the model is irrational. The lack of a logical basis requires the valuer to manipulate equivalent yields in the valuation stage for the non-perfect comparison. The manipulations necessary are difficult intuitively and become increasingly difficult as the comparables get less perfect. Without manipulation, the equivalent yield model gives almost no help to the valuer" (op cit, p 169).

Difficulties also arise in another context. Take two properties let at full rental value of $20,000 per annum. One has a rent review due in four years; the other has a term fixed at 15 years. A physically similar property was recently sold for $250,000 which is a yield of 8 per cent.

Four–year term case:

	$
Term income: $20,000	
PV 4 years at 8%	66,243
Reversion income: $20,000	
Perpetuity at 8%: $250,000	
deferred 4 years at 8%	183,757
Valuation:	250,000

Fifteen–year term case:

	$
Term income: $20,000	
PV 15 years at 8%	171,190
Reversion income: $20,000	
Perpetuity at 8%: $250,000	
deferred 15 years at 8%	78,810
Valuation:	250,000

The valuations are identical despite the fact that, in a growth situation, the first property is much to be preferred. Clearly, the equivalent yield used with the longer–term period should be adjusted–but by how much? In the absence of a transaction which is comparable, the required adjustment can only be the fruit of intuition. Indeed, if such a comparable were available, an analysis of yields would be unnecessary.

Let us return to Property B and compare the results obtained. They are summarised for convenience:

Model	*Result*	*Implied Growth*
Equivalent yield	$517,561	0%
Modified DCF with e = 10%	$520,157	5.22%
Modified DCF with e = 15%	$522,601	8.40%

The modified DCF approach results in a higher value–which seems to be appropriate in this case. How appropriate is this? To investigate the question, it is helpful to compute the respective internal rates of return under various growth assumptions and compare the results between the models.

Assuming a sale at the end of the third year and proceeding as above, the results are as follows:

Growth	*Comparable*	*Property B*		
Scenario	*Property*	*Equivalent Yield*	*e = 10%*	*e = 15%*
5%	10.522	10.625	9.991	9.130
10%	15.649	15.859	15.193	14.291

The closest internal rate of return for the comparable and for Property B is 10.522 per cent compared with 9.991 per cent. This indicates that, if growth is 5 per cent, the corresponding equated yield is about 10 per cent. Hence, the valuation of B under the 10 per cent equated yield assumption is closer to the comparable than if the equivalent yield model is used or the modified DCF with a higher equated yield.

Effect of changing the equated yield

It will be recalled that Property B was valued at equated yields of 10 and 15 per cent with the results of $520,157 and $522,601 respectively. The difference between them is less than one half of 1 per cent.

To illustrate the effect of changing the equated yield, consider the following example:

Term rent: $18,000 for two years
Reversionary rent: $30,000
Rent review interval: four years
Rack rented capitalisation rate: 8 per cent.

Taking four equated yields, the following results are obtained:

Equated Yield	*Growth Rate*	*Real Return*	*Term Value*	*Reversion Value*	*Total*
%	%	%	$	$	$
10.0	2.24	7.59	31,240	323,982	355,222
15.0	7.78	6.70	29,263	329,403	358,666
20.0	13.24	5.97	27,500	333,919	361,419
25.0	18.63	5.37	25,920	337,723	363,643

The range in the resulting values is just under 2.4 per cent. This masks a directional difference between the term and reversion components. The term decreases in value by –0.17 per cent and the reversion increases by 4.24 per cent. The extent of the off–set varies with the ratio of term: reversion income.

Baum and Crosby (op cit, pp 175–180) simulated a large number of combinations of capitalisation rates, term: reversion ratios, unexpired terms and equated yields all at a fixed five–year rent review period. The main points to emerge were:

1. There is a cut–off where the increase in value of the reversion resulting from higher equated yields is offset by the reduction in the term value. At this point the range in values is at a minimum.
2. For unexpired terms up to ten years, the range in values is only 2.2 per cent.
3. The range in values is low with high term: reversion ratios.
4. As the unexpired term increases, so does the range.
5. As the capitalisation rate increases, so does the range in values.

These last two led them to observe: "Therefore the valuation of prime property would appear to be more objective by contemporary techniques than valuations of higher yielding secondary property" (op cit, p 175).

MODIFIED DCF METHOD–THE CASE OF GROSS LEASES

In the examples used so far, leases have been of the net variety. If outgoings are paid by the landlord out of rental receipts, an assessment of the course of future outgoings has to be made. Such leases are sometimes referred to as "gross leases".

To illustrate their analysis using the modified DCF method, take the following example of a single tenanted shop:

Passing rent: $20,000
All risks yield: 8 per cent
Target rate: 12 per cent
Rent review period: four years
Current rental value: $22,500
Time to next rent review: two years
Escalation in outgoings estimated at 4 per cent per annum.

From equation 33, expected growth in rents is 4.47 per cent and the real rate of return is calculated to be 7.207287 per cent.

The valuation is set out as follows:

Term:

	$	$	$
Gross rent	20,000	20,000	
less outgoings	6,000	6,240	
Net	14,000	13,760	
PV at 12%	12,500	101,969	23,469
Reversionary net income:			
FV $16,500 in perpetuity at 8%: $206,250			
deferred two years at 7.207287%			179,451
			209,920

The reversion income of $22,500 and the outgoings of $6,000 are both expressed in terms of current dollars. The net income of $16,500 is capitalised in perpetuity at the all risks yield but deferred at the nominal rate of interest.

The result would probably be rounded to $210,000.

MODIFIED DCF METHOD–APPLICATION TO A MULTI–TENANTED BUILDING

Because buildings leased to multiple tenants are not initially rented at the same date, at any point in time rent reviews will be scheduled for irregular periods throughout the building.

To illustrate, consider the lease rent review schedule set out in Table 10.3 below for a building comprising two shops with four offices above in a suburban location. The leases are net of outgoings–that is, tenants pay all building operating costs.

Table 10.3

Rent Review Schedule for Suburban Shop and Office Development

Premises	*Area sq m*	*Passing Annual Rent $*	*Current Rental Value $*	*Time to Next Review (mths)*	*Lease Expiry (mths)*	*Notes*
Shop 1	200	15,000	20,000	3	39	
Shop 2	200	22,000	24,000	14	50	*Corner*
Office 1	75	3,000	3,375	8	42	
Office 2	80	2,450	3,200	3	39	
Office 3	70	2,000	2,450	3	39	
Office 4	70	2,500	3,500	5	41	

Current rental values are estimated with reference to recent lettings of comparable premises and leases. Recent sales of similar investments disclose an all risks yield of 9 per cent 'and investors' target rate is 17 per cent. Rent reviews are every three years in both comparable properties and the subject property.

Use of equation 33 discloses an implied growth rate of 8.66 per cent from which the real return is assessed to be 7.67 per cent.

We proceed as above for. each tenancy using Shop 1 as an illustration.

Term:

	$
PV of $(15,000 ÷ 12) per month for 3 months at (17 ÷ 12)%	3,646
Reversionary income: $20,000 perpetuity at 9%: $222,222	
deferred 3 months at (7.67 ÷ 12)% per month	218,015
Total present value:	221,661

Proceeding likewise for the other premises:

Shop 2	267,042
Office 1	37,514
Office 2	35,478
Office 3	27,193
Office 4	38,668
	627,556

From this figure, the valuer would make any adjustments deemed necessary, such as cost to make good any defects if the most probable buyer type would do so. Barring this, the valuation would probably be rounded to $630,000. The range within which this most probable price would fall would be derived following a review of factors such as those noted in the discussion of the central district off–ice building in Part I of this chapter.

The sales analysis of a multi–tenanted building may be carried out analogously. The method used above in the case of a single tenancy is simply extended. First, the present value of all the term portions is calculated and deducted from the sales price. It is then necessary to iterate, in the method described above, across all the leases until a solution is obtained within an acceptable margin of tolerance.

In a strict sense, the yield measures should be extracted from recent sales of properties which are comparable with the one to be valued – comparability in terms of the characteristics detailed above. If this is difficult in the case of a property rented to only one lessee, it becomes even more so in the case of multi–tenanted buildings.

To provide only one illustration, assume the building just valued is in fact a comparable sale from which the various return measures (excepting the equated yield) have been derived. Assume, further, that the building to be valued is similar in usage but each term portion is 12 months longer than the periods set out in Table 10.3 and the rent review intervals are five years instead of three.

On the basis of these amended assumptions, the valuation would be $621,753.

THE TERM AND REVERSION PROBLEM–SOME CONCLUDING COMMENTS

The valuation of fully rack rented properties is relatively straightforward given sufficient information from recent comparable sales.

When passing rent is different from current market rent (the term and reversion problem), the valuation is still relatively straightforward given the availability of recent comparable sales. Apart from factors of physical and locational similarity, which are very important of course, the preceding discussion has identified further elements of comparability in a financial sense. These are term income to reversion income ratio, length of term, rent review frequency and (in the case of the modified DCF approach) knowledge of the equated yield.

The characteristics of the real estate market reviewed in Chapter 2 suggest that perfect comparables will rarely be to hand. These are the characteristics of thin trading in relatively small submarkets and the inhomogeneity of real property. As shown above by way of some simple case studies, the traditional models are either flawed mathematically and should not be used or perform badly when comparable data is not available.

One comes away from a review of these methods with a distinct feeling of unease. Yet, valuations have to be carried out for manifold purposes and valuers must meet responsibly the demands upon their professional skills. What, then, to do?

The course of action to be adopted will depend partly upon the nature of the assignment and the nature of the available data.

If a range of data is available from which a series of yield measures can be extracted, one may expect that the "true" yields for the subject property fall within that range. If the valuer has valid grounds for drawing such a conclusion, a selection of yields will result in a range of value estimates and the most probable value has to be reasoned from this range.

The conditions under which this procedure may reasonably be implemented would include the following:

- Similar physical and locational characteristics;
- Term: reversion ratios spanning those of the subject leases;
- Length of term periods spanning those for the subject property;
- Rent review frequencies also spanning those for the subject leases.

In the case of multi–tenanted buildings, one would expect considerable heterogeneity in those characteristics possessed by comparable properties. For example, tenant types having the same term: reversion ratio may have term periods and/or rent review frequencies different from those in the subject property–and so forth. The greater the heterogeneity, the less confidence one can have, the wider is the range of yield measures used and the wider the estimate of the transaction zone assessed for the subject property. To quote only a single value estimate is to endow the result with false accuracy.

For this reason, valuations derived using one method should always be, checked against the result of adopting a different approach–such as, say, quality point rating.

Another check is to use the strategy detailed above. That is, make a reasoned assumption(s) as to the holding period and rental change factors, derive the resulting cash flow(s) and compute the internal rate of return(s). This is then compared with the returns investors are known to require as their target. If the result differs markedly, then the valuation needs to be reworked. ,

When no sales data can be located, or if existing sales data are regarded as being too unreliable, the valuer has to resort to a different method. This will more than likely be a full discounted cash flow analysis.

The considerations in the preceeding two paragraphs lead us to the conclusion that, in the assessment of income–earning properties, the use of the discounted cash flow approach cannot be avoided–either as a check against the results of applying another method or as the only available major method the circumstances will allow. We turn to this topic in the next section.

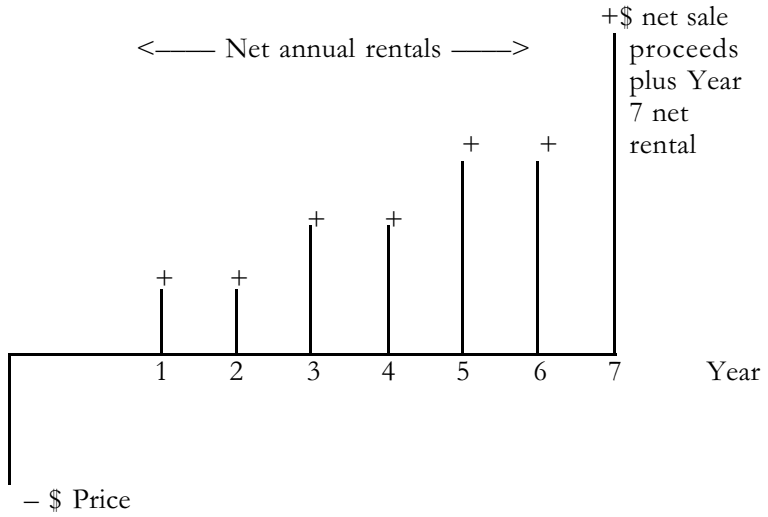
Part IV–Discounted Cash Flow Analysis of Income–Earning Buildings

INTRODUCTION

Cash flow analysis simulates the flows of cash expected to be generated by an investment. The rationale is that an investor will pay a sum now in order to enjoy the benefits conferred by the net receipts derived in the future. More specifically, the worth of the investment is the present value, at the investor's target rate, of the net periodical income derived over the period of ownership plus the present value of the net proceeds of sale received at the end of the holding period.

As a percentage of the initial outlay, the periodic returns in the form of net rentals are usually fairly small. A substantial part of the overall return is derived from capital appreciation on resale. The profile combines the investment elements of bonds and equity shares: bonds, because the initial outlay is expected to be recouped at the end of the holding period; equities, because it is hoped interim receipts will grow over the period and, on disposition, there will be capital growth.

The typical cash flow profile may be represented as follows:



Usually the cash flows are displayed in a table in which the columns represent time periods and the rows represent categories of income and expenses. Whilst this is typical, other methods of display are possible.

The row categories need to be carefully defined so as to be exhaustive and unambiguous. The names must be such that there is no doubt as to how a cash item is to be classified.

Furthermore, the row categories should be ordered in a logical sequence and subtotals derived for categories. For example, insurance premiums (outgoings) may be subdivided into fire, public liability, plate glass, rental loss and, possibly, others. When these have been entered, the next row may sensibly be devoted to the total of all insurance premiums. This would facilitate comparisons with other buildings where a detailed breakdown is not provided and can assist communication: the report may be confined to those rows which are subtotals and thus effect display economies. The results of sensitivity analyses may be reported in such an abbreviated form, for example.

Thought needs to be given to the time intervals to be adopted as well. A project lasting only 12 months may be represented by monthly cash flows. To use weekly time intervals implies the ability to forecast timings accurately to within a week–with many projects this is impossible. A two– to three–year project may use quarterly periods. A project extending beyond two or three years may use annual periods. Much depends upon the objectives of the analyst, the nature of the project and ability to forecast timings as finely as the time interval selected.

Once the intervals and row classifications have been chosen, a systematic approach needs to be taken to the estimation of cash flow magnitudes and timings. This is essentially a forecasting exercise, the usefulness of which is definitely a function of the analyst's experience.

DETAILED EXAMPLE

To illustrate the procedures involved in a DCF approach to price estimation, the example of a small suburban office building with six tenants is now introduced.

The building comprises four storeys with a ground floor carpark and entrance and three upper floors. It is five years old and has recently been redecorated.

There are few competing buildings in this part of the city. It is located close to a suburban railway line and medium–sized shopping centre. While some other sites are presently zoned for office use, they have not yet been so developed and are less favourably located than the subject property.

The productivity analysis is quite favourable. It is anticipated that the building will maintain its market position up to the next ten years and that demand for its space will continue to be firm if not strong. The building is of reinforced columns, reinforced concrete floor slabs and roof. The eastern and western elevations are of brick infill panels while the front and rear elevations are of aluminium – framed tinted glazing. In about ten years' time, the building will probably start to show its age. No immediate repairs are required. The present tenants have a high credit rating and enquiries reveal past rents have been paid on time and in full. An adequate replacement reserve runs with the building.

Lease and related details are as follows:

Tenancy A–First Floor
Area: 640 sq m.
Passing rent $150 per sq m.
Rent review: just agreed at $165 per sq m effective 2 months hence.
Licence fees for car spaces likewise just reviewed to $1,500 per month effective 2 months hence.
Rent review frequency: 2 yearly to market.
Initial term: 4 years, 1 year to run.
Options: 5 years + 5 years.

Tenancy B–Second Floor Area: 210 sq m.
Just leased.
Rent review frequency: annual as per CP1 with a minimum 5% to maximum of 9%
Current rental value: $155 per sq m.
Initial term: 3 years.
Options: 3 years + 3 years.
First 8 months of term rent free.

Tenancy C–Second Floor

Area: 210 sq m.
Just leased.
Rent review frequency: 2 yearly to market.
Current rental value: 160 per sq m.
Initial term: 3 years
Options: 3 years only.
First 6 months rent free.
Assume 3 months rent free on releasing in Year 7.

Tenancy D–Second Floor
Area: 204 sq m. Lease just expired.
4 year option exercised.
Rent review frequency: 2 yearly to market.
Current rental value: $160 per sq m.
3 months rent free to induce exercise of option.
Assume 3 months rent free on releasing in Year 5.

Tenancy E–Third Floor
Area: 280 sq m.
Leased 5 months ago.
Initial term: 3 years.
Options: 3 years + 3 years.
Current rental value: $155 per sq m.
Rent reviews: 2 yearly to market.

Tenancy F–Third Floor
Area: 350 sq m.
Just leased.
Initial term: 3 years.
Option: 3 years.
Rent reviews: 2 yearly to market.
Current rental value: $160 per sq m.
Rent free period for first 8 months.
Assume 3 months rent free on releasing in Year 7.

Car bays:

Tenancy A
10 bays. Current licence fees $135 each per month–but see above.

Tenancy B
2 bays. Current fee $160 each per month.

Tenancy C
2 bays undercover at $150 each.

2 Open bays at $140 each.
(2 x $150) + (2 x $140) = $580 per month.

Tenancy D
2 Undercover bays at $160 per month each.

Tenancy E
2 undercover bays at $160 per month each.

Open Bays:
6 open bays at $ 100 each casual.

Service Bay:
1 service bay–no income.

The bays are subject to the same rent review provisions and timings as for the related office space leases.

Other income items are naming rights (currently $5,000 per annum) and rent from office partitions (currently $9,000 per annum).

Estimating future rentals

As each lease is studied, a careful note is made of those provisions that affect income, its duration and review. Each of these is considered in turn.

Income: The valuer needs to ascertain the level of rent actually passing. This may not be the figure that is entered on the lease document. Since the lease was executed, the current rent may have resulted from a rent review or other arrangement entered into by the parties. Nevertheless, the actual rent being paid needs to be ascertained and verified.

Duration: This refers principally to the unexpired term under the lease. Given that the tenant is credit worthy and economically sound, it is fair to assume it will remain in occupation for the balance of the term and pay rent. The level of rent during that term will be a product of those provisions in the lease relating to how and when it is to be reviewed.

Under this heading, also, the valuer must note whether or not the lessee has the right to extend the term and, if so, for what periods and under what conditions – this provision is referred to as an "option": an option in the sense that it is at the tenant's option to exercise this right. For example, a lease may be for an initial term of three years with options to renew for two further periods each of three years. Hence, if the options are exercised, the tenant would remain in occupation for nine years.

The valuer needs to make a judgment, lease by lease, as to whether the lessee will exercise those options and, if so, what effect this may have on income. If it is believed that, at the time of exercise, the market will be a poor one, possibly the lessor will be able to secure lease renewal only if an incentive is offered.

If the options are not exercised and if their dates fall within the span of the projection period, the valuer needs to make judgments concerning the length of time it will take to find a new tenant. If the search continues beyond the lease expiry date there will, during such period, be no rental income for the space and the owner will be liable for outgoings. Assessments need also to be made as to whether or not incentives will have to be offered and the estimated cost of providing tenant's fitout. Under most leases, the departing tenant is required to make the premises good, except for fair wear and tear. Nevertheless, the building owner may have to recarpet the area to make the space competitive or incur other such costs. An estimate also has to be made of the costs of securing a new tenant–such as advertising and brokerage.

Review: Note carefully the dates on which the passing rent is to be reviewed and the basis for review. Usually, this is to estimated market rental value as at the date of review. If an existing lease provides for rent to be reviewed to market value every (say) three years, an assessment has to be made of the likely market rental level every three years of the lease term and entered into the income proforma for each lease. In this case, there will be a change in rent only every three years–assuming rents do change. If rents are expected to remain stable or decline, the lease may well have a "ratchet clause" whereunder the reviewed rent will not be less than the passing rent. Landlord's costs associated with rent review and lease renewal are transferred to the expenses proforma, lease by lease.

Sometimes leases provide for rent to be adjusted annuallly, say, in line with movements with the Consumer Price Index.

To illustrate this, take the case of a lease under which the passing rent is $300 per square metre per annum for an area of 1,000 square metres – $300,000. This is to be reviewed annually by indexing it to changes in the Consumer Price Index.

If the CP1 is anticipated to change by 4 per cent per annum over the forecast period, the gross annual rent generated from this tenancy can be estimated and entered into the tenancy schedule for the term of the lease. This is easily calculated using the future value function: $\$300{,}000(1 + 0.04)^n$. Here, n is the period to the next review.

Valuations for rent review purposes are treated systematically in Whipple (ed 1986 and 1990).

The golden rule is to check every lease thoroughly – a time-intensive task.

Once this information has been ascertained, revenue and cost estimates concerning each individual lease are made and collated in a convenient manner.

Before this can be done, however, the valuer needs to make assumptions as to the future level of inflation and (obviously) the future course of rents.

As to inflation, the valuer should make inquiries of those active in the money and real estate markets and ascertain the general view. A good knowledge of macro–economics is of great assistance in this regard together with close familiarity with trends reported in the financial Press. This is all part of one's continuing data–gathering tasks–the importance of which has been stressed elsewhere.

