Bachelor Thesis in Economics

Maximising Real Estate Return

Richard Wilson

Supervised by Clas Eriksson

2018-08-29
Abstract

This thesis provides a discussion and analysis of the factors that influence real estate return. The result is a combination of capital growth and rental profit, which are affected predominantly by changing location values, leverage, interest rates, and property use. These are analysed separately and brought together with formulas for calculating the total return, and demonstrations for how this return may be affected by changes in the underlying parameters.
Contents

(1) Introduction … (4)
   1.1) The Problem … (4)
   1.2) Literature Review … (5)
   1.3) The Limitations … (5)
   1.4) Methodology Overview and Table of Variables… (6)

(2-7) The Analysis … (7)
   (2) Starting Essentials … (7)
       2.1) The Deposit & Leverage … (7)
       2.2) Mortgage Selection … (8)
       2.3) Renovation … (10)
   (3) Trading … (11)
       3.1) Market Value … (11)
       3.2) Purchasing … (12)
       3.3) Selling … (13)
       3.4) Bargaining … (13)
   (4) Income … (14)
       4.1) Property Yield … (14)
       4.2) Occupancy … (15)
       4.3) Property Use … (16)
       4.4) Expenses … (16)
       4.5) Interest Rates … (17)
   (5) Utilising the Market … (17)
       5.1) Market Timing … (17)
       5.2) Predictions … (20)
   (6) Return … (21)
       6.1) Measuring Return … (21)
       6.2) Present Value … (22)
       6.3) Predicting Return … (23)
       6.4) Predicting Present Value Return … (24)
       6.5) Interest Rate Effects … (25)
       6.6) Risk … (26)
       6.7) Return Decisions … (27)

(7) Estimates … (28)
   7.1) Leasing Estimates … (28)
   7.2) Investment Estimates … (29)
   7.3) Variable Estimates … (30)

(8) Comparisons with other Investments … (32)
(9) Summary and Conclusion … (33)
References … (34)
(1) Introduction

The aim of this thesis is to consider the ways in which the return may be maximised in each stage of a real estate investment. This starts with the initial purchase stage, followed by the income stage or holding period, until finally and optionally, the sale. In addition, there will also some discussion of the final consideration of investing the resulting profits.

1.1) The Problem

All complex life on earth has a self-interest in maximising individual welfare. Organisms compete for resources to maximise their reproductive success, passing on successful genes. Humans are no exception, and take competition one step further. Investing means to sacrifice present consumption with the expectation of more future consumption. Given that complex societies have developed to give commodities and money, there are vast numbers of ways to invest. Investing financially is the principle way, but other investment sacrifices are taken, such as education and training, where income is forgone with the expectation that future income will be increased enough to warrant the sacrifice. Investing is mainly done individually, often with one’s family in mind, but individuals still form companies that invest for the company as a whole, but nonetheless work to maximise their own return within the company. Return is simply the speed at which the investment value grows, the end value minus the start value, divided by the time period.

Individual financial investments are the focus, the two main types are ownership investments, where ownership is purchased and expected to grow in value, and lending investments, where resources are lent to others under the expectation that more must be returned. In both, the aim is the same, to increase the return, while reducing the risk. There is a risk in all investments, and to protect resources, low risk investments are naturally sought. However, the return in such investments is compromised. Higher returns await those with a greater appetite for risk. Ownership investment risk derives from fluctuations in value of the asset, and many factors dictate volatility size. Lending investment risk is derived from the debtor's default probability, which is unknown, but is estimated with varying accuracy by the potential lender, in an attempt to evaluate the trustworthiness and capability of the debtor. Ownership or debt rights may be bought, sold, and leased to others, which is only possible if legal property rights sufficiently protect this ownership and control of property.