Given the present macro–economic outlook and referring to the example just introduced, the view might be taken that the present level of inflation (3 per cent, say) will remain stable over the first four years of the projection period. Thereafter, pressure on the currency may cause a rise in interest rates and increase inflation by another 1 per cent for the ensuing two years and a further rise of another 1 per cent for the next two years.

A close study of the competitive position of the building may point to its maintaining its position and achieving a rental growth of, say, half a per cent above inflation each year. The derivation of such estimates needs to be cogently reasoned and documented.

The outcome of such a reasoning process would usefully be summarised as follows:

Year	*Inflation Assumption* %	*Rental Change Assumption* %
19A1	3	3.5
19A2	3	3.5
19A3	3	3.5
19A4	3	3.5
19A5	4	4.5
19A6	4	4.5
19A7	5	5.5
19A8	5	5.5

In this example, rental change has been tied to anticipated changes in inflation. Whilst the influence of the course of inflation on rental values needs to be considered, other factors can be important (at times, even more important) determinants of rental change. It might, for instance, be known that another building will be opened three years hence. If it will be a close substitute, one would expect rental values in the subject property to weaken

for a time, at least. This would be reflected in lower rents on rent review (if there is, no ratchet clause in the lease) and on reletting. Market trends and anticipated changes must constantly be assessed for they are of paramount importance. Such considerations underpin the trend in future rental levels adopted for the analysis. It is stressed that the assumptions adopted for this illustrative example are for the sake of simplicity of exposition only.

So, too, is the outlook for the kinds of tenant presently housed in the building, and those likely to be attracted to it during the projection period. The demand for shelter is a derived demand, and the valuer needs to study the trends likely to be experienced by those enterprises and the affect this will have on their demand for space. Do not omit to consider likely changes in space standards per worker.

. Once an estimate is made as to the likely change in rental values, this information is applied to each lease for each year (or other time period being used) of the projection.

To illustrate, take the case of Tenant A in Table 10.4 below.

Passing rent is (640 square metres x $150) $96,000. This is payable for the next two months when a rent review is due.

On review, the current rental value of $165 per square metre will apply. This is $105,600 per annum but will be paid for only ten months of the current year.

For the first year, the gross rental paid will be pro rated: two twelfths of $96,000 plus ten twelfths of $105,600. This is $104,000 for the year and is so entered in Table 10.4.

The reviewed rent of $105,600 will be paid for all of 19A2 – even though, under the assumptions adopted, current market rental for that year will be $109,296 (that is, $105,600 x 1.035).

As the rent review interval is two years, the rental of $105,600 will be pro rated for the first two months of 19A3 when the rent will be reviewed to market–assessed at $113,121. This latter sum is pro rated for the ensuing ten months.

This is repeated for the remainder of the projection period.

Now examine Tenancy B. Here the lease provides for annual rental reviews tied to the Consumer Price Index with certain bounds placed upon it. The practical effect throughout the projection period is to set annual rental increases at the rate of 5 per cent.

With Tenancy C, note that the current rent is paid for only six months of the first year and the three months rent free assumption on reletting in 19A7 is allowed for.

The reader should check that the rental projections set out in Table 10.4 are consistent with the lease provisions and assumptions relating to reletting.

The aggregate projected rental income is carried forward to the main cash flow table – Table 10.5.

Table 10.4
Projected Income from Office Leases

	19A1	19A2	19A3	19A4	19A5	19A6	19A7	19A8
Tenant A								
Annual Rent if no Review	96000	109296	113121	117081	122349	127855	134887	142306
Contract Rent	96000	105600	105600	113121	113121	122349	122349	134887
Monthly Passing Rent	8000	8800	8800	9427	9427	10196	10196	11241
No of Months	2	12	2	12	2	12	2	12
Total	16000	105600	17600	113121	18854	122349	20392	134887
Current Rental Value	105600	109296	113121	117081	122349	127855	134887	142306
Monthly Passing Rent	8800	8800	9427	9427	10196	10196	11241	11241
No of Months	10	0	10	0	10	0	10	0
Total	88000	0	94268	0	101958	0	112406	0
Total for Year	104000	105600	111868	113121	120811	122349	132797	134887
Tenant B								
Annual Rent if no Rent Review	32550	34178	35886	37681	39565	41543	43620	45801
Contract Rent	32550	34178	35886	37681	39565	41543	43620	45801
Monthly Passing Rent	2713	2848	2991	3140	3297	3462	3635	3817
No of Months	4	12	12	12	12	12	12	12
Total for Year	10850	34178	35886	37681	39565	41543	43620	45801
Tenant C								
Annual Rent if no Review	33600	34776	35993	37253	38929	40681	42919	45279
Contract Rent	33600	33600	35993	35993	38929	38929	42919	42919
Monthly Passing Rent	2800	2800	2999	2999	3244	3244	3577	3577
No of Months	6	12	12	12	12	12	9	12
Total for Year	16800	33600	35993	35993	38929	38929	32189	42919
Tenant D								
Annual Rent if no Review	32640	33782	34965	36189	37817	39519	41692	43985
Contract Rent	32640	32640	34965	34965	37817	37817	41692	41692
Monthly Passing Rent	2720	2720	2914	2914	3151	3151	3474	3474
No of Months	9	12	12	12	9	12	12	12
Total for Year	24480	32640	34965	34965	28363	37817	41692	41692
Tenant E								
Annual Rent if no Review	43400	44919	46491	48118	50284	52546	55437	58486
Contract Rent	43400	43400	44919	44919	48118	48118	52546	52546
Monthly Passing Rent	3617	3617	3743	3743	4010	4010	4379	4379
No of Months	12	7	12	7	12	7	12	7
Total	43400	25317	44919	26203	48118	28069	52546	30652
Current Rental Value	43400	44919	46491	48118	50284	52546	55437	58486
Monthly Passing Rent	3617	3743	3874	4010	4190	4379	4620	4874
No of Months	0	5	0	5	0	5	0	5
Total	0	18716	0	20049	0	21894	0	24369
Total for Year	43400	44033	44919	46252	48118	49963	52546	55021
Tenant F								
Annual Rent if no Review	56000	57960	59989	62088	64882	67802	71531	75465
Contract Rent	56000	56000	59989	59989	64882	64882	71531	71531
Monthly Passing Rent	4667	4667	4999	4999	5407	5407	5961	5961
No of Months	4	12	12	12	12	12	9	12
Total for Year	18667	56000	59989	59989	64882	64882	53648	71531

Table 10.5
Cash Flow Analysis Before Tax and Financing

	19A1	19A2	19A3	19A4	19A5	19A6	19A7	19A8
INCOME								
Office Rents	218197	306050	323620	328001	340669	355484	356493	391851
Parking Bays	36380	44122	46438	47184	48644	50545	51150	54145
Office Partition Rent	9000	9270	9548	9835	10228	10637	11169	11727
Naming Rights	5000	5150	5305	5464	5682	5909	6205	6515
TOTAL RECEIPTS	268577	364593	384911	390483	405223	422575	425017	464238
RECOVERABLE OUTGOINGS								
Statutory Charges								
Municipal Rates	13200	13662	14140	14635	15294	15982	16861	17188
Water, Sewerage and Drainage Rates	12950	13403	13872	14358	15004	15679	16542	17451
Land Tax	9000	9315	9641	9978	10427	10897	11496	12128
Total Statutory Charges	35150	36380	37654	38971	40725	42558	44898	47368
Insurance	5900	6166	6443	6733	7103	7494	7981	8500
Air Conditioning								
Maintenance Contract	3200	3296	3395	3497	3637	3782	3971	4170
Electricity	14400	14904	15426	15966	16684	17435	18394	19405
Plant Overhaul	600	618	637	656	682	709	745	782
Total Air Conditioning	18200	18818	19457	20118	21002	21926	23109	24357
Life Maintenance								
Maintenance Contract	2000	2060	2122	2185	2273	2364	2482	2606
Electricity	1920	1987	2057	2129	2225	2325	2452	2587
Plant Overh aul	300	309	318	328	341	355	372	391
Total Lift Maintenance	4220	4356	4497	4642	4838	5043	5307	5584
Cleaning	17000	17510	18035	18576	19319	20092	21097	22152
Maintenance								
Painting	0	0	2700	0	0	0	3200	0
Repairs, replacements	2500	2575	2652	2732	2841	2955	3102	3258
Total Maintenance	2500	2575	5352	2732	2841	2955	6302	3258
Common area electricity and power	2040	2111	2185	2262	2364	2470	2606	2749
Servicing fire equipment	360	371	382	393	409	425	447	469
Security	1500	1545	1591	1639	1705	1773	1861	1955
Pest Control	200	206	212	219	227	236	248	261
Toilet requisites	1700	1751	1804	1858	1932	2009	2110	2215
Audit fees	575	592	610	628	653	680	714	749
Management fees	8000	8280	8570	8870	9269	9686	10219	10781
Total Recoverable Outgoings	97345	100661	106792	107641	112389	117347	126899	130397
Non Recoverable Outgoings								
Rent review and re-leasing fees	798	257	1427	398	1709	501	2236	624
Tenants' Improvements	0	0	0	0	10404	0	85270	0
Legal fees	750	773	796	820	852	886	931	977
Accounting fees	500	515	530	546	568	591	620	652
Structural repairs	1000	1030	1061	1093	1136	1182	1241	1303
Total Non Recoverable Outgoings	3048	.2574	3814	2857	14670	3160	90298	3556
TOTAL OUTGOINGS	100393	103236	110606	110498	127059	120507	217197	133953
Total Receipts	268577	364593	384911	390483	405223	422575	425017	464238
Add: Recoverable outgoings	97345	100661	106792	107641	112389	117347	126899	130397
TOTAL CASH	365922	465254	491703	498124	517611	539922	551916	594635
Less vacancy allowance	7318	9305	19668	24906	25881	32395	33115	41624
NET RECEIPTS	358603	455949	472035	473217	491731	507527	518801	553010
Less all outgoings	100393	103236	110606	110498	127059	120507	217197	133953
NET OPERATING INCOME	258210	352714	361428	362720	364672	387020	301604	419057
NET CASH FLOW	**258210**	**352714**	**361428**	**362720**	**364672**	**387020**	**3844545**	**419057**
PRESENT VALUES	224531	266702	237645	207386	181306	167319	1445307	
TOTAL PRESENT VALUE	2730196		:				Resale	3542941
IRR on price of $2,730,196	0.1500		:				% Growth	0.0487
Acquisition cost	2894008							
IRR on acquisition cost	0.1374							

Note: Some totals have been rounded after applying percentage changes to some constituent items. This applies also to some of the similar tables following

Table 10.6
Projected Income from Parking Bays

	19A1	19A2	19A3	19A4	19A5	19A6	19A7	19A8
Parking Fees–Tenancy A								
Rent per Month if no Review	1350	1553	1607	1663	1721	1782	1844	1908
Contract Rent per Month	1350	1500	1500	1607	1607	1721	1721	1844
No of Months	2	12	2	12	2	12	2	12
Total	2700	18000	3000	19282	3214	20655	3443	22127
Current Monthly Rental Value	1500	1553	1607	1663	1721	1782	1844	1908
No of Months	10	0	10	0	10	0	10	0
Total	15000	0	16068	0	17213	0	18439	0
Total for Year	17700	18000	19068	19282	20427	20655	21881	22127
Parking Fees-Tenancy B								
Rent per Month if no Review	320	331	343	355	367	380	393	407
Contract Rent-per Month	320	331	343	355	367	380	393	407
No of Months	4	12	12	12	12	12	12	12
Total for Year	1280	3974	4114	4257	4406	4561	4720	4886
Parking Fees-Tenancy C								
Rent per Month if no Review	580	600	621	643	666	689	713	738
Contract Rent per Month	580	580	621	621	666	666	713	713
No of Months	6	12	12	12	12	12	9	12
Total for Year	3480	6960	7456	7456	7987	7987	6417	8556
Parking Fees-Tenancy D								
Rent per Month if no Review	320	331	343	355	367	380	393	407
Contract Rent per Month	320	320	343	343	367	367	393	393
No of Months	9	12	12	12	9	12	12	12
Total for Year	2880	3840	4114	4114	3305	4406	4720	4720
Parking Fees-Tenancy E								
Rent per Month if no Review	320	331	343	355	367	380	393	407
Contract Rent per Month	320	320	331	331	355	355	380	380
No of Months	12	7	12	7	12	7	12	7
Total	3840	2240	3974	2j18	4257	2484	4561	2660
Current Monthly Rental Value	320	331	343	355	367	380	3913	407
No of Months	0	5	0	5	0	5	0	5
Total	0	1656	0	1774	0	1900	0	2036
Total for Year	3840	3896	3974	4092	4257	4384	4561	4696
Fees From Open Bays								
Monthly Rent	600	621	643	665	689	713	738	763
Annual Rent	7200	7452	7713	7983	8262	8551	8851	160

Projected licence fees for the parking bays reflect their market position and relative location on site. A study of the market for car bays reveals that few will be added to supply in the foreseeable future because of a generous provision in the immediate locality. The conclusion is reached that income from this source will grow, but not very strongly. In the final analysis, it is decided to adopt a growth rate of 3.5 per cent over the projection period. These assumptions form the basis of the parking income estimates set out in Table 10.6 and carried forward to the main Table 10.5.

Rental receipts from office partitions are assumed to be adjusted annually for inflation–but other arrangements can be entered into. Once again, the valuer needs to check the documentation.

Similar comments apply to income from naming rights.

Where space is vacant, the valuer needs to estimate its current rental value, the landlord's costs in effecting the letting and the time when the rent will start. These estimates are entered into the relevant proformas.

In the case of owner–occupied space, a rental value should be imputed to it. The details as to how hypothetical leasing costs will be handled depend upon the type of problem and client's instructions. If it is envisaged that the owner will not be vacating the space, a case could be made for excluding the associated costs: but they should be reported upon. If the valuation is for purposes such that vacant possession of this space is to be granted, then such costs should be included in the analysis. Valuations for balance sheet purposes normally would not include the costs of leasing the space but the magnitude of such costs and delay in securing a tenant(s) should be included in the report.

If the building is to be valued on the basis of vacant possession, all such costs and attendant delays in securing leases must be incorporated in the analysis.

Estimating annual costs

These estimates likewise demand careful attention and study–as stressed in the first part of this chapter. Following investigations of audited accounts for the building and comparison with those pertaining to other comparable properties, the valuer has been satisfied as to the level of current year outgoings, item by item. The following explanations are offered as guide points only–in an actual case, projections may well be carried out on completely different bases.

Study and inquiry of investment decision makers reveals the general expectation that the course of future expenses will be tied to inflation. This being so, and given the inflation projection discussed above, most cost items are adjusted accordingly in the example. The expectations adopted here are now discussed.

For statutory charges, it is assumed that the various local authorities will be unable to confine cost increases to the level of inflation. It was therefore decided to inflate these costs in line with rental receipts–that is, one half of 1 per cent above the projected inflation rate.

A similar assumption was made in relation to electricity charges.

Because of recent increases in the rate of burglaries and other nefarious events, insurance premiums are assumed to grow at a rate of 1 per cent above inflation.

Painting today would cost $2,470 but will not need to be done until 19A3. This cost is anticipated to move with inflation.

Management fees are assumed to have been negotiated to commence at $8,000 and then to be adjusted as rentals change – 0.5 per cent above inflation in the example.

Rent review and re–leasing fees have to be calculated in line with expected outcomes as each lease is reviewed or the space is relet. The detailed computations for the illustrative example are set out on Table 10.7 below wherein it is assumed that a fee of 7 per cent has been negotiated with the property management firm. It will be seen that these are computed on the quantum of rental increase for office space and car parking bays. These estimates are entered into the main cash flow Table 10.5.

Separate attention needs to be given to the allowances for tenants' improvements–a much neglected (and frequently major) item in many cash flow estimates. These costs normally are not recoverable from tenants.

The costs of maintaining the competitive position of the building need to be considered under three headings.

First, when a tenant vacates, it is frequently necessary to refresh the partitions and perhaps even to replace carpets. Sometimes, as already noted, such expenditures are necessary for an existing tenant to find lease renewal attractive and to exercise the option.

Table 10.7
Rent Review and Re–leasing Fees

	19A1	*19A2*	*19A3*	*19A4*	*19A5*	*19A6*	*19A7*	*19A8*
Tenancy A								
Office Space	9600		7521		9228		12538	
Car Parking	1800		1282		1373		1471	
Tenancy B								
Office Space		1628	1709	1794	1884	1978	2077	2181
Car Parking		134	139	144	149	154	160	165
Tenancy C								
Office Space			2393		2936		3989	
Car Parking			496		531		569	
Tenancy D								
Office Space			2325		2852		3875	
Car Parking			274		293		314	
Tenancy E								
Office Space		1519		3199		4428		5939
Car Parking		134		284		303		325
Tenancy F								
Office Space			3989		4894		6649	
Car Parking								
Open Bays		252	261	270	279	289	299	310
Total Increments	11400	3667	20388	5691	24420	7153	31941	8920
Fees	798	257	1427	398	1709	501	2236	624

Secondly, certain fixtures and fittings need to be replaced at the end of their economic life. Carpets, for example, frequently need to be renewed every five years or so. If a lease renewal date coincides well enough with the need to replace worn–out items, an allowance under one of these two headings will suffice for the other.

Thirdly, structural repairs need to be effected as required.

With these considerations in mind, their application in the case of the present example is now illustrated.

The carpet has already been replaced and, in the normal course, will not need to be replaced until, say, 19A7.

Nevertheless, Tenant D vacates at the end of 19A4 and Tenant F at the end of 19A6. As the latter space will be refurbished as part of the 19A7 cycle, it is reasonable that Tenant D's space should be attended to in 19A5 but not as soon as 19A7.

The current cost to recarpet is $35 per square metre and this will be indexed to inflation. There are no partitions in Tenant A's space but the other tenancies will probably need minor work to maintain the building's competitive position. Such minor works are estimated to cost $10 per square metre, indexed to inflation.

In 19A5, therefore, Tenancy D will need 204 square metres of carpet replacing at a cost, then, of $51 per square metre including minor works. This amounts to $10,404.

In 19A7, the remaining 1,690 square metres will require attention. Of this, only 640 square metres (Tenant A) will not require minor works. The total cost in 19A7 is estimated to be $85,270.

The preceding calculations are based on the assumption that all tenants will exercise their options to renew. This should be verified as far as possible by interviewing the tenants and ascertaining their intentions. It is useful to draw up a lease expiry schedule which reflects both assumptions – that is, that options will be exercised and that they will not be exercised (or such other profile that emerges from the interviews). Such a schedule for the subject property is presented in Table 10.8.

Table 10.8
Lease Expiration Schedule

Year Ending	*Options not Exercised*		*All Options Exercised*	
	% space	*Cumulative %*	*% space*	*Cumulative %*
19A1	33.79	33.79	0.0	0.0
19A2	0.0	33.79	0.0	0.0
19A3	55.44	89.23	0.0	0.0
19A4	10.77	100.00	10.77	10.77
19A5	0.0	100.00	0.0	10.77
19A6	0.0	100.00	29.57	40.34
19A7	0.0	100.00	0.0	40.34
19A8	0.0	100.00	0.0	40.34

If options are not exercised, it may be seen that considerable releasing expenses would be incurred in 19A1–2 and 19A3–4; in the latter two years alone up to 65 per cent of the space could come onto the market so that market risk is intensified. By the end of 19A4 all the space would have come onto the market under this assumption. If all options are exercised, the lessor is in a better position. Under this assumption, only 40 per cent of the space comes onto the market between 19A4 and 19A6. Significant costs and possibilities of vacancies are thereby diminished. Good tenants are worth keeping.

A crucial item to include in the analysis is the vacancy factor. As with all the other items, historical data (even if available) is not necessarily a guide to the future – particularly if the economic cycle has changed recently. In view of this, a reasoned approach must he adopted.

Discussions with investors in this class of property indicate (let us say) that the allowance they make depends upon whether or not rent–free and rent–up periods are allowed for in the gross income estimates. In the example, this practice was followed because it makes the related assumptions explicit.

Given this, it is decided that a vacancy allowance in the first two years may realistically be set at 2 per cent of gross receipts. The lease expiry schedule suggests the allowance in Year 3 should be a little higher–4 per cent, say. As the projection period lengthens, uncertainty increases and there is always the risk that another building will be added to supply. From Year 3 onwards it is decided to add to this allowance. The result is as follows:

Year	*Vacancy Allowance %*
19A1	2.0
1942	2.0
19A3	4.0
19A4	5.0
19A5	5.0
19A6	6.0
19A7	6.0
19A8	7.0

It may be seen, therefore, that the vacancy factor for a given year is a prudential allowance for risk of income loss.

In the present case, these allowances are applied to total cash receipts.

Note that an allowance for loss of revenue has already been built into the income projections described above. For example, Tenancy F was assumed to require a rent–free period of three months on lease renewal in Year 7. In all such cases, the further assumption was made that the tenant would be. responsible for the payment of recoverable outgoings during such periods. Even when such tenants commence rental payments, the risk to income represented by the vacancy allowance is present.

Some analysts assume a zero vacancy allowance against space occupied by substantial tenants holding under a long–term lease. Where this is done, sound reasons should be advanced in support.

Estimating resale proceeds

The reader should now turn to the main cash flow Table 10.5:

The holding period is assumed, in this case, to be seven years. The projection period needs to be chosen with care and to reflect the policy of investors in the class of property concerned. It seems generally agreed that holding periods for investment properties range from five to ten years. For periods longer than ten years, estimates are hazardous, to say the least.

The cash flow projections extend for one year beyond the holding period because it is on the basis of Year 8 performance that a buyer at the end of Year 7 will ground the pricing decision.

Year 8 net income is capitalised to assess the sale price from which selling expenses are deducted. The latter are estimated to be 7 per cent in this example. This may seem high but it includes an allowance for a penalty for early discharge of the mortgage–most lenders impose a fee if the mortgage does not run its full term, or at least, for quite a number of years. The resale capitalisation rate needs to be chosen with care as well. Once again, reference should be made to investors' expectations. Given that the building will then be seven years older, probably more expensive to maintain and enjoy a less favourable market position, the resale capitalisation rate is usually chosen to be, say, 1 to 1.5 per cent higher than the purchase rate. Nevertheless, it is the expectation of investors that should be given predominant weight in selecting the rate. The decision is clouded by the difficulty in identifying a purchase capitalisation rate which is truly applicable. Further comment is addressed to this below.

The resale computation in the present case is straightforward. The net annual income is divided by the assumed resale capitalisation rate of 0.11 and the 7 per cent allowance for selling costs is deducted to give an estimate of $3,542,941 as shown near the end of the table.

Net cash flows

Recoverable outgoings are recouped from the tenants–usually on a proportion of space occupied basis. Practices vary in Australia from city to city and the valuer needs to adopt local usage.

Gross receipts therefore comprise rental income and the like plus recoverable outgoings. Note that if leasable space is vacant, the lessor must pay the associated recoverable outgoings and, therefore, the vacancy allowance is applied to the total of the two.

Non–recoverable outgoings, as the title suggests, comprise those expenses which the lessor cannot recover from lessees. These are self explanatory.

The next few lines summarise some of the information set out above to derive net operating income estimates for each year. This line represents the cash receivable by the owner before the payment of income or capital gains tax and debt service. It will be seen that the estimated resale price is added to the net operating income in Year 7 to give an estimate of the terminal year cash flow.

Present value of the net cash flows

Finally, the net operating income for each year is converted into present value at the typical investor's target rate for this class of property. Each is summed to give an estimated present value of, in this case, $2,730,196 using the target rate of 15 per cent.

As with other items, the target rate selected must be capable of being supported. It should be ascertained from active investors and verified, where possible, by analysing recent comparable sales.

Having done so, check the result for reasonableness. For example, the adopted rate of fifteen per cent might fairly be regarded as being made up as follows:

Current yield from indexed bonds:	5 %
Margin for illiquidity:	3 %
Margin for anticipated inflation:	4 %
Margin for suburban location:	3 %
Total:	15 %

The current yield from indexed bonds may be regarded as the risk–free rate to which allowances for sources of risk are added. These are frequently a matter of judgment made by investors and which should be known to the valuer. In this case the geometric mean of inflation expected over the next eight years is 3.7 per cent – say, 4 per cent. (The numbers cited above are, of course, hypothetical and used for illustrative purposes only.)

The return of 15 per cent does not take account of acquisition costs. If these are estimated at, say, 6 per cent, they would amount to $163,812 and the internal rate of return would be 13.74 per cent. There is an anomalous situation in valuation practice whereunder prices forecast for properties are not adjusted for acquisition costs except in the case of development projects considered in Part VI below. These costs will, however, be brought into the after–tax analysis illustrated in Part V of this chapter in computing capital gains tax.

If the valuer is acting for an intending vendor, the instructing party is interested in the price expected excluding acquisition costs. Furthermore, comparisons with recently–sold comparable properties traditionally ignore such costs. If the instructing party is an intending purchaser, acquisition costs should be reported and the return achieved after such costs have been met should be quoted.

The next step in the analysis would be to conduct sensitivity and related tests. Before illustrating these, we pause to discuss the use of direct capitalisation – the opening topic of this chapter.

Direct capitalisation

It will be recalled that, in Part I of this chapter, the method of estimating value using direct capitalisation was restricted to the case where passing rents were at the current market level for both the subject property and the comparable properties from which the overall rate was derived.

Part II of this chapter investigated the modified DCF method. From this it was concluded that, apart from physical, locational and management comparability, this extended also to rent review frequency, the length of the term periods and the term to reversion income ratio.

It was for reasons such as these that the caveat announced in Part I of this chapter was stressed.

The present example also illustrates why the method of direct capitalisation has to be applied with great care in those cases where the conditions noted in considering the modified DCF method are not met–term to reversion income ratio, and so forth.

For present purposes, assume the property was sold for $2,730,000. The initial yield, or all risks capitalisation rate, is $258,210 + $2,730,000 or 9.46 per cent.

Note, however, that there is a considerable lift to net operating income in Year 2 of ($352,714 – $258,210) or $94,504. Using this as an estimate of "stabilised net annual income", the yield becomes 12.92 per cent. If the present value of Year 2 income is used, the overall rate, becomes 9.77 per cent.

Furthermore, gross rental income (office rents and parking bays: the first two lines of the cash flow table) is never equal to current market rent. Relying on the assumptions adopted to compute market rental value each year, it is instructive to compare them with the estimated passing rent:

Year	*Estimated Market Rental Value $*	*Estimated Passing Rent $*	*Difference $*
19A1	347,470	254,577	92,893
19A2	359,631	350,172	9,459
19A3	372,218	370,058	2,160
19A4	385,246	375,185	10,061
19A5	402,097	389,313	12,784
19A6	419,690	406,029	13,661
19A7	441,737	407,643	34,094
19A8	465,166	445,996	19,170

Each year, passing rent is less than estimated market rent–the magnitude of the difference depends on the rent, review pattern, the occurrence of rent–free periods and the rate at which rental values change.

Assume that expenses are as estimated. Given this, the net operating income for Year 1, based on current rental values, would be ($258,210 + $92,893) or $351,103. If the price were $2,730,000, the all risks yield would then be 12.86 per cent. In fact, to infer this would be to distort the relationship established in the market; with a higher first–year income, the investment would be more desirable in the marketplace, the bid price would rise and the all risks yield would be less than 12.86 per cent.

The fact that capitalising the actual Year 1 net income at 9.46 per cent results in the purchase price of $2,730,000 is a product of the further fact that the purchase price is the capital equivalent of the cash flows received over the holding period discounted at the target rate of 15 per cent.

From this it follows that the selected capitalisation rate must be taken from recent sales of comparable properties *having cash flows that also are comparable*. This is precisely the point made in Part III.

The reader needs to note very carefully that the cash flows do not necessarily have to be identical; rather, they must be comparable. *In the case of the continuing example, it would be possible to have different patterns of cash flow in Years 2 and onward which,* **WITH THE FIRST YEAR INCOME FIXED,** *produce the same present value.*

Once the reader understands this, then will dawn the realisation of just how difficult it is to select with precision recently–sold properties having cash flows that are comparable with those forecast for the subject property in order to identify a relevant capitalisation rate. This innate variability is one reason why there is no general real estate pricing model. Valuations are always case studies and the valuer should be educated in the strengths and weaknesses of the case study method.

In practice, and realising the world is an imperfect one, the valuer proceeds by classifying capitalisation rates for recently–sold properties having similar locational and physical characteristics. The classification principle hinges around the length of time it is anticipated will elapse before the building achieves something like its full rental potential. Crude classes may be those which already have done so, those which should do so in one year, those in two years and those for which it will take longer.

Adopting this approach, the subject property is in the second class–that is, one year to enjoying a fuller revenue. Recently–sold properties falling into that class are analysed to ascertain the capitalisation rates achieved on sale. The spread of those rates would be used to estimate the transaction zone assessed for the subject property. It is likely that the median of such rates would be used to assess the most probable price. The greater the number of sales for which reliable data is available, the better. This was discussed previously in reviewing the application of comparable sales to price estimation.

Part of the rationale for this approach lies in the fact that the discounting process from Year 3 on has the effect of dampening expectations that far, or further, out in time (see the effect in the "present values" line of Table 10.5.

Hence, even when the method of direct capitalisation is used, attention has to be given to the pattern of expected cash flows if a valid rate is to be chosen–in short, one needs to go at least some of the way in performing a DCF analysis: the very point made at the conclusion of Part III.

As the illustrative example suggests, passing rent and current market rent are rarely, if ever, identical. The "true" market yield, as a product of current market rental value, is probably never known. In the absence of information on passing rents and their likely course, the mere knowledge of a purchase price is insufficient for use in the income capitalisation process (it may, however, be sufficient if using the quality point rating approach). The capitalisation technique, to be validly applied, makes severe demands on the quality of data. To impute current rental values to the space because the passing rentals are unknown and then compute a capitalisation rate using the obtained price can be a very misleading procedure. The price fetched is a product of the passing rents and expectations, not of market rents: rarely will the two coincide. Valuation and uncertainty are indeed inseparable.

On the features of direct capitalisation and price imputation using DCF analysis, some further comment is in order before proceeding further with the present example.

COMMENTS ON THE CAPITALISATION AND DCF METHODS

It is frequently overlooked that direct capitalisation is a forecasting tool. The numerator is a forecast of income deemed to endure in perpetuity. Defining the numerator is, like all forecasting, not without difficulty. The possibilities are that it is the actual first year of net income, the second year of net income or an estimate of "stabilised net annual income". The latter acknowledges the reality that cash flows are rarely smooth, continuous phenomena but begs the question of how to derive it apart from adopting some A3ustment process which may not be market based. The problem is particularly vexing in the case of estimating the value of a new building which is still renting up or one in which recent lettings are associated with significant incentives. Difficulties such as these are reviewed in Chapter 12.

In view of this, it may be advocated that the second year is, in some way, more typical of the investment's ability to generate cash. As noted above, however, the ability to make this judgment with credibility relies upon the ability to assess the cash flow pattern – at least during the close in years. Hence, one becomes involved in a DCF analysis, even if it is for a short period.

To overcome these problems or, rather, to mitigate their effect, it is probably best to capitalise the first year of income and refer to this as the "initial yield" as defined earlier in this chapter. One then needs to select from comparable data initial yields obtained in the market for investments having similar income prospects–as discussed above. This, however, brings us back to the point just made: one must be able to predict cash flows in the short run for both subject and sold properties to ensure comparability.

Were one to compute capital value using the three measures of income suggested, how does one interpret any one of them or the differences between them? This presents the valuer with a very considerable difficulty, given that the valuation report is also a communications device and all three cannot be market value.

This is a fundamental difficulty which needs to be recognised. As pointed out earlier in this chapter, the problem of interpretation did not arise some decades ago when income streams were stable. Under those conditions, passing rent and market rental value were the same and the capitalisation rate and the internal rate of return were identical–or near enough so. Because income was stable, the forecasting problem reduced itself to estimating accurately the true passing income. Such stable conditions meant that the capitalisation rate was a measure of profitability (return on capital) and also disclosed the actual provision for the return of capital. Furthermore, those conditions permitted valid comparisons between different investments.

When variability of cash flow is brought into the analysis – which it must be – it is soon realised that the models inherited from stable times are of limited usefulness. Irregularity of income brings with it forecasting difficulties in addition to other problems which it is beyond the nature of a capitalisation rate to solve. Let us consider some of them.

In the continuing example, investors' required yield for this class of property is established at 15 per cent. The initial yield of (about) 9.5 per cent of itself is no indicator as to whether or not the target rate is met. It is of no help in comparing investments in other opportunities such as securities. Related to this, it makes no distinction between return on capital and return of capital both are implied only.

The simple use of a capitalisation rate does not disclose the significance of the reversion value (the net proceeds of sale) on present worth. If the original outlay is not recouped at the time of sale, some of the periodical income has to be set aside for this purpose–in which event the actual rate of return is less than that which might be inferred from a knowledge of the capitalisation rate alone.

As noted earlier, the capitalisation rate impounds within it expected outcomes which are not defined. Of itself, it does not quantify anticipated changes in key variables such as gross incomes and the costs necessarily incurred in supporting this income. A static model, by definition, cannot make dynamic elements explicit. Neither does it make explicit recognition of possible changes in the value of the reversion: recall that the building would be expected to sell, at the end of. the holding period, at a somewhat higher capitalisation rate. The use of this method tempts one to ignore these important issues–a risk to professionalism.

Given the impact that a host of factors have on the prices investors will pay. from time to time, capitalisation rates derived from actual transactions soon become irrelevant in a changing investment environment. Consider, for example, the impossibility of adjusting accurately a set of capitalisation rates obtained from a period in which interest rates and income taxation laws were different. The difficulty lies in the fact that their effect, along with that of myriads of others, cannot be disentangled from a raw capitalisation rate. Compensating effects cannot be identified either.

All these observations, and others that could be offered, simply amount to stating that the capitalisation rate does not permit one to understand the structure of the investment decision process or the financial facts of the investment being valued. Because of this, it is dangerous to use it as a standalone decision tool.

For all of these effects, the capitalisation rate does, however, have two potential advantages. First, if adequate comparable data is available, it may be a suitable predictor of price. Second, it gives a clue as

to the cash generated in the initial stages and this is a measure which some investors use as a preliminary screening device.

Concerning the second of these, it may be regarded as a crude measure of liquidity in that it is a rough indicator of the amount of cash available to the investor to meet requirements external to the investment itself. This could be an important portfolio consideration, for example. During the holding period, there must be sufficient cash available to service the debt and equity positions from year to year. This important topic is reviewed in Part V of this chapter.

Its accuracy in forecasting price depends upon meeting the requirement of comparability stressed above. Estimated capital value is sensitive to small changes in the capitalisation rate. Referring to the continuing example, a rate of 10 per cent results in capital value estimate of $2,582,100. If the rate is changed to 12.0 per cent, the corresponding estimate is $2,151,750.

The major recurring criticism of the DCF approach is that it is a way of deriving a higher value by using unreal growth rates. This, however, is a criticism of the user of the technique–not of the technique itself.

Another criticism is that it is very difficult, if not impossible, to derive useful forecasts for a few years ahead–let alone for five to ten years generally adopted in DCF analyses. This is true, of course, but it ignores the fact that investors do make projections.

As illustrated above, DCF analysis forces the analyst to take explicit account of the timing and magnitude of all component cash flows over the holding period. Therefore it imposes a degree of rigour on the analytical process which the method of direct capitalisation cannot. It is, nevertheless, important to understand the conditions requisite to the valid use of the technique.

As regards income, it is improper simply to take the current aggregate passing income and assume a rate of change over the holding period. As illustrated above, each income source must be separately identified and decisions taken as to the most likely consequences of important events triggered under the relevant documentation. It is only in this way that adequate allowances can be made for changes in income and related costs such as vacancies, rent–free periods or other incentives, releasing fees and tenants' improvements.

As regards costs. items of expenditure need to be sufficiently disaggregated so as not to mask different trends within the same broad class. As with income estimates, anticipated rates of change, by class of item, must be made explicit. Again it is improper to take current aggregate costs and escalate them 'Over the holding period at an assumed gross rate.

Information must be obtained as to investors' target rates and their calculus has to be replicated in the analysis. This requires a close study of interest rates, response to the current position in the real estate and economic cycle, expansion or contraction in the supply of money and the strength of competing investments from the real estate market and beyond it.

Because all elements are made explicit in a proper DCF analysis, it dissolves a great deal of the mystery surrounding the use of direct capitalisation. For example, it allows one to incorporate different assumptions as to varying market absorption rates, it distinguishes between the return on capital and the return of capital and it makes comparison between different classes of investment possible. It enables an identification of changes in risk at points along the time path mapped by the analysis. For instance, periods of high refurbishment costs can be identified and the available net cushion of cash likely to be available at that period. Negative cash flows can be identified for incorporation into the investor's overall capital budget.

Whilst it makes the needed distinction between income and reversion, it requires for the latter a forecast of the capitalisation rate assumed on resale. In this respect it is vulnerable to the weaknesses inherent in the capitalisation approach–but not to the same extent. To be sure, the question arises here, too, of the representativeness of the income level in the final year of the projection, the rate to adopt and the pattern of future net cash flows as perceived by buyers at that time.

The general practice is that illustrated above–that is, use a resale rate which reflects the fact that the building will be older, less competitive and offering a shorter time for capital recovery by the new owner. The valuer needs to be acquainted with investors' practices and adopt the same rate. The terminal year income may have to be adjusted if though necessary. However, the process of discounting the reversion to present value at the investors' target rate diminishes a certain portion of the error component.

There are certain cases where the DCF approach is almost mandatory. This is when there is inadequate sales evidence or information on net incomes from which to deduce a capitalisation rate, when the building is still being rented, when lettings entail extensive incentives or when the instructing party incorporates non–market criteria in the value definition to be adopted.

In practice, the valuer has to use all the information available. Where investors base their decision on the results of a DCF analysis, the valuer should proceed likewise but check the result by applying a market derived capitalisation rate if a comparable one can be identified from a reasonable number of sales. Both methods are sensitive to the assumptions underlying them and it is simple prudence to check one result against that obtained from the other. The DCF method has the commendable quality of forcing the analyst to make explicit all assumptions. In the hands of an experienced valuer, it can be a very powerful aid in estimating probable price.

These observations need to be tempered with the strategic issues reviewed in Chapter 3 concerning the choice of method. These were the nature of the problem, the available data, the cost of assembling it and the skills possessed by the particular valuer. As instanced there, if the valuation has been called for by an intending mortgagee or equity partner, the mere estimation of present value using direct capitalisation addresses only a small part of the client's special concerns. Only a DCF analysis can reveal those points on the time path where risk of default would appear to be greatest. This knowledge is a prerequisite to formulating an effective property and loan Management strategy – to the advantage of all concerned.

The importance of defining the problem at the very start cannot be overemphasised. Much confusion on issues such as value definition and choice of method dissolves when this eminently sensible first step is carefully thought through.

SENSITIVITY ANALYSIS

Since the DCF model forces the valuer to make all assumptions explicit, it confers the ability to test how sensitive the outcome is to variations" in those assumptions. This is not possible with the unaided direct capitalisation approach.

Given that passing rents and costs can be accurately ascertained, the major assumptions bearing on the final result are the rates of change adopted. It is true that other factors can change over the term of the projection such as the costs of selling, but these tend not to have as major an effect.

A great deal will depend, naturally, on the "causal" relationships built into the model. In the continuing example, the assumption was made that rents will vary directly with inflation. Not only is it likely that estimated inflation rates will transpire to be different from those predicted, but the relationship between that and rental change also could differ from expectation.

Crucial assumptions are the first elements to be investigated by varying them within bounds deemed reasonable on any sensible view of the future and ascertaining the extent to which the value estimate is sensitive to them. Hence the words "sensitivity analysis".

Apart from probing the valuation for weak points in this way, there is a second reason why a valuation should include a sensitivity analysis. This is because any client having a prospective commercial interest in the property is concerned also to understand sources of risk.

Each of these aspects is now reviewed and illustrated.

Table 10.9 sets out, in no particular order, the impact on present value of making the individual variations listed. The reader should carefully note that, in sensitivity analysis, the items are varied singly. Consider the resale capitalisation rate. Without altering any other values, the valuation is reworked on the assumption that this rate is changed from 11 per cent (as in the original) to, say, 13 per cent. It may be seen that this lowers the present value to $2,525,285 – or, a reduction of $204,911.

To test a change in the resale costs, the resale capitalisation rate is left at 11 per cent so that the only difference is to raise resale costs to, say, 8 per cent. It may be seen that this has little effect on the present value.

Because the change in the resale capitalisation rate had a greater effect than raising resale costs, the result is said to be "more sensitive" to variations in it than to resale costs.

Scanning the results in Table 10.9, it may be seen that the variables which have the greatest effect on present value (as judged by the range in the results for an item) are:

- inflation (– $80,658 to $462,263)
- margin of office rents above inflation (– $152,598 to $166,038)
- investors' required return (–$204,911 to $133,193)
- resale capitalisation rate (–$234,420 to $265,473)
- vacancies (– $115,989 to – $38,663).

Some of these are a product of the structure of the particular model that has been adopted. Given the assumption that rental growth will always be 0.5 per cent above the inflation rate, the impact of changes to the inflation rate is increased on this account alone.

This discloses the crucial importance of the growth rate assumption which, it will be readily seen, is related to most of the others.

Table 10.9
Sensitivity Results

	IRR	*Present Value*	*Initial Yield %*	*Net Resale $*	*Change in Present Value*	*Change in Net Resale*
Inflation						
Start at 8%	18.40	3192459	8.088	4450404	462263	907463
Start at 2%	14.34	2649538	9.745	3387725	–80658	–155216
Rent margin over inflation						
2.5%	16.29	2896234	8.915	3866831	166038	323890
Zero	14.68	2690825	9.596	3466668	–39371	–76273
–1.5%	13.73	2577598	10.017	3248565	–152598	–294376
Car bay fee escalation						
4.5%	15.10	2742435	9.415	3566497	12239	23556
No escalation	14.69	2691375	9.594	3469257	–38821	–73684
–1%	14.60	2681351	9.630	3450525	–48845	–92416
Investors' required return						
17.0	17.0	2495776	10.346	3542941	–234420	0
16.5	16.5	2551713	10.119	3542941	–178483	0
14.0	14.0	2858759	9.032	3542941	128563	0
13.0	13.0	2995669	8.619	3542941	265473	0
Resale capitalisation rate						
13%	13.27	2525285	10.225	2997873	–204911	–545068
12%	14.08	2619203	9.858	3247696	–110993	–295245
10%	16.04	2863389	9.018	3897235	133193	354294
Lease negotiation fees						
8%	14.99	2729347	9.456	3542186	–849	–755
9%	14.99	2728498	9.455	3541432	–1698	–1509
Resale costs						
8%	14.88	2715875	9.507	35048 44	–14321	–38097
6%	15.11	2744518	9.408	3581037	14322	38096
Vacancies						
Add 3%	14.06	2614207	9.056	3392120	–115989	–150821
Add 2%	14.37	2652870	9.190	3422393	–77326	–120548
Add 1%	14.69	2691533	9.324	3492667	–38663	–50274

The rate of capital change over the holding period is a derived quantity' being a product of the growth rate and other assumptions. For this reason it is not separately tested. In the illustrative example, it transpired to be 4.87 per cent per annum. This usually is a key variable and should be reported along with the valuer's opinion as to whether it is typical for the class of property concerned. In doing so, the valuer should take a fairly long view, especially if the market is expanding or contracting abnormally. Growth rate assumptions in boom times are frequently unrealistic and are based on relatively short–term expectations. The position is usually analogous

when the market is in recession. Even though the DCF analysis incorporates growth assumptions currently adopted by investors, the valuer should report the extent to which they are consistent with historical facts.