Real estate falls under the ownership type, and like many ownership investments, borrowing may be used to create a leveraged investment, amplifying the return. Providing the ownership return is higher than the return needed for the financier, a return can be made on the borrowed funds. The ownership investment typically has a higher risk, while the financier a lower risk. Leverage is frequently used since real estate has a high value compared to the wealth and income of many buyers. Real estate risk does vary greatly, but typical residential risk falls between medium-low and medium-high, depending on the specific nature of the property. Real estate includes the land and the structures that occupy the land. It is therefore immovable, and thus, location is of paramount importance. Real estate also has a defined use, which may be to live, trade, manufacture, or for support or utility use. Residential real estate is the most common and straightforward to analyse and invest in.
1.2) Literature Review

The textbook by Brueggeman and Fisher (2011), delivers a basis for analysing real estate investments. They provide a foundation for the legal concepts in property ownership, the time value of money, and illustrate how amortising loans are paid, such as how the debt is reduced slowly at the beginning of a mortgage, and gradually increases as interest payments decrease. These essentials of mortgages are covered as well as more complex mortgage varieties. The explanations for payment basics are well covered, but as the mortgage concepts become more in-depth, (with the formulas necessary for making calculations about debt service, payments etc), the explanations are not covered mathematically, and the reader is merely referred to financial calculator functions. Indeed, this practical perspective might suffice, but a little more mathematical understanding would have been welcome. Mortgage points and calculating total effective interest rates are well covered. The incremental loan cost understanding is covered, and is well explained, but without the real mathematical calculations, the understanding is slightly brief for such an important concept.

Valuations of income property are well covered with explanations for the different ways that the same property can be valued. There is also some risk analysis that demonstrates that the highest return investment is not necessarily the best when risk is taken into account. They cover taxation quite extensively by including taxes in all later chapters. Although it is explained quite well, and it does not hurt to understand the fundamentals of taxation, it seems unnecessary because the book is the international edition, and is not intended for any specific country. Since all countries have different tax laws, a general guide may be quite misleading, or just irrelevant.

In later chapters, there is a look at property development, alternative financing and different ways to invest indirectly, through real estate investment trusts, as well as portfolios of property. Overall, the book, delivers a solid look at the many topics that are essential, and of course, all topics cannot be covered thoroughly, and should be researched specifically to gain more detail.

Genesove and Mayer (1997), shows a correlation between the property leverage and sale price, with many other details. They study the selling price of 80% loan-to-value and 100% LTV. Although interesting, it would have been better to see more extended research including lower LTV ratios, including that of full ownership when no mortgage exists.

1.3) The Limitations

The limitations of the analysis and estimates are primarily related to the uncertainty in predicting the future. The market value growth is dominated by the location value change and is something that cannot be accurately predicted. Just like a stock price cannot be predicted for tomorrow, and certainly not many years in the future. Unexpected events happen all the time, whether by a declining market value, property damage or economic downturn.

A further limitation, is that the return can only be precisely calculated when the property is leased to another. When a landlord is living in their own property, they do not pay rent, but rather sacrifice potential income in exchange for utility from living there. The capital return
may still be calculated, but leasing income will appear negative, since maintenance and expenses still have to be paid. To overcome this, the utility may be valued at the estimated market rent, but still would be perhaps too low or high.

1.4) Methodology Overview

All investments begin with capital. It is this capital that the return is generated from. For real estate, it is typically made up of the deposit, \( D \), that is leveraged to make a larger purchase. The size of the investment is dictated by the size of this deposit and the availability of leverage. Which in turn is dictated by the amount of income needed to consistently pay for the loan. The income may be from leasing the property, \( L_t \), or the owner’s personal income in the case of an owner occupied property. The principle is the same regardless of investment size.

The leverage comes in the form of a mortgage from a lending institute, commonly a bank or building society. The bank provides the difference between the purchase price of the property and the deposit. The deposit then becomes the equity in the property.

To purchase a property, many costs must be paid, \( P_c \), some of which are unavoidable, but others can be reduced or bypassed. The property also may need renovation costs, \( R_{en.c} \), either small cosmetic touches or large modifications. These costs, along with the deposit, form the initial investment, \( II \).

Once this purchasing stage is complete, the property may be leased in exchange for regular payments. This is typically the longest stage of the investment, and in fact may continue indefinitely if a sale is not sought. From this leasing income, expenses must be paid for the maintenance and running costs of the property, which then gives the operating income.