With the crucial variables identified, the valuer can subject them to close scrutiny and revise them if necessary. Following such revision, the effect that varying them has on estimated capital value should be reported upon.

The analyses reported above were offered in the context of identifying critical variables so the assumptions underlying them can be reviewed and the valuation strengthened. This really is for the valuer's benefit. If acting for a potential purchaser, the valuer would need to allow for the effect of acquisition costs. This will not alter the identification referred to nor their ranking in degree of sensitivity. The decision to include such costs or not depends upon the nature of the assignment. If included and comparisons made with recently sold similar properties, prices should be adjusted accordingly as discussed in Chapter 9.

In addition to changes such as those just illustrated, there is no reason why time series could not be altered so as to change their trend. For example, the trend in inflation and/or vacancies could be varied over the entire holding period–or for just a part of it.

Valuable as it is, sensitivity analysis has several drawbacks. First, it is difficult to review results if several variables are altered at the same time. Part of the reason for this is that a number of the component series will be correlated in time–that is, the elements of the model will not be independent of each other. This can bring about unanticipated effects difficult to untangle. If, or instance, rents are expected to increase, then rates and taxes also will increase together with management charges and re–letting fees.

Secondly, and related to the first reason, when certain parameters change, there is a resulting adjustment in the investment market which is difficult to pre–calibrate. For example, as inflation increases, investors' desired return also changes (it probably lags behind it) and so, to be more realistic, a change in inflation should be accompanied by a change in the rate of return incorporated in the model. The relationship between these two is unclear, however, and it is thereby difficult to model over the whole of the projection period.

Thirdly, the analyst needs to know the limiting effect a change has which will cause the investment to be rejected. This brings us to the second reason for conducting sensitivity analyses.

Unacceptable loss

To what extent can a project tolerate change in a crucial variable? To answer this question, the valuer needs to know at what point the project incurs an unacceptable loss. Defining that point will depend largely on the particular investor's cost of capital rate and risk/reward profile.

It is generally accepted that, other things, being equal, an investor will accept a risky investment only if the returns offered are sufficient to offset that risk. Some investors are risk averse while others are risk takers. An individual's attitude to risk may vary during the life cycle; older people usually avert risk whilst, in their younger years, they may have been prepared to accept a much higher level. A great deal of the risk/ reward mm. is rooted in the psychology of the individual–for which view, the short essay by Dick (1989) is of interest. The interested reader should refer also to Hillier (1963), Swalm (1966), Ratcliff and Schwab (1970) and Young (1977).

If the investor's cost of capital is known, this, when used as the target rate, defines the price that should be paid so that debt and equity capital can be serviced. To this a margin for project specific risk is added and the sensitivity tests reduce to ascertaining the extent to which a variable must change to eliminate this margin–but no more.

Assume the investor's average cost of capital is 13 per cent. Recall from the discussion in Chapter 8 that any project meeting this rate will earn sufficient to pay the cost of borrowed funds and leave a surplus sufficient to pay dividend's on equity capital. If a project is deemed to be riskier than that typical for the asset class the investor trades in, then a margin for such risk needs to be added. The extent of the margin will depend upon the perception of risk and reward. Nevertheless. assume that this margin is assessed to be 2 per cent. Given this, the target rate would be 15 per cent. The rate the project must attain, is, 13 per cent, in default of which the ability to service. the sources of capital will be eroded. If it returns less than 13 per cent, it would then produce a loss.

There is more than one way to proceed. Most analyses use the internal rate of return as the criterion. The investment, as analysed in Table 10.5, shows an internal rate of return of 15 per cent on the assumption of a purchase price of $2,730,196. With the purchase price fixed, the sensitivity analysis may now be carried out to some purpose for it reduces: to answering the question to what extent does a variable have to be altered to produce an internal rate of return of 13 per cent? What is the likelihood of such an alteration? We take the sensitive variables in turn.

As inflation and rental growth are locked together in the model, these aspects of sensitivity can be tested by varying the margin that office rents are assumed to achieve above inflation. Recall this was set at 5 per cent.

A trial and error process yields the following approximations:

Margin over inflation: a margin of –2.68 per cent added to the original inflation pattern as an estimate of office space rents gives an internal rate of return of 13.0 per cent.

Alternatively, if the original margin of 0.5 per cent is retained, the test indicates that inflation in year 19A1 would fall to 0.32 per cent (3.00 – 2.68) to produce the same result.

Investors' required rate of return: as shown in the sensitivity Table 10.9, decreasing the required rate of return to 13.0 per cent results in a present value of $2,995.669. To purchase at this price would leave, no margin to cover project specific risk. Project performance at any point below expectation would result in a loss.

Resale capitalisation rate: if this is increased to 13.36 per cent, the internal rate of return is lowered to 13 per cent.

Vacancies: vacancies over budget lead to shrinking income and a lower return than expected. This test also can be viewed as studying the effect of a decline in rental income since, if vacancies rise, rents have to fall (or the equivalent in incentives has to be offered) if occupancy is to be maintained.

For the continuing example, vacancies would have to commence at 8.25 per cent and 'be incremented as provided for in the original estimates – that is, 11.25 per cent in years 19A4 and 19A5, 12.25 per cent in the next two years and 13.25 per cent in 19A8.

The valuer must then consider to what extent these deviations from the original estimates are likely. They are summarised for convenience:

Office rent margin over inflation: – 2.68 per cent.

Change in investors' rate of return to 13.0 per cent: purchase price becomes $2,995,669–that is, $265,473 more than the analysis suggests.

Resale capitalisation rate: 13.36 per cent.

Vacancies: commencing at 8.25 per cent.

Depending upon one's view of the future, it may be decided that none of these eventualities is likely. In present value terms, the margin of $265,473 may be regarded as a fairly reasonable one and it may also be reasonably likely that rental growth will exceed 0.32 per cent in the initial years. In terms of covering project specific risk, they are equivalent, of course.

Following such analyses, the valuer would report the results together with an estimate of the possibilities. It would then be for the client to consider the findings in the light of the client's particular risk/ reward preference.

Note that this kind of information is useful to clients in their decision making. The valuer who merely reports an estimate of probable price without taking the work a little further is not helping the client as much as possible and fails to demonstrate that valuers can do more than that. When done competently. the relevance of the, profession becomes more widely recognised and accepted.

SCENARIO ANALYSIS

It was noted above and it should now be abundantly clear that sensitivity analysis has some disadvantages. These revolve around the difficulty of varying more than one variable at a time and determining the conditions which mark the limits to be tested in any variable–in short, just how much variability should be built into the analysis?

Scenario analysis involves the valuer defining one or more scenarios that are plausible. Frequently two cases are formulated: a most optimistic one and a most pessimistic one. These boundaries define the limits within which any outcome for the investment is deemed to fall. They should not be chosen without thought or reason–merely to erect an hypothesis about the future for the sake of doing so is counter productive. The scenarios are a product of likely future events that will have an impact on the investment and should be reasoned statements. Obviously, much will depend upon the actual situation and the view taken of the future by the analyst. Alternatively, the future prospects may be drawn following review by a panel of experts. The following discussion is illustrative only; in an actual case, the analysis would need to be far deeper.

The scenarios may be derived from a review of macro influences or from consequences arising out of actions in the real estate market–or some combination.

In this illustration the assumption is made that the macroeconomic prospects are stable but the investment could be affected by actions in the local market.

For the pessimistic scenario, assume it has just been learned that a nearby site has been purchased by Tenant E subject to rezoning permission issuing from the planning authority for the erection of a small office building having a rentable area of 900 square metres.

A discussion with Tenant E about future intentions has been rather inconclusive but it may safely be assumed that the lease will not be renewed three years hence. It is not difficult to surmise that Tenant E's space requirements will be for about half of the new building and that, say, 450 square metres of new space will be available for rent in about three years' time.

Recall from Table 10.8, which sets out the lease expiry schedule, that 55 per cent of space is due for renewal in the same year (1 9A3) if options are not exercised. Will any of the present tenants be induced to relocate into the new building? There will be insufficient space for Tenant A who currently occupies 640 square metres but if this tenant exercises the renewal option at the end of 19A I, the next option will not be due until 19A6. Hence, Tenant A, it seems, will not be a taker for the new building. However, Tenants B and C (both 210 square metres) are candidates if their space requirements will not expand by 19A3.

Tenant B is a small wholesaler without stocks and has been slowly expanding operations over the last six months with some family members working from home in selling goods from sample. It is likely that this tenant will relocate when the current lease term expires.

Tenant C is an engineering consultant who has a younger brother due to graduate in engineering in two years' time and who will join the firm then, at which point larger premises will be required.

This information strongly suggests that Tenant C will not renew the present lease and this space also will have to be relet by the end of 19A3.

Prudence suggests that the vacated space may remain vacant for six months of 19A4, during which period the investor has to pay the quantum of recoverable outgoings proper to that space.

Added market supply may cause the resale capitalisation rate to increase slightly–say from 11.0 per cent to 11.5 per cent.

These prognostications are incorporated in the analysis to give the results set out in Table 10.10. The net present value is now $2,659,015. Although the amended rental schedule is not reproduced here, the reader should note that this brings about a new rent review pattern for Space E and a change in car bay income.

If the property had been purchased for $2,730,196 and if the pessimistic scenario came to pass, the internal rate of return would drop to 14.42 per cent. This is still satisfactory in terms of the criteria adopted for the sensitivity analyses (that is, 13.0 per cent before the project fails to service the debt and equity positions).

With the pessimistic scenario the discount rate should not be set at the risk free rate because risk and difficulty still attend. Even if there were none, such a return would not enable the investor to cover the cost of capital.

The optimistic scenario proceeds in a similar way.

TABLE 10.10
Pessimistic Scenario

	19A1	*19A2*	*19A3*	*19A4*	*19A5*	*19A6*	*19A7*	*19A8*
INCOME								
Office Rents	218197	306050	323620	289020	340669	357698	356493	394821
Parking Bays	36380	44122	44782	46735	48644	50696	51150	54307
Office Partition Rent	9000	9270	9548	9835	10228	10637	11169	11727
Naming Rights	5000	5150	5305	5464	5682	5909	6205	6515
TOTAL RECEIPTS	**268577**	**364593**	**383255**	**351053**	**405223**	**424941**	**425017**	**467370**
RECOVERABLE OUTGOINGS								
Statutory Charges								
Municipal Rates	13200	13662	14140	14635	15294	15982	16861	17788
Water, Sewerage & Drainage Rates	12950	13403	13872	14358	15004	15679	16542	17451
Land Tax	9000	9315	9641	9978	10427	10897	11496	12128
Total Statutory Charges	**35150**	**36380**	**37654**	**38971**	**40725**	**42558**	**44898**	**47368**
Insurance	5900	6166	6443	6733	7103	7494	7981	8500
Air Conditioning								
Maintenance Contract	3200	3296	3395	3497	3637	3782	3971	4170
Electricity	14400	14904	15426	15966	16684	17435	18394	19405
Plant Overhaul	600	618	637	656	682	709	745	782
Total Air Conditioning	**18200**	**18818**	**19457**	**20118**	**21002**	**21926**	**23109**	**24357**
Lift Maintenance								
Maintenance Contract	2000	2060	2122	2185	2273	2364	2482	2606
Electricity	1920	1987	2057	2129	2225	2325	2452	2587
Plant Overhaul	300	309	318	328	341	355	372	391
Total Lift Maintenance	**4220**	**4356**	**4497**	**4642**	**4838**	**5043**	**5307**	**5584**
Cleaning	17000	17510	18035	18576	19319	20092	21097	22152
Maintenance								
Painting	0	0.	2700	0	0	0	3200	0
Repairs, Replacements	2500	2575	2652	2732	2841	2955	3102	3258
Total Maintenance	**2500**	**2575**	**5352**	**2732**	**2841**	**2955**	**6302**	**3258**
Common Area Electricity & Power	2040	2111	2185	2262	2364	2470	2606	2749
Servicing Fire Equipment	360	371	382	393	409	425	447	469
Security	1500	1545	1591	1639	1705	1773	1861	1955
Pest Control	200	206	212	219	227	236	248	261
Toilet Requisites	1700	1751	1804	1858	1932	2009	2110	2215
Audit Fees	575	592	610	628	653	680	714	749
Management Fees	8000	8280	8570	8870	9269	9686	10219	10781
TOTAL RECOVERABLE OUTGOINGS	**97345**	**100661**	**106792**	**107641**	**112389**	**117347**	**126899**	**130397**
NON RECOVERABLE OUTGOINGS								
Rent Review & Re–Leasing Fees	798	257	1427	398	2969	501	2236	624
Tenants' Improvements	0	0	0	0	10404	0	85270	0
Legal Fees	750	773	796	820	852	886	931	977
Accounting Fees	500	515	530	546	568	591	620	652
Structural Repairs	1000	1030	1061	1093	1136	1182	1241	1303
TOTAL NON RECOVERABLE OUTGOINGS	**3048**	**2574**	**3814**	**2857**	**15930**	**3160**	**90298**	**3556**
TOTAL OUTGOINGS	**100393**	**103236**	**110606**	**110498**	**128319**	**120507**	**217197**	**133953**
CARRY DOWN:								
Total Receipts	268577	364593	383255	351053	405223	424941	425017	467370
Add: Recoverable Outgoings	97345	100661	106792	107641	112389	117347	126899	130397
TOTAL CASH	**365922**	**465254**	**490047**	**458694**	**517611**	**542288**	**551916**	**597767**
Less Vacancy Allowance	7318	9305	19602	22935	25881	32537	33115	41844
Net Receipts	358603	455949	470445	435759	491731	509750	518801	555923
Less All Outgoings	100393	103236	110606	110498	128319	120507	217197	133953
NET OPERATING INCOME	**258210**	**352714**	**359839**	**325261**	**363412**	**389244**	**301604**	**421970**
NET CASH FLOW	**258210**	**352714**	**359839**	**325261**	**363412**	**389244**	**3714059**	**421970**
PRESENT VALUES	**224531**	**266702**	**236600**	**185969**	**180680**	**168281**	**1396252**	
TOTAL PV	**2659015**						**Resale:**	**3412455**
IRR on price of $2,730,196	**0.1442**						**% Growth:**	**0.0471**

TABLE 10.11
Optimistic Scenario

	19A1	*19A2*	*19A3*	*19A4*	*19A5*	*19A6*	*19A7*	*19A8*
INCOME								
Office Rents	218197	306322	330846	336391	357178	373950	383095	422758
Parking Bays	36380	44180	46558	47372	48905	50885	51576	54662
Office Partition Rent	9000	9270	9548	9835	10228	10637	11169	11727
Naming Rights	5000	5150	5305	5464	5682	5909	6205	6515
TOTAL RECEIPTS	**268577**	**364922**	**392257**	**399060**	**421994**	**441381**	**452045**	**495663**
RECOVERABLE OUTGOINGS								
Statutory Charges								
Municipal Rates	13200	13860	14553	15281	16197	17169	18371	19657
Water, Sewerage And Drainage Rates	12950	13598	14277	14991	15891	16844	18023	19285
Land Tax	9000	9450	9923	10419	11044	11706	12526	13403
Total Statutory Charges	**35150**	**36908**	**38753**	**40691**	**43132**	**45720**	**48920**	**52345**
Insurance	5900	6254	6629	7027	7519	8045	8689	9384
Air Conditioning								
Maintenance Contract	3200	3296	3395	3497	3637	3782	3971	4170
Electricity	14400	15120	15876	16670	17670	18730	20041	21444
Plant Overhaul	600	618	637	656	682	709	745	782
Total Air Conditioning	**18200**	**19034**	**19907**	**20822**	**21988**	**23221**	**24757**	**26396**
Lift Maintenance								
Maintenance Contract	2000	2060	2122	2185	2273	2364	2482	2606
Electricity	1920	2016	2117	2223	2356	2497	2672	2859
Plant Overhaul	300	309	318	328	341	355	372	391
Total Lift Maintenance	4220	4385	4557	4736	4970	5216	5526	5856
Cleaning Maintenance	17000	17510	18035	18576	19319	20092	21097	22152
Painting	0	0	2700	0	0	0	3200	0
Repairs, Replacements	2500	2575	2652	2732	2841	2955	3102	3258
Total Maintenance	**2500**	**2575**	**5352**	**2732**	**2841**	**2955**	**6302**	**.3258**
Common Area Electricity And Power	2040	2142	2249	2362	2503	2653	2839	3038
Servicing Fire Equipment	360	371	382	393	409	425	447	469
Security	1500	1545	1591	1639	1705	1773	1861	1955
Pest Control	200	206	212	219	227	236	248	261
Toilet Requisites	1700	1751	1804	1858	1932	2009	2110	2215
Audit Fees	575	592	610	628	653	680	714	749
Management Fees	8000	8400	8820	9261	9817	10406	11134	11913
TOTAL RECOVERABLE OUTGOINGS	**97345**	**101673**	**108902**	**110943**	**117016**	**123432**	**134645**	**139990**
NON RECOVERABLE OUTGOINGS								
Rent Review And Re-Leasing Fees	798	306	1930	506	2308	631	2975	788
Tenants' Improvements	0	0	0	0	10404	0	85270	0
Legal Fees	750	773	796	820	852	886	931	977
Accounting Fees	500	515	530	546	568	591	620	652
Structural Repairs	1000	1030	1061	1093	1136	1182	1241.	1303
TOTAL NON RECOVERABLE OUTGOINGS	**3048**	**2624**	**4317**	**2965**	**15 269**	**3290**	**91037**	**3720**
TOTAL OUTGOINGS	**100393**	**143296**	**113219**	**113908**	**132285**	**126722**	**225682**	**143709**
CARRY DOWN:								
Total Receipts	268577	364922	392257	399060	421994	441381	452045	495663
Add: Recoverable Outgoings	97345	101673	108902	110943	117016	123432	134645	139990
TOTAL CASH	**365922**	**466594**	**501159**	**510004**	**539010**	**564813**	**586689**	**635653**
Less Vacancy Allowance	7318	9332	20046	25500	26950	33889	35201	44496
Net Receipts	358603	457262	481113	484503	512059	530924	551488	591157
Less All Outgoings	100393	104296	113219	113908	132285	126722	225682	143709
NET OPERATING INCOME	**258210**	**352966**	**367893**	**370595**	**379775**	**404202**	**325806**	**447448**
NET CASH FLOW	**258210**	**352966**	**367893**	**370595**	**379775**	**404202**	**4288913**	**447448**
PRESENT VALUES	**224531**	**266893**	**241896**	**211889**	**188815**	**174748**	**1612361**	
TOTAL PV	**2921133**						**Resale:**	**3963107**
IRR on price of $2,730,196	**0.1647**						**% Growth:**	**0.0554**

Again, much will depend upon the particular situation and perceptions of future events. By way of illustration, assume that the planning authority is reviewing the provisions of the existing planning scheme. One of the options envisages the suburb we are concerned with as being devoted to high–rise residential use. In fact, this option sees the local sub-region absorbing a substantial proportion of future population growth by infilling and redevelopment

If this option is adopted, the subject property will be in a monopoly position. It already enjoys a very convenient location but the adoption of the proposal will reinforce its market position as it will have no nearby competition.

Buoyed by this prospect, it is now judged that rental growth will be much stronger and is now anticipated to be 2 per cent above inflation. The resale capitalisation rate will likely be lowered to 10.5 per cent because the property will now be a more desirable investment.

These parameters are changed to produce the results set out in Table 10.11 from which it may be seen that the optimistic estimate is $2,921,133 and an internal rate of return on $2,730,196 of 16.47 per cent.

There is no reason why a series of scenarios cannot be thought through and the results from each derived. Where the future is clouded by a number of possibilities, scenario analysis is frequently useful in assisting the decision process. Additionally, the review of the various prospects could well result in changing a great many of the parameters built into the model – not just the few used here. The initial model should be built so as to facilitate this objective if possible. It is far easier to alter the required values in a spreadsheet and recompute the results than to fashion a new one for each scenario.

The results for each would represent a range of estimates of probable price–one for each envisaged set of circumstances. For present purposes, however, we leave it at two–one optimistic and one pessimistic.

Scenario analysis and price estimation

The valuer has now arrived – at the stage where price estimates have been derived for (in our case) three futures: one pessimistic, one most likely and one optimistic. The cases representing the outer limits also express the transaction zone while the result associated with the most likely outcome represents the most probable price. After rounding, the results would be reported as follows:

Transaction zone: $2,660,000 to $2,920,000
Most probable price: $2,730,000.

It is not necessary for the most probable price to bisect the transaction zone.

Having derived these estimates, the valuer would check the results using another method. Perhaps this would be direct capitalisation, as discussed above, or some other approach such as quality point rating.

PARTITIONING THE INTERNAL RATE OF RETURN

In the scenario analyses, the internal rate of return was used as an important benchmark for decision making. It is necessary for the reader to understand that the structure of this measure of return can be portrayed as a byproduct of a DCF analysis. This cannot be achieved with the direct capitalisation method, however.

It is possible to partition the cash flow in a number of ways. In what follows, the most commonly accepted manner is illustrated, following the contributions of Valachi (1978), Zerbst (1980) and Chester (1986). Other approaches are suggested by Dilmore (1985) and Healy and Teetsel (1992).

The benefits of real estate investment (leaving the effects of financing and taxation aside for the moment) may be regarded as those arising from cash flow and cash proceeds from resale. These major two components may be further subdivided as follows:

Cash flow:	Maintaining year 1 cash flow
	Growth in cash flow
Cash proceeds:	Equity recapture
	Net appreciation

These will be evaluated using the continuing example.

Year 1 cash flow is the present value of $258,210 per annum for seven years at 15 per cent. The reader should verify that this is $1,074,262.

Cash flow growth is net operating income for each year less Year 1 income. For the example:

Year	*Cash Flow*	*Less*	*Change*	*Present Value*
$	*$*	*$*	*$*	*at 15.0%*
19A 1	258,210	258,210	0	0
19A2	352,714	258,210	94,504	71,459
19A3	361,428	258,210	103,218	67,868
19A4	362,720	258,210	104,510	59,754
19A5	364,672	258,210	106,462	52,930
19A6	387,020	258,210	128,810	55,688
19A7	301,604	258,210	43,394	16,313
Total				324,012

Equity recapture is the return of the original equity investment over the holding period. This is the present value of $2,730,196 over seven years at 15 per cent which is $1,026,382.

Net appreciation is (sale price) – (costs of sale) – (original equity). Substituting:

($3,809,609) – ($266,673) – ($2,730,196) = $812,740.

The present value of the net appreciation of $812,740 over seven years at 15 per cent is $305,539.

These are summarised in the following display which also shows their total and percentage of the total:

	$	*Per Cent of Total*	*Per Cent of IRR (15%)*
Year 1 cash flow	1,074,262	39.35	5.90
Growth in cash flow	324,012	11.87	1.78
Equity recapture	1,026,382	37.59	5.64
Net appreciation	305,539	11.19	1.68
Total	2,730,195	100.00	15.00

The total present value tallies with that shown in Table 10.5 to within $1 of rounding error.

Of the 15 per cent internal rate of return, the two growth factors, in association with the other components, account for just under one quarter. The major sources of benefit (about 77.0 per cent) are due to maintenance of the initial cash flow and recoupment of the purchase price at the end of the holding period. One would, perhaps, characterise the investment as providing security combined with ease of management.

The individual components are not independent, of course. In combination they produce the overall return of 15 per cent. Each acts in association with the others.

In the same way, the internal rate of return associated with the two scenario analyses can be partitioned with the following results:

	Per cent of Internal Rate of Return	
	Best Case	*Worst Case*
Year 1 cash flow	5.52	6.06
Growth in cash flow	1.83	1.70
Equity recapture	5.64	5.64
Net appreciation	2.01	1.60

The scenarios have little effect on the sources of risk to the overall return. This is because the structure of the investment is little changed.

Partitioning the internal rate of return is a useful means of identifying the sources of risk to investment performance. If, for example, a very large part of the return relies upon only one or two components, they are the ones which need to be further studied as to their likelihood of failure and which would need to be continuously reviewed during the holding period.

FURTHER APPLICATIONS OF DISCOUNTED CASH FLOW ANALYSIS

To the advantages of the cash flow approach reviewed above one should add that of asset management. A detailed cash flow analysis, setting forth the sources of income and outgoings over the holding period and from which the components of the overall return are identified, is an essential tool for monitoring performance. As soon as any item departs significantly from expectation, control measures can be put in hand to remedy the situation. It therefore gives purpose to an asset management plan. This is not possible in the absence of such an analysis. Valuers are capable by virtue of their training of rendering a wide range of useful services to clients in addition to the simple reporting of a value estimate.

Part V – After–Tax Cash Flow Analysis

INTRODUCTION

Most clients will find it beneficial if the valuer presses the study beyond the point reached with a scenario analysis. As an obvious example, take the case of a client who is an intending mortgagee. Here the focus is on the ability of the property to perform in such a fashion that debt service potential is assured and that risks to the borrower and to the lender are identified as far as possible. The equity investor client, too, is vitally concerned to ascertain whether equity is at risk and, if so, in which year of the holding period this is most likely. The client who requires a valuation for sale purposes needs to understand the calculations a potential buyer is likely to make in the process of formulating negotiation strategies. The same applies for an intending buyer.

In addition to such considerations, and having taken the work this far, the valuer needs to review it and ascertain if the indicated value makes good sense from the point of view of the most probable buyer type. This is best done by extending the analysis to the after–tax stage.

This Part sets out the kinds of analyses referred to, analyses that informed valuers must be in a strong position to offer as part of their professional service. The treatment is compressed a little because an excellent review of the issues we now turn to is available in Pyhrr, Cooper, et al (1989) and Rowland (1993)–to whom the reader is referred for a fuller account.

PRELIMINARY CONSIDERATIONS

Before constructing an after–tax cash flow analysis, certain preliminary steps are required. These entail detailed calculations showing the obligations under the relevant financing arrangement (or arrangements) and the annual depreciation charges that may be claimed for income taxation purposes.

Financing obligations

Here the valuer calculates the periodic repayments of principal and interest together with the balance owing at the end of each period.

In the illustrative case, the facility contemplated is a loan on first mortgage in the amount of 60 per cent of the value of the property. In the previous section this was estimated at $2,730,000. Sixty per cent of this is $1,638,000. It would be unusual for the loan to be calculated as a percentage of the acquisition price plus costs of purchase. It will be recalled these amounted to $163,812.

The terms of the proposed mortgage include equal monthly repayments of principal and interest. The interest rate will be fixed at 9 per cent for the first five years, after which the rate will be reviewed. Inquiry reveals the general expectation among borrowers and lenders that interest rates on first mortgages over properties such as the one considered here will increase by 2 per cent after five years. The loan provides for a balloon repayment at the end of 12 years. Payments over that period will be based on a term of 25 years. The mortgage also provides for a penalty on early discharge and this is included in the assessed resale costs.

Given this information and expectation regarding future interest rates, the first step is to calculate a mortgage amortisation table for the seven–year holding period as follows:

Year	*Interest Payment*	*Total Payment*	*Principal Payment*	*Remaining Balance*	*Effective Mortgagee Constant*
19A1	1645952	146,541	18,411	1,618,128	.1019
1.9A2	164,952	144,814	20,138	1,597,990	.1032
19A3	164,952	142,925	22,027	1,575,963	.1047
19A4	164,952	140,859	24,093	1,551,869	.1063
19A5	164,952	138,599	265354	1,525,515	.1081
19A6	188,954	166,707	22,247	1,503,268	.1257
19A7	188,954	164,133	24,821	1,4785447	.1278

* Switch to 11 per cent on $1,525,515 over 20 years.

The effective mortgage constant is the total annual payment divided by the remaining balance. The effective cost of borrowing increases as equity increases. The reader may better appreciate this if it is regarded from the point of view of an investor – which the lender certainly is. At the beginning of 19A3, the lender has $1,597,990 invested in the project for which a "dividend" of $164,592–or 10.47 per cent–is received that year.

These facts will form part of the after–tax cash flow analysis presented below.

Depreciation or building write–off

The building comprises a gross building area of 2,391 square metres and was erected for a contract sum of $2,150,000 five years ago.

The word "depreciation" is used rather loosely because it is, in this context, a mechanical calculation quite unrelated to loss in value per se. The concept, which is a very "untidy" one, is reviewed in detail in the following chapter.

Mechanical depreciation allowances attach to the property and the, remaining balance available to the buyer comprises an important consideration in the acquisition decision. In the present case, the original cost comprised the following elements:

	$
Non–depreciable assets:	122,000
Original carpets:	56,280
Plant and equipment:	387,000
Depreciable part of the building structure	1,584,720
Total:	2,150,000

The original carpets were written off by the vendor and have just been replaced at a cost of $66,290. All these items may be depreciated using the declining balance method except for the building structure which is depreciated on a straight line basis over 40 years.

To illustrate the declining balance method, take the case of the plant and equipment costing $387,000. Let us say this may be depreciated, under the income taxation law, at 9 per cent. The depreciation schedule follows:

Year	*Opening Balance* $	*Less Depreciation at 9%* $	*Remaining Balance* $
1	387,000	34,830	352,170
2	352,170	31,695	320,475
3	320,475	28,843	291,632
4	291,632	26,247	265,385
5	265,385	23,885	241,500
19A1*	241,500	21,735	219,765
19A2	219,765	19,779	199,986
19A3	199,986	17,999	181,987
19A4	181,987	16,379	165,608
19A5	165,608	14,905	150,703
19A6	150,703	13,563	137,141
19A7	137,141	12,344	124,797

* This is the opening balance used in the ensuing cash flow analysis.

The new owner in 19A8 would continue to claim a depreciation allowance under this heading starting with $124,797 unless a different sum was entered on the contract of sale–in which case certain income taxation consequences may follow–but such issues are beyond the scope of this work.

Other depreciable items coming into consideration over the holding period are:

Cost of carpets just installed: $66,290. Cost of carpets to be installed in 19A5: $8,160. Cost of carpets to be installed in 19A7: $72,670.

The cost of tenants' improvements foreshadowed in the various years is assumed to be expensed against income.

It is assumed that carpets may be depreciated at the rate of 24 per cent per annum using the declining balance method. The reader should prepare a depreciation schedule for these last three items and sum the yearly amounts over the holding period.

The amount available at the outset for building depreciation was $1,584,720. This sum may be depreciated on a straight line basis over 40 years–that is, $39,618 per annum. The reader should prepare depreciation schedules for all these items and sum the yearly amounts over the holding period.

The rates adopted must mirror those allowed under the current income taxation law. This varies from time to time and the valuer needs to keep abreast of tax treatments. The assumptions adopted are for illustrative purposes only.

CONSTRUCTING THE AFTER–TAX CASH FLOW TABLE

The reader should refer to Table 10.12. Take the case of the first year, 19A1.

Net operating income is transferred from Table, 10.5. For 19A1 this is $258,210. Cash flow before paying income tax is this sum minus mortgage interest and reduction of principal (the latter two are, of course, the mortgage repayment amount).

Before tax cash flow is, therefore, $93,258. This is frequently abbreviated as BTCF and often referred to as "cash throw–off."

To compute income tax liability, depreciation is deducted but, because principal repayment is not an allowable deduction, this latter is added back in to give taxable income of $34,406.

Income tax is assumed in this example to be at the corporate rate of 39 per cent, Applying this gives an income tax liability in 19A1 of $13,418.

The tax flow before income tax is now carried down. From this the tax computed above is deducted to give after–tax cash flow (often abbreviated as ATCF) of $79,840. This is also referred to as "spendable cash after tax".

TABLE 10.12
After Tax cash Flow Analysis

	19A1	*19A2*	*19A3*	*19A4*	*19A5*	*19A6*	*19A7*
Net operating income	258,210	352,714	361,428	362,720	364,672	387,020	301,604
Less mortgage interest	146,541	144,814	142,925	140,859	138,599	166,707	164,133
Less principal repayments	18,411	20,138	22,027	24,093	26,354	22,247	24,821
Before tax cash flow	93,258	187,762	196,476	197,768	199,719	198,066	112,650
Less depreciation	77,263	71,488	66,806	62,981	61,789	58,703	73,600
Plus principal repayments	18,411	20,138	222,027	24,093	26,354	22,247	24,821
Taxable Income	34,406	136,412	151,697	158,880	164,284	161,610	63,871
Income tax at 39%	**13,418**	**53,201**	**59,162**	**61,963**	**64,071**	**63,028**	**24,910**
c/d before tax cash flow	93,258	187,762	196,476	197,768	199,719	198,066	112,650
Less income tax	13,418	53,201	59,162	61,963	64,071	63,028	24,910
Cash flow after tax	**79,840**	**134,561**	**137,314**	**135,805**	**135,648**	**135,038**	**87,740**
Selling price	2,863,277	3,002,845	3,149,215	3,302,721	3,463,709	3,632,544	3,809,609
Less selling expenses	200,429	210,199	220,445	231,190	242,460	254,178	266,673
Less inflation adjusted price	2,980,828	3,070,253	3,162,360	3,257,211	3,387,520	3,523,021	3,699,112
Taxable gain	-317,981	-277,607	-233,590	-185,701	-166,271	-144,755	-156,236
Less capital gains tax at 39%	0	0	0	0	0	0	0
Less mortgage balance	1,618,128	1,597,990	1,575,963	1,551,869	1,525,515	1,503,268	1,478,447
Net proceeds of sale	**1,044,719**	**1,194,655**	**1,352,807**	**1,519,661**	**1,695,734**	**1,874,998**	**2,064,489**
IRR on initial equity after tax	0.0296	0.1403	0.1718	0.1829	0.1866	0.1864	0.1821
Unleveraged IRR after tax	**0.0441**	**0.0894**	**0.1039**	**0.1102**	**0.1134**	**0.1155**	**0.1151**
Capital value growth:	0.0487						
Total acquisition cost	2,894,008						
Inflation:	0.0300	0.0300	0.0300	0.0300	0.0400	0.0400	0.0500
Initial equity	1,092,196						
Target rate	0.1500						
Purchase price	2,730,196						

The cash flow table is commonly constructed to show the position as if the building were sold at the end of each year. It is the writer's firm view that this should be the norm because, in this way, the investor is able to gauge change in financial position from year to year. Lenders, too, are able to assess their position from, period to period.

This requires an assumption as to the sale price likely to be fetched at the end of each Year. Usually this is computed on the compound interest principle. Reference to Table 10.5 shows the expectation that the building would sell for $3,809.609 gross in 19A7 ($419,057 ÷ 0.11). This is equivalent to a *compound Interest* growth in capital value of 4.8744 per cent per annum. Applying this percentage on an annual basis gives the forecast sale price at the end of each year. For 19A1 this is $2,863,277. Other bases could be met incorporated into the analysis and the valuer should use that which is most sensible having regard to the circumstances of the case. In some cases, linear (that is, constant annual) growth may seem appropriate. In other cases a careful assessment may be made of the building's competitive position in each year, the course of future property prices in the submarket, trends in interest rates and other such factors in assessing annual realisable values.

From the assessed price of $2,863,277 in 19A1, the net sale proceeds need to be estimated because this is an element in the flow of cash anticipated in this year. The items are selling costs, taxation of capital gains (if any), the outstanding mortgage balance and mortgage pre–payment penalty.

Selling costs are estimated at 7 per cent, as before, and this amounts to $200,429.

Capital gains tax is levied on capital value growth exceeding – inflation that is, growth in real money terms. The inflation assessment for 19A1 is 3 per cent. For the purpose of calculating capital gains tax, the initial acquisition, costs are added to the purchase price. Hence, to the price of $2,730,196 purchase costs of $163,812 are added and the total is inflated by 3 per cent to $2,980,828 (that is $2,730,196 x 1.06 x 1.03. The price, in this presentation, has not been rounded to $2,730.000 as it was carried at $2,730,196 in the spreadsheet prepared for this analysis).

At the end of 19A1, the selling price is estimated to be $2,863,27 1.This, less selling costs of $200,429 and less the inflated figure of $2,980,828 is negative – that is, –$317,980

As the real gain in capital value is negative, no capital gains tax is incurred or 19A1. In fact, the building avoids this impost throughout the holding period.

The next deduction is the mortgage balance of $1,618,128 to give net proceeds of sale in 19A1 of $1,044,7 19.

Year 19A1 after tax cash flow is, therefore, made up of the following items:

Equity:	– 1,092,196
Year net rent:	+ 79,840
Net proceeds of sale:	+ 1,044,719

The internal rate of return for 19A1 is calculated on the two figures $1,092,196 and ($79,840 $1,044,719) $1,124,559. The result is 2.96 per cent as shown. The equity outlay is the initial value minus the amount of the mortgage ($2,730,196 – $1,638,000,). This is an after–tax IRR which reflects the impact of borrowing.

It is important for the reader to become familiar with the procedures just described and check the calculations for the other six years manually.

UNLEVERAGED IRR AFTER TAX

Borrowing incurs a level of financial risk for the mortgagor. Is the added benefit worth that risk? One way to probe this is to compute the IRR after tax on the basis that there was no borrowing. If the resulting return is less than that produced on the basis of borrowing, then it is favourable to that extent.

To do this, the cash flow after tax that would be produced without debt service is derived and, from. this, the IRR is calculated.

There are several ways of computing this. One of these is now illustrated with reference to the data for year 19A2.

The first step is to calculate cash flow to total capital after tax. For year 19A1 this is:

(Equity cash flow after tax) + (mortgage payment)
– (interest payment x income tax rate).

Substituting:

$79,840 + $164,952 – ($146,541, x 0.39)
= $187,641

To elucidate, it may be helpful to start at a different level in. the cash flow:

	$
Net operating income:	258,210
Less income tax:	13,418
	244,792

The amount of $244,792 overstates what the cash flow would be if there were no borrowing. Taxation is less because of the interest deduction allowable in computing the quantum of tax. Hence, from this figure it is necessary to subtract the tax "saved" by virtue of the interest deduction. This is the amount of the interest multiplied by the tax rate. Thus:

	$
Carry down:	244,792
Less $146,541 x 0.39	57,151
Cash flow after tax unlevered	**187,641**

as before.

The figure for 19A2:

	$
$134,1561 + $164,952 – ($144,814 x 0.39) =	243,035

Net resale:

$3,002.845 – $210,199 =	2,792,646
Total:	**3,035,681**

Summarising for 19A2:

	$
Beginning	2,730,196
19A1	+ 187,641
19A2	+ 3,035,681

for which series the IRR is 8.94 per cent, as entered in Table 10.12.

It may be seen that, excepting 19A1, the leveraged IRR exceeds the return obtainable if there were no borrowing. Hence, borrowing, in this case, is favourable. Whether the augmented return is sufficient to more than offset financial risk introduced by borrowing is a decision for management.

RATIO ANALYSIS

As ratios are used in the analysis of company revenue 'accounts and balance sheets, so also are they employed in the performance analysis of income earning properties. There is a plethora of such ratios. The interested reader is referred to Canestero (1990) for a review of 25 of them. Those presented here are the most commonly used and will be found in Pyhrr, Cooper, et al (1989). Some were presented in Part II of this chapter and in Chapter 6.

They are subdivided into three groups: profitability ratios, risk, ratios and those used to test the basic assumptions of the cash flow analysis. We take each group in turn – Table 10.13 refers.

Table10.13
Ratio Analysis

	19A1	19A2	19A3	19A4	19A5	19A6	19A7
Profitability Ratios:							
NOI/ Total Cost	0.0946	0.1292	0.1324	0.1329	0.1336	0.1418	0.1105
BTCF /Initial Equity	0.0854	0.1719	0.1799	0.1811	0.1829	0.1813	0.1031
ATCF/ Initial Equity	0.0731	0.1232	0.1257	0.1243	0.1242	0.1236	0.0803
ATCF+Equity Buildup ÷ Initial Equity	0.0900	0.1416	0.1459	0.1464	0.1483	0.1440	0.1031
ATCF+Equity Buildup + Appreciation ÷ Initial Equity	0.2118	0.2694	0.2799	0.2869	0.2957	0.2986	0.2652
Risk Ratios:							
Debt Coverage Ratio	1.5654	2.1383	2.1911	2.1989	2.2108	2.0482	1.5962
Break-even Point	0.7251	0.5764	0.5604	0.5530	0.5642	0.5732	0.7359
End of Year Loan Balance ÷ Original Cost	0.5927	0.5853	0.5772	0.5684	0.5588	0.5506	0.5415
Property Value	0.5651	0.5322	0.5004	0.4699	0.4404	0.4138	0.3881
Risk Absorption Ratio	-0.1204	-0.0100	0.0236	0.0371	0.0430	0.0444	0.0400
Basic Assumption Test Ratios:							
NOI/ Property Value	0.0902	0.1175	0.1148	0.1098	0.1053	0.1065	0.0792
Gross Rent Multiplier	7.8248	6.4542	6.4047	6.6303	6.6917	6.7279	6.9025
Operating Expenses ÷ Gross Possible Income	0.2744	0.2219	0.2249	0.2218	0.2455	0.2232	0.3935
Gross Effective Income	0.2800	0.2264	0.2343	0.2335	0.2584	0.2374	0.4187

Profitability ratios

Net operating income to total cost: The value of this ratio for 19A1 is:

$$\frac{\$258,210}{\$2,730,196} = 0.0946$$

It is a measure of productivity relative to the total capital invested. In the illustrative case, it rises each year except the last. This should be compared with the effective mortgage constant (set out above in the repayment schedule); for ease of convenience both sets of figures are repeated:

	NO1 ÷ Total Cost	*Effective Mortgage Constant*
19A1	0.0946	0.1063
19A2	0.1292	0.1032
19A3	0.1324	0.1047
19A4	0.1329	0.1063
19A5	0.1336	0.1081
19A6	0.1418	0.1257
19A7	0.1105	0.1278

If the return on investment (first column) is less than the effective mortgage constant, the situation is one of negative leverage – the borrower would be better placed putting the money out on mortgage, In this case, leverage is positive except for the, first and last years. We have seen that the first year is rather atypical, being burdened with certain rent–free periods whereas the last year has some major refurbishment costs charged to that year's income. Given positive leverage, the return on equity exceeds the return on investment. That this is so for the years where leverage is positive is shown below.