Since leverage is used, the mortgage payments must be paid from the leasing income. Naturally then, it is the goal that the leasing income exceeds all expenses and loan payments by as much as possible, giving a regular profit. However, quite possibly, the operating income might not always cover the mortgage payments, especially in harder economic conditions when interest rates are high, rental demand is low etc. Yet even with a negative leasing profit, the capital appreciation of the property offsets running losses to an extent, unless of course there is negative appreciation, where the location is suffering and property prices are falling. Both the leasing profit and the capital growth sum to give the total return, which may either be realised by the sale of the property, or by continuing to hold the property as an asset.

The leasing profit, and indeed sale profit, may be reinvested, perhaps for another property, or into a different type of investment. The minimum return pursued should be to attain the discount rate of the economy, in order to keep the same value in future years. Since it is compounded, reinvestment adds a great amount to the total return.
### Table of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposit / Equity at time t</td>
<td>$D_t$</td>
</tr>
<tr>
<td>Purchase costs</td>
<td>$P_C$</td>
</tr>
<tr>
<td>Purchase Price</td>
<td>$P_P$</td>
</tr>
<tr>
<td>Purchase total</td>
<td>$P_T$</td>
</tr>
<tr>
<td>Renovation costs</td>
<td>$Ren_C$</td>
</tr>
<tr>
<td>Initial Investment</td>
<td>$I_0$</td>
</tr>
<tr>
<td>Sale Price</td>
<td>$S_P$</td>
</tr>
<tr>
<td>Sale costs</td>
<td>$S_C$</td>
</tr>
<tr>
<td>Sale total</td>
<td>$S_T$</td>
</tr>
<tr>
<td>Market value</td>
<td>$MV_t$</td>
</tr>
<tr>
<td>Property appreciation</td>
<td>$MV_T - MV_0$</td>
</tr>
<tr>
<td>Annual Mortgage interest</td>
<td>$r_M$</td>
</tr>
<tr>
<td>Mortgage leverage</td>
<td>$M_L$</td>
</tr>
<tr>
<td>Mortgage Outstanding</td>
<td>$M_T$</td>
</tr>
<tr>
<td>Expected Market value</td>
<td>$MV_E$</td>
</tr>
<tr>
<td>Annual Leasing Profit / GOI</td>
<td>$L_t$</td>
</tr>
<tr>
<td>Leasing Profit Yield</td>
<td>$L_t / P_P$</td>
</tr>
<tr>
<td>Saving Interest</td>
<td>$r_s$</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>$r$</td>
</tr>
<tr>
<td>Annual MV Growth Rate</td>
<td>$g$</td>
</tr>
<tr>
<td>Property Leasing Profit / NOI</td>
<td>$L_t - M_A$</td>
</tr>
</tbody>
</table>

## (2) Starting Essentials

All investments begin with research, and real estate is no exception. The first point to consider is the scale of the investment. Investments can be entire portfolios or start with one property. Even with a single property, values vary tremendously. How much is available to invest thus dictates which properties are accessible.

The initial investment is made up of the deposit, $D$, possible renovation costs, $Ren_C$, along with the necessary purchasing costs, $P_C$, and together with leverage, they are the starting point for an investment in real estate. Holding everything else constant, if a smaller deposit together with lower fees, and lower renovation costs can be achieved for the same estate value, then a higher return will be achieved.

### 2.1) The Deposit & Leverage

The deposit is typically the largest cost in the initial investment. A lower deposit may be achieved by selecting a lower value property, which is a matter of investment scale. However, a lower deposit for the same property value may be achieved by using higher leverage. This comes with an increased cost of borrowing, as the loan is deemed higher risk, but providing the reduced capital needed compensates for this, then it’s a return-enhancing move. The initial deposit is $D_0$, and transforms into the equity in the property at any time, $D_t$.