Before Tax Cash Flow ÷ Initial Equity: For 19A1 this is

$$\frac{\$93,258}{\$1,092,196} = 0.0854$$

In the years of positive leverage, the return is increased to the advantage of the equity position. This is the cash–on–cash return before tax.

After Tax Cash Flow ÷ Initial Equity: This is the same ratio as just considered but in the numerator one adds the amount of income tax saved (if any) or deducts the amount of tax paid. It is therefore a test of the tax effectiveness of the investment.

Because the illustrative case offers no tax shelter, this ratio is uniformly less than the one just considered.

After Tax Cash Flow + Equity Buildup Initial Equity. The figures comprising this ratio in 19A1 are

It adds the effect of equity buildup (that is, principal repaid in the year concerned) to the previous

$$\frac{\$79,840 + \$18,411}{\$1,092,196} = 0.0900$$

ratio, After 19A4, cash flow after tax is decreasing this is reflected in the previous ratio. Equity buildup proceeds as each mortgage payment is made and this, too, is reflected in the present ratio. This effect is favourable from 19A3 to 19A5 after which the ratio declines its the effect of the new mortgage arrangements begin to bite and cash flow is less in 19A7 for the reason just given.

After Tax Cash Flow + Equity Buildup + Appreciation ÷ Initial Equity: To the numerator of the previous ratio is added the change in gross selling price over the year. For 19A1 it is

$$\frac{\$79,840 + \$18,411 + (\$2,863,277 - \$2,730,196)}{\$1,092,196} = 0.2118$$

To the previous ratio, this one adds the effect of capital appreciation. It may be seen that this effect offsets the unfavourable influences reviewed above – even in the final year. This is an accounting rate of return which ignores the time value of money and the costs of sale. While it measures productivity as ranging from 21.18 per cent to 26.52 per cent in the last year, it should be remembered that the true yield after tax is measured by the IRR on initial equity shown in Table 10.12 – that is, from 2.96 per cent in 19A1 to 18.21 per cent in 19A7.

To summarise: The project reaches overall profitability except for the atypical years. At this level of borrowing it offers no tax savings in any year and would therefore be unsuitable to an investor seeking a shelter against other income. The effect of rental concessions diminishes profitability while the projected financing arrangements set to take effect in the last two years., coupled with some refurbishing also reduce profitability. This suggests the desirability of negotiating a different loan facility of spreading refurbishment costs due in Year 19A7 over a longer period or, perhaps, deferring them altogether. Perhaps a higher level of maintenance designed to extend the life of fittings would enhance overall profitability. The analysis suggests sonic positive ingredients for an asset management plan.

Risk ratios

Essentially, the risk ratios test the ability of the investment to spin off sufficient cash to service the debt and equity positions and point to those years when the project is most likely to lack capacity in that regard. Once again, they will be reviewed in turn, showing calculations for 19A1.

Debt Coverage Ratio: the debt coverage ratio represents the lender's viewpoint. It is net operating income divided by debt commitments of principal and interest. For 19A1:

$$\frac{\$258,210}{\$146,541 + \$18,411} = 1.5654$$

This indicates that mortgage obligations are covered just over 1.5 times by net income. From the lender's perspective this is a very favourable situation. For every dollar of debt service, 19A1 income is $1.57 – there is a $0.57 cushion to cover the lender's position.

For this kind of property, the debt coverage ratio might be expected to be around 1.2 – so the financing plan would seem to be somewhat conservative.

Since the ratio increases for most years, the indication is one of increasing liquidity and, hence, decreasing risk to the lender.

Break Even Point. this ratio is often referred to as the "default ratio" and represents the point of view of the equity position. It is the sum of operating expenses (Table 10.5) and debt service divided by gross income ("Total Cash" in Table 10.5). For 19A1:

For every dollar of gross income, some $0.72 is committed to meeting building outgoings and debt service in 19A1. Hence, for this year, some $0.28 is available to meet vacancies not allowed for in estimating gross income (such as the rent–free allowances incorporated in Table 10.5) plus dividends to the equity owners. It measures liquidity from the owner's point of view and the risk that no dividend will be paid.

As a building ages its upkeep is more costly. Hence, one would expect this ratio to decline over the years. From year 19A2 through year 19A6, the ratio is very favourable and again indicates a conservative borrowing policy. The higher ratio in 19A7 is due to the causes noted above.

Ratios Derived From End of Year Loan Balance: both these ratios measure the effect of leverage as the balance owing declines. The ratio based on cost, for 19A1 and 19A2 is:

19A1	19A2
$\frac{\$1,618,128}{\$2,730,196} = 0.5927$	$\frac{\$1,597,990}{\$2,730,196} = 0.5853$

That based on assessed value is:

The interpretation is based on a comparison of the two, not necessarily on a review of the trends

$$\frac{\$1,618,128}{\$2,863,277} = 0.5651 \qquad \frac{\$1,597,990}{\$3,002,845} = 0.5322$$

in one of them. Looking at cost, the ratio declines from about 59.0 per cent to about 54.0 per cent – not a startling difference.

On a value basis, the ratio declines from about 57.0 per cent to around 39.0 per cent – a more dramatic drop.

This indicates a decline in risk over time and suggests the desirability of refinancing in year 19A6 when the divergence between the two is more marked.

In summary, the project presents a very comfortable cushion of protection to both equity and non–equity positions. The suggestion remains that the borrowing plan, at least in the first five years, is conservative. Perhaps a higher level of borrowing would lead to some tax savings.

The risk absorption ratio

Part of this ratio was presented in Chapter 8 in comparing investments with different lives. The present measure was introduced by Wofford and Gitman (1978).

Its formula for a given year of cash flow is:

RA Ratio = ((Equity Present Value – Initial Equity) ÷ Present Value Factor)) ÷ Initial Equity

For 19A2, the equity present value is the present value of the following series:

	$	$
Year 1		79,840
Year 2:		
Equity cash flow	134,561	
Net resale	**1,194,655**	**1,329,216**
Present value of both at 15.0%		**1,074,504**

The PV of $1 per annum factor for two years at 15 per cent is 1.6257.

Substituting:

RA Ratio for 19A2 = (($1,074,504 – $1,092,196) ÷ 1.6257) ÷ $1,092,196
= – 10,882.70 ÷ 1,092,196
= – 0.01

The annualised net present value measures the reduction in cash flow that can be accepted before net present value is equal to the initial equity. For 19A2 the result is negative, indicating that the present value of the equity cash flow is less than the initial equity and this is, of course, an unsatisfactory result for that year. The investor would have to inject $10,882.70 into the project in order for 19A2 performance to meet the target of 15.0 per cent. It is converted into a relative measure by dividing by the amount of the initial equity. In this form it "measures risk absorbing ability per dollar of investment" (Wofford and Gitman, op cit, p 94).

The ratio is negative for the first two years, indicating that the target rate is not met in these years (this is obvious from the "IRR on initial equity" figures in Table 10.12).

Basic assumption test ratios

These ratios are designed to test whether or not certain aspects of the cash flow analysis reflect basic assumptions that are sensible.

Net Operating Income ÷ Property Value: This is the overall capitalisation rate computed for each year. For 19A1 it is:

$$\frac{\$258,210}{\$2,863,277} = 0.0902$$

As a building ages, this ratio should increase unless the investment climate is an inflationary one. The result for 19A7 is out of line with the resale capitalisation rate assumed in the analysis and applied to 19A8 income. The 19A7 result is to be expected given the abnormal items affecting net income for this year. From a high in 19A2, it tends to decline thereafter. This suggests that the annual property value estimates need revision. Changes in net annual income seem somewhat out of line with the projected changes in property value. The valuer is alerted accordingly.

Gross Rent Multiplier: This ratio has been introduced above and in earlier chapters. It is selling price ÷ gross income for that year ("Total Cash" in Table 10.5). The figures for 19A1 are:

$$\frac{\$2,863,277}{\$365,922} = 0.2744$$

As operating costs increase with the years, this ratio should decline over time–unless times are inflationary. This is generally the case in the illustrative example. The results suggest, however, that

the operating cost levels for the last three years should be reviewed – another warning signal to the valuer.

Operating Expense Ratios: Again, as the building becomes older, operating expenses increase. This is generally so with the example case. Computations for 19A1 follow:

The numerator is from Table 10.5, entry "Less all outgoings":

$$\frac{\$100,393}{\$365,922} = 0.2744$$

Effective income is defined as gross income minus the vacancy allowance.

Ratio to Effective Income:

$$\frac{\$100,393}{\$365,922 - \$7,318} = 0.2800$$

MORTGAGE EQUITY COMPONENTS AND PROFITABILITY INDEX

The present values used in the construction of the risk absorption ratio may be used to convey additional information. Table 10.14 refers.

Take the case of the terminal year, 19A7. The present value of the equity cash flow is $1,274,031 – which the reader should verify.

This, when added to the mortgage amount (itself a present value–that is, the present value of the scheduled payments at the stipulated interest rate) gives an estimate of the value of the investment. In 19A7 this is

$
1,274,031
1,638,000
2,912,031

This exceeds the initial cost of $2,730,196. The ratio of the two is the profitability index (introduced in Chapter 8) and is 1.0666. The only difference from the treatment in Chapter 8 is that the numerator combines the present values of both debt and equity.

Hence, using the present value test, the project is acceptable because the obtained return exceeds the investor's hurdle rate–except for the first two years (compare IRR on initial equity after tax in Table 10.12).

Table 10.14 shows the calculation of present values and the profitability index for each year of the holding period. It may be seen that profitability (in present value terms) increases each year–given the validity of the initial projections.

PARTITIONING THE LEVERAGED INTERNAL RATE OF RETURN

Table 10.15 shows the partitioning of the leveraged internal rate of return on initial equity after tax, year by year. The procedures are essentially the same as illustrated previously when defining the components of the IRR before tax and financing.

Because the analysis has been taken to the further stages of identifying taxation impacts and the effects of borrowing, some extra categories can be distinguished.

Added factors are benefits derived from loan amortisation and tax savings (if any). In the present case there are no tax advantages, so this component is zero.

Table10.14
Mortgage Equity Components and Profitability Indices

	19A1	19A2	19A3	19A4	19A5	19A6	19A7
Present Value of Equity	977877	1074505	1150953	1207978	1249627	1275542	1274031
Total Debt	1638000	1638000	1638000	1638000	1638000	1638000	1638000
Indicated Value	2615877	2712505	2788953	2845978	2887627	2913542	2912031
Profitability Index	0.9581	0.9935	1.0215	1.0424	1.0577	1.0672	1.0666

Table 10.15
Partitioning of Leveraged Internal Rate of Return

	19A1	19A2	19A3	19A4	19A5	19A6	19A 7
Cash Flow:							
Year 1 Cash Flow	7.0996	12.0319	16.1047	19.5545	22.5241	25.1537	27.6990
Cash Flow Growth	0.0000	3.8529	6.9191	9.3774	11.4660	13.2835	13.6869
Tax:							
Tax Savings	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cash Proceeds From Resale:							
Equity Recapture	97.1222	76.9011	62.1472	51.0773	42.5159	35.8606	31.0092
Loan Amortisation	1.6372	2.8961	4.0346	5.0880	6.0762	6.8090	7.5933
Net Appreciation	–5.8590	4.3180	10.7944	14.9027	17.4178	18.8932	20.0116

The procedure is best understood by following the calculations for a year – 19A3, say. For this year, the related IRR is 17.18 per cent, which is the factor used in the following:

	$	$
Year 1 level of cash flow:		
PV $79,840 per annum for 3 years:		175,900.03
Cash flow growth:		
PV of $0 for 1 year	0.00	
PV of $54,721		
(i.e. $134,561 – $79,840) over 2 years	39,851.72	
PV of $57,474		
(i.e. $137,314 – $79,840) over 3 years	**35,719.96**	75,571.68
Equity recapture:		
PV of $1,092,196 due in 3 years		678,797.29
Loan Amortisation:		
PV of $18,411 for 1 year	15,711.73	
PV of $20,138 for 2 years	14,665.92	
PV of $22,027 for 3 years	13,689.73	
	44,067.38	

Net appreciation:
This is net proceeds of sale less initial equity less loan amortisation – all in PV terms:
$(1,352,807 – 1,092,196) = $260,611.
The PV of this sum due in 3 years = $161,969.13
From this is to be subtracted the PV of loan amortisation:

$161,969.13 – $44,067.38 =	117,901.75
Total	**1,092,238.13**

The total should be $1,092,196 which is the initial equity; the difference is due to rounding.

It is necessary to deduct the PV of loan amortisation in computing net appreciation; not to do so results in double counting.

Percentages of the total are as follows:

Year 1 cash flow:	16.11
Cash flow growth:	6.92
Tax savings:	0.00
Equity recapture:	62.15
Loan amortisation:	4.03
Net appreciation:	10.79
	100.00

The reader should check through the workings for the other years. Be sure to use the correct discount rate and check that, for each year, the sum of the discounted components is equal to the initial equity of $1,092,196.

To complete the picture, Table 10.16 sets out the annual partitioning of the unleveraged internal rate of return after tax. Computations are left as an exercise.

Table 10.16
Partitioning of Unleveraged IRR After Taxation

	19A1	19A2	19A3	19A4	19A5	19A6	19A7
Year one cash flow	6.5828	12.1001	16.9189	21.5194	25.7519	29.5444	33.3700
Cash flow growth	0.0000	1.7097	3.5959	3.7071	3.7365	4.1643	3.2268
Equity recapture	95.7799	84.2629	74.0960	66.4640	59.7626	53.5743	48.8587
Net appreciation	– 2.3627	1.9274	5.3892	8.3095	10.7489	12.7170	14.5445

It is instructive to review the partitionings derived in the previous section with that relevant to 19A7 after taxation and borrowing:

	Per Cent of 19A7 IRR		
	After tax Leveraged	**After tax Unleveraged**	**Before tax Unleveraged**
Year 1 cash flow:	27.70	33.37	39.35
Cash flow growth:	13.69	3.23	11.87
Tax savings:			
Equity recapture:	31.01	48.86	37.59
Loan amortisation:	7.59	–	–
Net appreciation:	20.01	14.55	11.19

Examine the first two columns–the two after–tax positions. The effect of borrowing is to reduce the concentration in the categories of Year 1 cash flow and equity recapture. Subtracting the two, component by component, and summing those of the same sign, shows that borrowing has caused a redistribution of some 23 per cent between categories. Year 1 cash flow is diminished because of the need to amortise the mortgage, there is less equity to recapture and net appreciation is less because of the need to repay the outstanding balance of the mortgage on resale. The overall effect is to diversify the sources of risk within the investment–less reliance is placed on more components. This consideration has portfolio implications which are beyond the scope of this book.

Whether the redistribution due to financing is into higher or lower risk categories is a decision for management. Ordinarily, one would expect that maintaining Year 1 level of cash flow is more likely to be achieved than cash flow growth. In like manner, one would also expect that equity recapture is a less risky source of benefit than capital appreciation.

The second and third columns show the before– and after–taxation partitionings where the impact of income tax is evident.

Now that the sources of risk have been identified, the investor is better able to judge whether the project meets investment requirements and its compatibility with the risk profile of other projects already in the portfolio.

It is important to recall that the cash flow can be partitioned in any number of ways deemed informative to the decision–maker. Chester (1986), for example, discusses partitioning on the basis of long and short–term leases. There are occasions when this would be useful as one would expect the proportion of return due to long–term leases would be less risky than that due to short–term ones.

SUPPLEMENTARY PERFORMANCE MEASURES

Table 10.17 sets out two sets of measures traditionally found useful.

The first panel shows cash flow as a proportion of net proceeds of sale for each year. This is the same kind of measure as the mortgage constant and brings property value performance into focus. The difference between the two shows the impact of income tax. These measures are of importance in periods of rapidly changing property values.

The last section shows the ratio between cumulative income and initial equity. For each year, the cumulative net income is added to the net proceeds of sale for that year and this total is divided by the initial equity. This is a type of payback period measure and gives a crude indication of how long, before and after tax, the initial equity may be regarded as being at risk if the property is sold at the end of the year concerned.

Table 10.17
Supplementary Performance Measures

	19A1	19A2	19A3	19A4	19A5	19A6	19A7
BTCF/ Net proceeds of sale	0.0893	0.1572	0.1452	0.1301	0.1178	0.1056	0.0546
ATCF/ Net proceeds of sale	0.0764	0.1126	0.1015	0.0894	0.0800	0.0720	0.0425
Cumulative cash flow/Initial equity:							
Before tax	1.0419	1.3511	1.6758	2.0096	2.3537	2.6992	2.9758
After tax	1.0296	1.2901	1.5606	1.8377	2.1232	2.4109	2.6648

CONCLUDING COMMENTS

This completes our treatment of the analysis and valuation of income earning properties.

Analysis precedes valuation. An income–earning property, even such a simple one as that comprising our case study, is a very complex phenomenon. To regard it as a static collection of bricks and mortar is to commit a profound error. The physical aspects are of great importance, of course, and in every case have to be subjected to the overall productivity analysis using the guidelines set forth in Chapter 5.

But above this, it is a dynamic set of interacting cash cycle enterprises, each of which needs to attain solvency – as discussed in Chapter 2. The valuer must recognise that each entity in the complex strives to divert cash to its account: the tenants need to achieve a level of turnover sufficient to meet overheads, pay a dividend and, of concern here, to pay rent. The local authorities need to fund their requirements out of building taxes (and from elsewhere); lenders need to be assured that their position is covered by sufficient net revenue to provide a cushion against risk–a comfort level.

Underlying all of these demands on solvency is the position of the investor. Equity funds will not be sunk into the project unless the investor is assured to a reasonable level of probability that all the enterprises concerned will spin off sufficient cash to cover their requirements and then have enough left over to assure servicing of the equity position for the duration of the investment.

For each of the actors, the test is the reasonable assurance that revenues will exceed claims to a sufficient extent to induce confidence to proceed.

As noted a few pages back, investors in income–earning properties regard them as cash–generating vehicles. If they generate sufficient cash to meet the requirements adverted to above, they may decide to buy–otherwise they will place their money elsewhere.

Recognising the dynamism of income–earning properties, the method of assessment that best equates to this is that of discounted cash flow. This approach releases a project from the cold abstraction encapsulated in a capitalisation rate, which reveals little of its vitality.

Even when the method of price estimation via the application of an overall capitalisation rate is the preferred method, the valuation should be taken to the stage of a DCF analysis for many reasons, some of which are now briefly reviewed.

A DCF analysis reveals whether or not the valuation is logical in its structure and outcome. Given typical financing arrangements and taxation positions, would the most probable buyer (an investor of one kind or another) purchase the property at the figure derived by the valuer? The analytical

approaches delineated above shed much light on the answer to this question. If such analyses indicate that, for example, growth rates seem unrealistic (in either direction) or that the ratio between income and expenses does not change in a logical way, then something is out of balance and the valuer's estimates need to be reworked.

The many ratios illustrated above enable comparisons to be made with other recently–sold properties of the same class. Comparison of ratios frequently discloses whether or not the present assessment is out of line.

The various ratios, of course, do not make decisions for us. Where they change over time, the valuer needs to trace through the reasons for the change by reviewing the elements comprising the numerator and the denominator. Having identified these, what are the implications for investment productivity and risk? Such a review merely suggests where further examination may fruitfully be commenced. Nevertheless, this approach makes it possible to "dig deeply" into the financial and operating aspects of the property. In like manner, such analyses carry forward into the asset management phase of property investment.

Whenever reliable data is to hand, the valuer should carry out an analysis along the lines set forth above–including the computation of such ratios as the data permit. With a number of sets in the data bank, an assignment can be undertaken with greater confidence and in such a way that comparisons can be made on as many important bases as possible. Guidelines for this were presented in Part II of this chapter.

Certainly in the 1990s,' and possibly beyond, account has to be taken of items such as rent–free periods, leasing and releasing incentives, and refurbishments. The only way to assess their impact is in a lease–by–lease discounted cash flow framework. Today's valuer has to become very familiar with the techniques discussed above in order to perform responsibly in the years ahead. The methods and accompanying mind–set of yesteryear are wholly unsuited to taking on the complexity that underlie contemporary real property decision making.

Part V1 – Development Projects

INTRODUCTION

Real estate development (or redevelopment in the case of improved properties) is the process of converting land to another. use or enabling the continuation of the present use at a different intensity.

Examples include the subdivision of a tract of land into a number of sites suitable for the erection of structures such as houses, factories, warehouses, etc.

The development of a block of home units also falls within the scope of this activity.

The end product of the process may be sold (as with home, units or developed sites) or rented (as with a block of rental flats, an office building or a shopping centre).

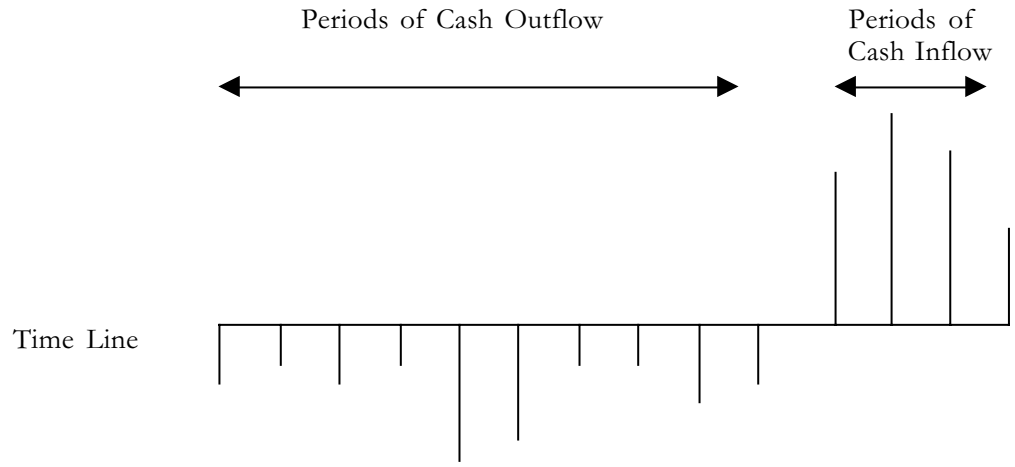
Furthermore, the developer may take a rental project to the stage of selling it as an income–earning building to an investor.

Building a house upon a vacant block of land for speculative sale also meets the description just given. Although the basic rationale is similar, such a small project is not normally regarded as falling within the real estate development process.

In this Part, methods for assessing the value of development projects will be illustrated with spatial reference to the subdivision of land for housing purposes. Such areas are frequently referred to as "in globo land" because value has to be assessed for the land in globo rather than in subdivided form. They are also referred to as "accommodation lands". A fully worked analysis of a home unit development may be found in Whipple (1988). Since the principles are the same, it would be needlessly repetitive to include such a case here. That article should be referred to by those having a particular interest in such projects.

CASH FLOW CHARACTERISTICS

The cash flows generated by development projects are markedly different from those associated with income earning properties. The following profile is representative:



Development projects are characterised by relatively many time periods where cash is outlaid on land acquisition, development costs, consultant fees, government charges and so forth. Following are fewer time periods in which cash is ...received as the developed units are disposed of in the market.

The profile above could be associated with a home unit development or a land subdivision where sales proceeds are received over the last four periods.

A variation would be the development of an income–earning property which is sold at the end of the process. Here there would probably be only one large cash inflow at the end preceded by rather small cash receipts as the space is rented.

Because the cash flow profiles differ so markedly from those of income–earning properties, the methods used to evaluate the latter are of little use in analysing the former. As investments they are quite different.

Consideration of the typical profile illustrated above discloses the major source of risk confronted by the real estate developer. Any action which causes the negative and positive cash flows to be separated in time will result in lowering their present value. The ideal management plan is one which defers the cash outflows for as long as possible and which brings the positive flows nearer. Because of the time value of money, this has the effect of maximising the present value of the receipts and of minimising the present value of the payments.

It follows from this that the essence of success in real estate development is timing: the incidence of the cash flows needs to be managed such that outflows are postponed for as long as possible and the inflows brought forward in time as soon as possible.

ANALYSIS OF COMPARABLE SALES OF IN GLOBO LANDS

As with any other valuation assignment, the most reliable method of price estimation is inference from past transactions–provided, of course, that there are sufficient observations of the required quality to validate the operations of induction and analogy reviewed in the previous chapter.

The same methods of market comparison may be used as illustrated in that chapter.

Assuming that the lot yield (lots created per hectare) is fairly uniform (the usual case), the major differences affecting raw land values are aggregate development costs and prices fetched by the subdivided lots.

If lot yields are significantly different from that attainable for the subject property, deriving an adjustment on this score is very difficult if proceeding via an adjustment grid. Such differences can be included in a quality point rating approach, of course. This would be done by erecting a set of class intervals wherein the sales are grouped according to the number of lots per hectare and a score allotted to each class.

Similar comments apply to significant differences in the prices of the developed sites., Such differences can be brought into the quality point rating approach by classifying them by average gross prices. With an adjustment grid it is tempting to simulate various projects having, say, different lot yields and developed prices, and arrive at a raw land price adjusted for these differences. Such an estimate would not be market based and runs the risk of an insufficient identification of the effects of cross correlation. For example, as the price of developed sites rises, other factors also change: sales costs and rate of sale are two instances. Hence, this can be rather misleading and should not be done.

Therefore, if analysing comparable sales in an adjustment grid, only those sales should be retained where comparability as to lot prices and yields applies.

This means that differences for which a price adjustment can be derived are on the scores of time, terms of sale, development cost, area of the unsubdivided land and possibly other items. An example of the latter is where a liability to meet certain costs (contribution to a major sewerage work, for example) can be deferred a number of years. Such a difference can be accounted for by discounting to present value.

To illustrate the main procedures, a simple case study will be used. The site, which has an area of 2.3786 hectares, is ripe for subdivision and an investigation of the rate of sale of developed sites in the submarket indicates a firm underlying demand. The land is fairly level and the productivity analysis does not disclose any problems leading to excessive development costs.

Enquiries lead to the identification of the following recent sales of unsubdivided land meeting the requirements noted above–that is, similar developed site prices and lot yields (about 12 lots per hectare):

Sale No	*Area (hectares)*	*Price $*	*Price per hectare $*
1	1.05	420,000	400,000
2	2.0	740,000	370,000
3	2.5	912,500	365,000
4	3.2	1,104,000	345,000
5	3.87	1,346,760	348,000
6	4.23	1,280,000	302,600

The prices have been adjusted for time differences.

It may be seen that the price for the sixth property is out of line. Enquiry reveals that extra drainage and earthworks cost $820 per lot, the estate comprised 55 lots and the extra cost, therefore, was $45,000.

Adjusting Sale 6 to the comparable entails adding $45,000 to the price of $1,280,000 to give a price, adjusted on this score, of $1,325,000–or $313,239 per hectare.

Although this brings the price of Sale 6 more into line, there is still so variability. A scatterplot reveals a negative relationship between area and per hectare. Proceeding with the area adjustment illustrated in the previous chapter, the natural logarithms of both series are obtained and the following regression equation obtained:

$$\text{Ln unit price} = 12.91951 - 0.14652 \text{ area.}$$

Following the steps illustrated in the previous chapter, the prices, adjusted to the area of the comparable, are:

Sale No	*Adjusted Price $/hectare*
1	354,836
2	360,720
3	367,671
4	360,325
5	373,724
6	329,232
Arithmetic mean:	$357,751 per hectare
Standard deviation:	$14,088 per hectare
Coefficient of variation:	0.0394

Statistics for the prices unadjusted for area (but adjusted in the one case for differences in development costs) are:

Arithmetic mean:	$356,873
Standard deviation:	$ 26,527
Coefficient of variation:	0.0743

Although the arithmetic means are similar, the series adjusted for area has a far smaller coefficient of variation and this results in a narrower estimated transaction zone.

The most probable price, inferred from past transactions, would therefore be $(357,751 x 2.3786) $850,947.

To obtain the transaction zone, the standard deviation is used. Note that this is in units of price per hectare and has to be multiplied by the area of the comparable. This results in a zone from $884,457 to $817,437.

The final result would be rounded to a most probable price of $850,000 within a transaction zone of $885,000 to $817,000.

THE TRADITIONAL RESIDUAL MODEL

When no comparable sales are available, some authorities advocate the use of the traditional residual method–also known as the "static model" or the "method of hypothetical development".

This derives from the traditional developers' equation:

"Value" = land + development cost + finance cost + profit

This equation persists from the days when there were virtually no delays in securing permits, price inflation was largely unknown and development was not as capital intensive as now. The intensification of development costs means that estates now take much longer to prepare for sale and, as a result, time factors are far more important. Under the conditions of earlier times, the equation gave reasonably useful results as the time value of money could be largely ignored. The altered circumstances referred to have caused it to be quite unreliable and, as we shall see later, it is mathematically flawed and should not be used.

For the sake of illustration, the example of a 70–lot residential subdivision will be used. The calculations are set out on Table 10.18, to which the following description refers.

Estimating the lot yield

The first step is to draw up a plan of subdivision showing the lot yield and other estimates such as the length of roads to be constructed, sewers and drains to be laid, power lines to be erected and so forth. This is all part of the productivity analysis of in globo land.

Some guidelines in the preparation of such plans are now offered (see Robinson and Keeble, 1952).

The plan must comply with the relevant regulations and market requirements. The former is usually straightforward but the latter can be more subtle. Take just one case–for which there are myriad variations.

In the jurisdiction in which the 2.3786–hectare site is located, the minimum lot area is 500 square metres with an average area of not less than 571 square metres. The minimum lot frontage is 15 metres and road reservations are a minimum of 14 metres. There are additional, requirements for odd–shaped lots–such as "battle–axe" lots and fan–shaped lots. In addition, the Water and Sewer Authority insists upon the registering of a sewerage easement if lot size is less than 600 square metres and where a sewer is located at the rear of the lot.

This latter requirement affects marketing aspects because such an easement could be a selling disadvantage which can be overcome only by ensuring that such lots have a size of 600 or more square metres.

Table 10.18
Application of Static Valuation Method to 70–lot Subdivision

	$	$	$
Gross realisations:			
70 lots @ $70,000 per lot			4,900,000
Less:			
Selling costs @ $3,100 per lot			217,000
Net realisations:			4,683,000
Less profit and risk allowance (20% of outlay)			
$4,683,000 x (20 ÷ 120)			780,500
Development costs, land value and interest			3,902,500
Less development costs:			
Water and sewerage headworks,	175,000		
Earthworks, drainage, road construction	497,000		
Undergrounding power	55,650		
Surveying fees	31,500		
Planning fees	10,500		
Council fees	4,900		
Engineering design and supervision	68,250	842,800	
Other Costs:			
Overhead–say 4% of sales		196,000	
Open space contribution		58,800	
Sub–total:		1,097,600	
Contingencies –say 5% of $1,097,600		54,880	
		1,152,480	
Interest and Property Taxes:			
Interest on development costs @ 9% for 12 months: $1,152,480 x 0.09		103,723	
Rates and taxes for 2 years allow $1,050 per lot $1,050 x 70 x 2 years		147,000	1,403,203
Land value, acquisition costs and interest on land purchase			2,499,297
Less interest on land 9% for 2 years: $2,499,297 x (18 ÷ 118)			381,249
Land value plus acquisition costs			2,118,048
Less acquisition costs @ 3%: $2,188,048 x (3 ÷ 103)			61,691
Estimated land value:			2,056,357

While the usual requirement is to maximise the lot yield, marketing demands may dictate that lots larger than the minimum would sell more readily. The maximum permitted use may exceed that which the market requires–in which case the market is supreme.

Consider the topography of the land as well. Place the roads so that lots do not fall steeply away; ensure the majority of potential users are able to enjoy the favourable features offered by the site whilst the effect of unfavourable factors is minimised.

It may be seen, therefore, that the design of the estate needs to be considered with a number of possibly conflicting requirements resolved in the process.

Frequently the client will have a plan of subdivision already prepared. This should be carefully checked for compliance with statutory and market requirements.

Following a satisfactory preliminary design, an estimate is made of the price that each developed site would probably fetch if offered for sale as at the date of valuation. This is a static model so prices anticipated when the developed sites reach the market should not be used–the calculations are

based on current prices. The average estimated price is commonly used to assess the likely gross realisations – although, with large estates, a weighted average may be computed across groups of similarly priced sites. These estimates should be derived using the method of inference from past transactions.

Selling expenses

Selling costs are deducted from this to give an estimate of net realisations. These costs are derived from local practice. Typically they include advertising, commission and legal fees on sale. The latter two may be ascertained from the scale of charges promulgated by the professional bodies concerned; frequently, they are negotiated on an estate–by–estate basis.

Advertising costs are a function of the strength of the market, the extent to which the location of the estate confers an advertising advantage and the size of the estate. Advertising costs will be higher in a buyers' market and where the subdivision does not enjoy good exposure to passing traffic. A large estate may require high initial advertising costs to "get it rolling". For smaller estates, the major advertising budget covers one or two on–site hoardings, newspaper classified or display advertising and, possibly, some leaflets. These remarks assume sale by private treaty. Sales by auction frequently occasion a larger advertising budget and, if the estate is a large one, may also include television or radio exposure. A common error is to underestimate advertising costs.

Selling expenses are deducted at this stage because such costs are regarded as being substantially met from the proceeds of sales. Net realisations are regarded as comprising an estimate of the developer's total outlay (equity and non–equity).

Profit and risk factor

The margin allowed for profit and risk is a function of the total outlay–in the example a margin of 20 per cent is allowed. The sum of $780,500 is arrived at by simple proportion, as shown in Table 10.18.

This estimates total costs at $3,902,500 – 20 per cent of which is $780,500. Total costs, of course, include the cost of the raw land. To derive this, other costs are estimated a step at a time to arrive at the cost of the unsubdivided land.

Development costs

These should be estimated with care and applied to the subdivision plan already prepared. Reference should be made to contractors and other professionals active in the area to ascertain current costs and professional fees. Careful allowance needs to be made for any abnormal conditions such as rock excavation, drainage of low–lying areas, major earthworks, the location of satisfactory drainage discharge points (they may be remote from the estate), and the like. Check with the supply authorities as to the conditions under which supply will be made available. For example, sometimes an extra charge will be levied on an estate as a contribution to the cost of headworks; do not rely on generally accepted averages.

The writer's experience is that development costs estimated on a per subdivided lot basis can be misleading. There are situations where length of road per lot, for instance, can vary with the layout adopted, the size of the project and the ratio of lots fronting existing roads. It is best to scale off the length of roads and drainage works and use this as the basis of costing.

In the illustration, these costs amount to $842,800 in current dollars. With a static analysis, costs should not be escalated to allow for price inflation.

Other costs

These include contribution to overhead, open space levy and possibly others.

Overhead is charged for head office costs such as staff wages, telephone and so forth. Bear in mind that a major overhead cost lies in investigating proposals that do not proceed–for one reason or another. Such costs have to be met out of operations.

Public garden and recreation space contributions may be in cash or by the dedication of land agreed with the Planning Authority for this purpose or both. Local practices and requirements need to be ascertained and an appropriate allowance made. In the present illustration, the assumption of a cash contribution is made. If land is to be dedicated, the lot yield will be less and gross realisations will be affected accordingly.

It is not uncommon for a contingency allowance to be included in the calculation. In the example this has been set at 5 per cent of costs excluding land purchase and interest charges. Again, local practices should be ascertained. It is difficult to identify what this allowance is for and some comment will be addressed to this below.

Interest and property taxes

Interest allowance is usually at the rate applicable to the funding of development projects of the type concerned. Here it is assumed that this will be by way of rolling over bank–backed bills at an interest cost of 9 per cent per annum simple.

The usual assumption is that the development moneys will be outstanding for an average of half the period during which the estate is being developed and sold. Assuming a two–year life (this, obviously, is derived from the marketing studies), the interest allowance is $103,723 calculated on development costs including the contingency allowance.

Property taxes are commonly computed on a per lot basis and allowed over the life of the project. In this case, estimated rates and land tax amount to $147,000. An alternative, and preferable method, is illustrated below.

Costs estimated to this point amount to $1,403,203. When deducted from net realisations, the difference is $2,499,297. This figure represents land purchase, acquisition costs and interest on these items.

Interest on land cost is assumed to accrue over the duration of the project and is determined by proportion as shown in the table.

Acquisition costs include stamp duty, legal and other fees on purchase allowed for at 3 per cent in the illustration. Their incidence is, again, calculated by simple proportion so that the residual finally arrived at is $2,056,357 – the estimated value of the land.

ANALYSING COMPARABLE SALES TO ESTIMATE THE PROFIT AND RISK FACTOR

An item of crucial importance in the method just illustrated is the allowance for profit and risk. This may be ascertained by direct enquiry of subdividers, active in the local market or derived from an analysis of recent sales of in globo land.

Using the continuing illustration, Table 10.19 shows how the margin is derived, given the knowledge of all the other items.

The table simply represents a rearrangement of the traditional developers' equation given above.

Enquiries made of local subdividers as to the margin they require and obtain are likely to be fruitless for the simple reason that the traditional equation has long since been discarded by leading members of the industry. The reasons for this will be investigated below.

CASH FLOW ANALYSIS OF DEVELOPMENT PROJECTS

To illustrate this approach, the earlier example of the 2.3786–hectare site will be continued. An outcome of the productivity analysis was a subdivision plan comprising 29 lots.

Estimating statutory charges

A tedious aspect in preparing data for a cash flow analysis of development projects relates to assessing the timings for payment and receipts of municipal water, sewerage and drainage rates and land tax.

The basis on which these charges are levied varies with the jurisdiction. In the illustrative example, those obtaining for the particular jurisdiction will be' adopted but the valuer needs to be fully familiar with local practices in this regard.

Charges are usually ad valorem based. The in globo land will be valued at a figure less than the value of the developed sites. Hence, the first step is to assess; the level of these imposts on the raw land.

Table 10.19
Sales Analysis to Estimate Margin for Profit and Risk Using the Data of Table 10.18

	$	$
Land Cost		2,056,357
Acquisition costs-3%		61,691
		2,118,048
Loss of interest – 2 years @ 9%		381,249
Rates and Land Tax		
$1,050 x 70 lots x 2 years		147,000
Development Costs:	1,152,480	
Interest at 9% for 1 year	103,723	1,256,203
		3,902,500
Gross Realisations:	4,900,000	
Less selling costs	217,000	4,683,000
Margin:		**780,500**

Margin as per cent of costs:

$$\frac{\$780,500}{\$3,902,500} \text{ X } 100 = 20 \text{ per cent}$$

The second step is to assess what the position will be when the new lots are created. In the jurisdiction used here, the new lots are assessed for rating and taxing purposes when the subdivision plan has been approved by the planning authority. So, from this time onward, the basis of rating and taxing changes and these changes need to be incorporated into the cash flow analysis.

In the present case, the assumptions are made that charges on the broadacres will have to be paid in September 19A1 and that the assessments for the developed lots will have to be paid in March 19A2. The payments made in this month will be prorated against the charges levied on the broadacres assessment.

The rating basis on the broadacres is as follows:

Municipal rates: 7.0115¢ per $1 of gross assessed, – rental value. In this case the GRV is $40,000.

Water rates: 5.21¢ for the first $6,500 of GRV plus 4.47¢ per $1 thereafter.

Sewerage rates: 6.92¢ for the first $4,900 of GRV plus 4.85¢ per $1 thereafter.

Assessments for the developed sites are based as follows:

Municipal rates: $300 minimum rate.

Water rates: $109 minimum rate.

Sewerage rates: 6.92¢ per $1 of GRV–assumed to be $2,500 in this case. This amounts to $173 per lot.

In the following calculations, the further assumption is made that imposts on the developed sites will be for an average of six months per lot.

Facts and assumptions such as these enable the projections to be made as now set out:

	Sep 19A1	*Mar 19A2*
	$	**$**
Municipal rates		
Broadacres: 7.0115c x $40,000	(2,805)	
Developed sites: 29 lots x $300 x 0.5		(4,350)
Rebate on broadacre rates: 0.5 x $2,805		1,402
Water rates:		
Broadacres: $ 6,500 x 5.21c = 339 $33,500 x 4.47c = 1,498	(1,837)	
Developed sites: 29 x $109 x 0.5		(1,580)
Rebate on broadacres: 0.5 x 1,837		918
Sewerage rates: Broadacres: $ 4,900 x 6.92c = 339 $35,199 x 4.85c = 1,702	(2,041)	
Developed sites: 29 x $173 x 0.5		(2,508)
Rebate on broadacres: $2,041 x 0.5		1,020
Outflows:	(6,683)	(8,438)
Inflows:	(4,350)	3,340

Rates and taxes adjustment on settlement

When the buyers settle for their lots, rates and taxes are prorated as at the date of settlement.

In the illustrative case, land tax is assessed at $16,740 for the financial year and is payable in October 19A1. This amounts to $577 per lot.

The imposts per developed site are now summarised:

	$
Municipal rates:	300
Water rates:	109
Sewerage rats:	173
Land tax:	577
Total:	**1,159**

On sale, the imposts are prorated. For example, it is estimated that eight lots will be sold in December 19A1. The adjustment (being the buyers proportion of the charges for the remainder of the year–that is, seven months or seven twelfths of a year) is:

$$\$1,159 \times 8 \times 7/12 = \$5,409$$

and this is an item of income for the next month–it being assumed that settlements take place one month after sale. In some jurisdictions settlements cannot be effected until the plan of subdivision has been registered at the Land Titles Office, in which case settlements may take longer to effect.

. As noted, these calculations are rather tedious but, in the case of a small subdivision, they should be made. With larger estates where the development proceeds in stages with each taking a year or more to complete, adjustments to rates and taxes would be approximated by using some simplifying assumptions. Being more remote in time, the discounting process would diminish the effect of the approximations.

We now turn to an estimation of the magnitude and timing of other costs and returns for the example development.

Insert table 10.20

Insert table 10.21

Estimated cash receipts

Experience leads to the conclusion that the developed sites will be available for sale in December 19A1, given that planning starts in January of the same year–the month in which the deposit is paid for the purchase of the raw land.

The reader should now refer to the cash flow display in Table 10.20.

Another by–product of the productivity analysis is an assessment of the rate of sales likely to be achieved 12 months hence:

December 19A1:	8 lots
January 19A2:	6 lots
February 19A2:	4 lots
March 19A2:	3 lots
April 19A2:	3 lots
May 19A2:	3 lots
June 19A2:	2 lots

Given a reasonably strong level of demand, most estates achieve a more rapid rate of sales at the beginning of the marketing period with the rate tailing off towards the end.

As stated above, settlements are assumed in this case to follow one month later. Hence, the "Source of Cash" section of the table lists, first, the payment of deposits at 10 per cent of the purchase price with the balance following one month later. At settlement, the rates and other statutory charge adjustments are made and the rebate of rates paid on the raw land is entered in the months nominated above.

This completes the estimation, month by month, of the sources of cash in this case.

Other sources of cash would vary with the project. There could, for instance, be rental receipts if the land were being share cropped during the planning stage or existing structures leased.

Estimating the uses of cash

Next follows a series of sections which record the way in which cash raised will be expended. It is convenient to adopt a classification such that the totals for each can be used for purposes to be illustrated below. The classification adopted should suit those predetermined purposes, of course, and may well differ from those adopted here.

The analyst continues to build the cash flow display with the principle of reality uppermost in mind. In essence, the task is to imagine the project proceeding, to track all expenditures as they occur and record them in the appropriate cells of the table.

Again, the degree of disaggregation will vary with the purpose. In many cases it was the writer's habit to retain a fairly fine distinction among types of cost and use the cash flow analysis as a project management aid.

Cost data sources were discussed above. Overheads are assumed here to be 5 per cent of gross sales. It is important to allow for price and cost inflation if using a market–derived interest rate for the reasons set out in Chapter 8.

The total use of cash is deducted from the total source of cash to result in the estimated net cash flow per time period. The negative entries record the cash contribution required for the periods concerned and are an important ingredient of the entity's capital budget.

EVALUATING CASH FLOW

With the analysis completed on the basis of one set of assumptions, the valuer needs next to test whether or not the results make sense. For this purpose a number of approaches is available.

First, the internal rate of return is calculated and compared with the rate required in the market. In this case, the IRR is 41 per cent per annum effective compared with the required rate of, let us say, 20 per cent. Hence, this test is met. Note that this is the effective annual return computed via equation 8.

Next, the cumulative cash flow is reviewed to ascertain the investor's maximum financial exposure. In this case, the maximum outlay is $1,148,873 in December 19A1. This defines the estimated maximum capital at risk. The cash outlaid is not recovered until May 19A2.

It. may be seen, therefore, that liquidity problems always beset real estate development projects.

The next step in establishing economic feasibility is to convert the cash flow data into accrual form and enter it into the entity's projected revenue accounts and balance sheets over the life of the project. This discloses the impact it will have on the market's valuation of the entity, share price, borrowing ability and likely changes in its average cost of capital. It also enables an assessment to be made of its capital–raising requirements and the budgetary policies needed to maintain solvency. These issues, although important, are beyond the scope of this book.

Before proceeding, it may well be asked why the IRR in this case is 21 per cent above the developer's target rate? The answer is that care has been taken to manage the cash flow's intelligently and the difference should be regarded as a reward to the management input. If settlement had been effected in February 19A1, say, land tax would have been payable for the period to the end of June 19A1 and the balance of the purchase money and stamp duty would have been brought forward in time. If the policy of deferring settlement until July had not been adopted, the IRR would have been reduced to 26 per cent effective (see Table 10.21). Just this simple alteration shows the importance of timing on the profitability of development projects. Detecting this effect is quite beyond the capacity of the static model reviewed above and revisited below–but a sensibly conceived scenario analysis reveals it.

Break–even analysis

As with the case of an income–earning property of the type reviewed in Part V, the valuer should conduct a sensitivity analysis by altering, one at a time, the various entries in the cash flow to identify the most sensitive items.

It is simpler, and usually far more effective, to conduct a break–even analysis somewhat like that adopted in the previous Part for income properties.

For this purpose the various subtotals set out in Table 10.20 will be adopted. It is invariably the case that the row totals are used without discounting them to present value. This is erroneous, however, since they are not comparable – we shall return to this important point a little later.

Break–even analysis proceeds in two steps: first, the row totals are discounted to present value at investors' target rate. The second step is to ascertain by how much each has to change so as to eliminate project specific risk.

Using the rate of 20 per cent, the following present values are derived:

	$	$
Total cash		1,322,694
Acquisition	812,907	
Development	312,871	
Administration and overhead	91,145	1,216,923
Margin for Project Risk		**105,771**

The second step is to ascertain the extent to which each of the items has to change to eliminate project specific risk – that is, $105,77 1. The answers are:

Total cash	– 8.0 per cent
Acquisition	13.0 per cent
Development	34.0 per cent
Administration and overhead	116.0 per cent

The critical categories are total cash and acquisition. If sales receipts decline by 8 per cent or if acquisition costs increase by 13 per cent, project–specific risk disappears. Such changes would mean that the return will simply cover the entity's cost of capital and leave nothing over to cover project–specific risk.

It may well be thought that development costs would not escalate 34 per cent over the 19–month period. Nevertheless, certain unforeseen circumstances might arise which could precipitate such a result. For instance, once development starts, bottom soil conditions may be discovered such that additional drainage costs have to be incurred.

That administrative and overhead costs will increase by the figure given above is highly unlikely.

While the actual figures may not change significantly, their present values could alter to the extent calculated above if the timing factors are allowed to run out of control. For example, sales receipts would not have to be delayed many months to produce a reduction in their present value of 8 per cent. Other possibilities along these lines are obvious. These considerations show the danger of relying upon the method of hypothetical development.

Comparatively high money costs apply to real estate development projects so that the discounting effect is even more pronounced; as a consequence, the timing factor is of paramount importance as is the choice of target rate.

This last observation underscores again the point made earlier: success in real estate development is largely a product of the professionalism with which the cash flows are timed. Modes of analysis and valuation need to have the ability to take timings into account. Again, this is not possible with the static model–except perhaps in a crude but really ineffective way.

Scenario analysis

Also underscored is the importance of conducting a number of different cash flow analyses, each based on different assumptions as to future events and how they may be expected to impact on the magnitude and timing of the cash flows. The analyst's report must document all the assumptions and trace through the effect they have on the final result.

An example of scenario analysis was given in the previous Part in the case of an income–earning property. The procedures to be adopted with the analysis of a development project are identical. An example, using a home unit development project, is given in Whipple (1988) to which the reader should refer.

SOLVING FOR LAND VALUE

The preceding analyses would be common to both an economic feasibility study and a valuation–although, in the latter, the cost of capital rate would be ascertained indirectly by interview. It is likely that a range of rates will be quoted–from which the analyst would use the median or, possibly, their geometric mean. A feasibility study would adopt the client's specified rate.

With a valuation, the land value is unknown. In this case the cash flow analysis proceeds as illustrated above but omits land acquisition and related costs such as stamp duty and legal fees on purchase.

Referring to Table 10.20, the entry near the end entitled "Cash. Flow less Land etc" shows the net cash flow with these acquisitions costs omitted. When discounted to present value at the target rate (assumed also to be the cost of capital rate), the result is an estimate of the level of acquisition costs that can be justified, given the magnitude and timing of all the other entries.

In this case, the estimate is $918,677. This includes the costs of acquisition. To solve for land value, related costs are estimated at 3.9 per cent so that indicated land value, by proportion, is $884,194.

As just observed, the choice of target rate is a critical factor. If this is raised to, say, 22 per cent, estimated land and associated costs are $894,452. Hence, this rate must be chosen with care and must be supported with full information in the valuation report.

As stressed above, the cash flow analysis would be repeated for each set of assumptions deemed sensible to adopt–possibly in the form of scenario analyses. From these, a transaction zone would be selected along with the most probable price within this zone. Again, the procedures are the same as already illustrated in the case of the income–earning property reviewed in Part V.

CHECK AGAINST ANALYSIS OF COMPARABLE SALES

The discounted cash flow analysis just presented is for the same property for which a price estimate was derived earlier using the method of inference from past transactions. It will be recalled that this was in the sum of $850,000. Hence, the two approaches yield reasonably compatible results in this case. The actual price paid of $870,000 is consistent with the analyses reported above.

CHECK AGAINST TRADITIONAL RESIDUAL METHOD

This is set out in Table 10.22 using the approach generally discussed in older texts on valuation and follows the structure of Table 10.18. Before discussing the result, some preliminary remarks are in order.

It was stated above that, when using the method of hypothetical development, current costs and prices are used. This is because it is a static model. In the cash flow estimates set forth in Table 10.20, certain items were escalated – in fact, each item has to be scrutinised and a decision made as to the effect price changes will likely have on it over the planning, development and selling period.

Table 10.22
Application of Static Valuation Method to 29-lot Subdivision

	$	$	$
Gross realisations:			
29 lots @ $59,000.per lot			1,711,000
Less:			
Selling costs			89,750
Net realisations:			1,621,250
Less profit and risk allowance (20% of outlay)			
$1,621,250 x (20 –120)			270,208
Development costs, land value and interest			**1,351,042**
Less development costs:			
Water and sewerage headworks	68,000		
Earthworks, drainage, road construction	193,000		
Undergrounding power	23,000		
Surveying fees	13,000		
Planning fees	4,350		
Council fees	2,000		
Engineering design and supervision	28,000	331,350	
Other Costs:			
Overhead-say 5% of sales		85,550	
Open space contribution		24,000	
Sub-total:		440,900	
Contingencies – say 5% of $440,900		22,045	
		462,945	
Interest and Property Taxes:			
Interest on development costs @ 9%			
for 9 months $462,945 x 0.09 x 0.75		31,249	
Rates and taxes for 19 months			
allow $1,050 per lot			
$1,050 x 29 x 1.58 years		48,111	542,305
Land value, acquisition costs and interest on land purchase			808,737
Less interest on land 9% for 19 months:			
$808,737 x (14.25 – 114.25)			100,871
Land value plus acquisition costs			707,866
Less acquisition costs @ 3.9%:			
$707,855 x (3.9 – 103.9)			26,571
Estimated land value:			**681,295**

For the purposes of constructing the cash flow approach, the following assumptions as to price changes were made:

Gross realisations: in January 19A1 the lots would have been expected to sell for $59,000 each on average. Marketing analyses and review of the fundamental factors affecting land prices in the submarket concerned indicated that they should average $61,000 each by year's end.

Development costs: headworks, roads, drainage, and related costs were expected to escalate at the rate of about 4 per cent per annum over the period. In short, these items were estimated to cost $68,000 and $193,000 respectively in January 19A1.

The remaining items were mostly fixed by scales of professional charges and the like which were not expected to change over the period concerned – or, if they did, negotiations to keep them at the current level were anticipated to be successful.

Thus, in the static analysis recorded in Table 10.22 these items are entered at their January 19A1 prices.

The result is an estimated price of $681,295 for the raw land. This is considerably different from the estimates derived from an analysis of comparable sales or from the cash flow approach. In this instance the static model produces a result which is out of line with the other two. This prompts the query: how reliable is the static model? We investigate this in the next section.

THE GENERAL STATIC MODEL – AN ASSESSMENT

The first part relating to gross and net realisations is straightforward.

The sum of $1,621,250 is regarded as the capital commitment by the developer. At the time of writing (late 1993), the conventional valuation wisdom is that for a suburban residential subdivision in a reasonably active market, the profit and risk allowance should be in the order of 20 per cent. A profit factor is required to induce the developer to undertake the project in the face of the considerable risks confronting its successful realisation. This fact is not in dispute–rather the method of measuring it is.

A useful summary of judicial views on the profit and risk factor may be found in Hyam. (1983, pp 98–99).

It is difficult to know what this margin actually measures. As pointed out several times earlier in this text, a developer or investor is concerned, first, to attain solvency in operations. That means a project must show a return at least equal to the entity's cost of capital. This done, debt financing can be serviced, the equity portion of the investment will receive its due dividend and share prices will be maintained (see equation 37 and related discussion of the cost of capital in Chapter 8).

It was pointed out there that the return required by equity and non–equity investors is set in the market place and incorporates (inter alia) their assessment of risks associated with the entity.

In addition to the sources of risk noted in that earlier discussion, the entity will require a margin over its cost of capital rate to cover any project–specific risks perceived to be out of the ordinary (if any). It is reiterated that, if the entity invests in projects that consistently cover its cost of capital, dividend growth will be maintained (turn back to p 230 and consider equation 37).

If, then, a contemplated project is assessed to cover the cost of capital, the question then arises: what are the risks that it will fail to do so? That is what we refer to as "project–specific risk". The extent of this additional inducement, if relevant to the instant case, is a function of managements' risk/reward profile and is a matter for managements' collective decision.

These truisms indicate how inadequate the conventional allowance for profit and risk as set out in Table 10.22 is. It gives no indication whatsoever as to whether or not the project will show a return equal to the firm's cost of capital and it says absolutely nothing about the additional allowance for project specific risk. That it does not measure profitability is obvious from the fact that the magnitudes recorded in Table 10.22 cannot be related to the firm's set of revenue accounts and balance sheet. Impact on corporate performance cannot be assessed if left in this form nor is it in the least useful for capital budgeting purposes.

Proceeding to the next part, the various development and other costs are itemised and their cost today is ascertained and entered into the Table.

At the end of this section, it is not uncommon to add an allowance for contingencies – generally 5 or so per cent of development and related costs. This is usually justified on the grounds that contract prices can escalate at short notice and it is a "conservative" and, hence, prudential policy. Its incorporation is a case of double counting because such factors are allegedly covered by the above mentioned profit and risk factor.

The next entry is an allowance for interest costs on development moneys. This is usually calculated on a simple interest basis for half the project period. Half the period is adopted because these costs are expended progressively: they are not outstanding for the whole period. The rate, in theory, is usually set at the developer's opportunity cost–that is, the return that would be available had the next–best project been undertaken. As this is usually impossible to identify, the measure used, in practice, is the financing cost incurred. In the example, as already noted, the development is assumed to be financed by rolling over a bank–backed bill line of credit at the annual rate of 9 per cent simple. This becomes just one source of capital among others used by the entity.

Interest on the net negative entries shown in the cash flow analysis, of Table 10.20 was not allowed. The reason is that interest is part of the cost of capital available to the developer and to include it as a project–specific cost would be to double count. Recall that the cost of capital is the hurdle rate and it is inapt to include an interest charge in calculating the internal rate of return. The cash advanced to the project would doubtless be a mixture of the sources of funds available to the developer–a mix of equity and non–equity, each with its particular cost.

The method of allowing for the incidence of municipal and water rates and other such imposts is an approximation. In the illustration, a rough rule of thumb has been adopted, but other approaches are possible.

Then follows an allowance for interest charges against the land and related acquisition costs. Typically, this is allowed over the whole of the project period. In the particular example, this assumption is rather unreal as settlement was delayed six months.

Analysed profit and risk factor

Table 10.23 sets out the conventional way of extracting the profit and risk factor from a sale of undeveloped ingloboland. In this case, the profit and risk factor is a mere 2.93 per cent.

This shows the absurdity, in this case, of adopting the static method of valuing land ready for subdivision and in deriving the so–called "profit and risk" factor.

Table 10.23
Sales Analysis of 29–Lot Subdivision to Estimate Margin for Profit and Risk

	$	$
Land Cost		870,000
Acquisition costs – 3.9%		33,930
		903,930
Loss of interest 19 months @ 9%		128,810
Rates and Land Tax		
$1,050 x 29 lots x 1.58 years		48,111
Development Costs:	462,945	
Interest at 9% for 9 months	31,249	494,194
		1,575,045
Gross Realisations:	1,711,000	
Less selling costs	89,750	1,621,250
Margin:		46,205

Margin as per cent of costs:

$$\frac{\$46,205}{\$1,575,045} \text{ X } 100 = 2.93 \text{ per cent}$$

The cash flow analysis showed an internal rate of return of 41 per cent surely an acceptable one. No developer would entertain this project if appraising it by way of the static model. To use it as the decision criterion in this case would be to bypass a satisfactory investment opportunity. The problem with it, of course, is that it does not reflect reality.

COMPARISON OF THE, INFERENTIAL, DCF AND STATIC APPROACHES

Of the three approaches, the method of inference from past transactions is to be preferred if the important dimensions of comparability can be assured. This frequently is not possible. When it is possible, the results should always be checked by applying another method.

The DCF approach attempts to simulate reality–or, rather. those alternative futures deemed to be realistic. In a given case it is most unlikely that the valuer will rely upon just one DCF analysis. As stressed several times already, a DU analysis should be prepared for a number of plausible scenarios to derive a range of likely values from which the most probable value is selected. The wider the range, the less confident is the valuer's price prediction. This forces the identification of assumptions – all, of which must be documented and reported upon to the client. The assumptions

embedded in the static model are not so easily discovered and this constitutes another major source of risk in its use.

Disadvantages of the DCF approach have been reviewed in the previous section dealing with income–earning buildings. Essentially, they reduce to estimating with reasonable accuracy the magnitude and timing of the individual cash flows. This underscores the necessity of careful productivity and marketing analyses in the early stages of the work.

The entries comprising the static model or hypothetical development approach are not comparable. As this is generally overlooked, some discussion is in order.

Those entries are cast in terms of present–day prices. This requirement pays lip service only to the need to incorporate the time value of money. The various figures purport to be the present value of variable (and non–comparable) cash flows. They are akin to the row totals of cash flow tables such as those in Table 10.20. Those totals are largely without meaning indeed, from the financial mathematics point of view, they lack meaning because they are not comparable.

To be made comparable, they should be discounted to present value (or compounded forward to future value) using an appropriate interest rate. It was in this way that the break–even analysis was performed above – the magnitudes had first to be made comparable. Without this precaution, the manipulations would have been meaningless.

It follows, therefore, that the figures making up the hypothetical development approach are not comparable. The manipulation of numbers which are not comparable produces senseless results.

The inexorable consequence of this is that the static model is mathematically flawed. This is the most damming indictment of the traditional approach–for which reason alone it should not be used as a pricing model. It does, however, have a use as a ranking device–as illustrated in Chapter 6. There are imperfections enough in the real estate market without the valuer adding to them–consciously or unconsciously.

VALUATION OF DEVELOPMENT WORKS IN PROGRESS

Refer to Table 10.20 and imagine the project has to be valued as at the end of March 19A2. Assume all the projections made at the outset have been on–line and the projections for the remaining months are still regarded to be valid. The valuation to be carried out will depend upon the. definition of value relevant to the problem.

If the valuation is for accounting purposes, the value construct will be. one of two:

- realisable value in the ordinary course of business;
- realisable value in its existing state.

The first "represents the expected selling price[s] less all costs still to be incurred to develop and sell the project" (Phin, 1985, p 28).

Realisable value in its existing state "represents realizable value in the ordinary course of business discounted to eliminate the profit not yet earned" (op cit).

Table 10.24 sets out the prospective cash flows as from the end of March 19A2 using the subtotals from Table 10.20.

Table 10.24
Valuation as at End of March 19A2

	April A2	May A2	June A2	July A2
SOURCE OF CASH				
Gross Receipts	184,159	183,869	177,480	109,993
Less Selling Costs	9,250	8,750	6,200	400
Net Receipts	174,909	175,119	171,280	109,593
USE OF CASH				
Total Development Cost	–	–	–	–
Total Overhead	–	–	–	88,450
Total Use of Cash	–	–	–	88,450
Net Cash Flow	174,909	175,119	171,280	21,143
Present Values	169,947	165,323	157,111	18,844
Total Present Value	511,225			
IRR per month	0.0292			
Annual Effective IRR	0.4121			

The present value of the net cash flow at 2.92 per cent per month is $511,225. This is the sum an investor would pay for the right to that income stream, given that particular target rate. An adjustment for office overheads may be deemed relevant. This could well be apportioned to sales receipts back to December 19A1.

If the net cash flows from inception to the end of March are projected forward to the date of valuation at the entity's cost of capital rate (20 per cent), the result is – $395,194. That represents the cost to the entity of advancing the project to its present stage.

The difference $(511,225 – 395,194) is $116,031. This difference is a product of the spread in interest rates. The accounting treatment of the $116,031 would probably be unrealised profit – a reward due to advancing the project this far without suffering project risk. Book value would probably be $395,194.

If the instructions were to estimate the project's value in its existing state, ' a different set of considerations comes into play. Phin observes (1982, p 18):

> "Net realisable value in its existing state represents the property's value to another developer, that is, the price which another developer would pay for the property, less selling expenses. It can be regarded as the wholesale price as opposed to the retail price, on which realizable value in the ordinary course of business is based. Any fall in a property's existing state value would be regarded as a loss and written off."

Now the valuer must identify the most probable type of buyer and proceed as discussed previously. In the present case, the project has been developed and more than half the lots have been sold. With project–specific risk now almost eliminated, a developer could probably be found who would capitalise the prospective cash flow at a rate lower than if the project had been offered for sale in, say, October 19A1.

Taking on a partly completed project is a very complicated matter which buyers would be attracted to only if the return offered was quite high. As the writer observed elsewhere (Whipple, 1988, p116):

> "The current status of all contracts, payments made thereunder and yet to be made, planning and other consents. labour relations, perceptions by potential buyers of the finished product and the difficulty in identifying contingent liabilities are all problematical.
>
> If the project were offered for sale . . . the required discount rate would be raised in face of (those) difficulties".

Costs incurred in excess of those necessarily entailed in producing a project which pays a return acceptable in the marketplace should be disregarded.

It may be seen, therefore, that defining the concept of value relevant to the problem being addressed is of paramount importance–as it is in all assignments.

The major issues as they affect development projects are discussed by various authors in Whipple (1985).