Leverage is the tool that amplifies the return, and the existence of leverage means that the entire purchase value is not required by the buyer. The return from the leverage is the difference between the return earned by the investment on the borrowed funds, and interest paid to the lender for the use of their funds. The total return for the year, $R_{\%}$, can be expressed...
as the difference between the property return, \( R_p \), and the interest payable on the mortgage, \( r_M \).

\[
R_\% = R_p M_L D_0 - r_M M_L D_0
\]

Where \( D_0 \) is the deposit and \( M_L \) is the mortgage leverage measured as a multiple of the deposit. \( r_M \) increases with the size of the leverage in practice, but in theory, whenever \( R_p > r_M \), the leveraged is advantageous to be as close to 100% as can be reached, meaning that the whole purchase price is provided by the lender. In this fictitious case (no fees to pay) there would be no deposit and a return would be made on the loaned money, \( M_T \), which would be as large as could possibly be.

\[
R_\% = R_p M_T - r_M M_T
\]

To illustrate, assume £100 is deposited to purchase a £300 property with a £200 loan costing 2% annually. One year later, the property increases in value by 5%.

\[
R_\% = 0.05 \times 3 \times 100 - 0.02 \times 2 \times 100 = 11\%
\]

The leverage is 1:3, meaning that two multiples of the deposit are added to purchase the property. In real estate, this means a 66% loan to value with a 33% down payment. A higher risk is involved with higher leverage, since if the property performs poorly, then the losses are also amplified. For instance, if a 5% decrease in value occurred instead, the lost value would be amplified in addition to not covering the loan cost. This is illustrated below.

<table>
<thead>
<tr>
<th>Initial Investment</th>
<th>Return after one year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposit</td>
<td>Loan</td>
</tr>
<tr>
<td>£100</td>
<td>£0</td>
</tr>
<tr>
<td>£100</td>
<td>£200</td>
</tr>
<tr>
<td>£100</td>
<td>£0</td>
</tr>
<tr>
<td>£100</td>
<td>£200</td>
</tr>
</tbody>
</table>

Notice that when the property value appreciated, the new equity became the increase in value minus the loan cost. This changes the leverage, and in this case, the equity increased from 33.33% to 35.23% of the property value (=111/315). Although the debt remains the same at £200, the owner now has a lower leverage, and if the same leverage power is desired in the next year, then the loan could be increased back to 66.66%, £210 (=0.66*315), making the equity lower, now £105, which would release £6 from the equity. This gives funds to reinvest elsewhere, and is usually done after many years, since the administrative costs of changing the loan can be substantial.

The probabilities have to be considered of course. If the outcome is positive, there is a resulting gain of 11%, if the outcome is negative the gain is -19%. This positive outcome would have to occur at least 63.33% of the time to make the expected value of the investment at least equal to zero (=19/(11+19)). In real world investments however, these probabilities are difficult to predict, and more general outlooks about the return potential are considered instead.
2.2) Mortgage Selection

With such a large debt, it is important to ensure the best possible mortgage is selected. Therefore, it is not uncommon to frequently change the mortgage. In the UK, the most common type of mortgage is an adjustable rate mortgage or ARM, while in the US a fixed rate for the whole term is more common\(^1\). ARMs are linked to interest rates in the economy, commonly the bank of England base rate. Introductory periods, often 2-5 years, where the rate is fixed or discounted, are common. The total cost of the loan should be calculated in order to make comparisons. The key points are the interest and the debt service, but moreover, it is the total interest and debt service that should be calculated, since fees and hidden terms often disguise the real cost. Administration fees are often required at the start, or ‘points’ to be paid, where the lender pays out the loan less a certain percentage, with the borrower required to pay interest on the ‘full’ loan. Although measures like the annual percentage rate, APR, attempt to show the whole cost, they often neglect to take everything into account. Therefore, specific loan calculations should be made.

For an interest-only mortgage, the debt service is equal to the interest, and is simply the overall annual interest of the loan multiplied by the loan amount, with the principal remaining constant. For amortising mortgages however, the principal is gradually paid back in addition to the interest. This means that the annual debt service is higher and will reduce the annual leasing profit. This gives a trade off between a lower annual leasing profit with a lower outstanding mortgage at the end of the term, or a higher annual leasing profit with the same (nominal) mortgage remaining. The answer to which is best lies in whether the investment’s return is higher than the interest payable. If so, then a return is made on this extra principal kept each month. It’s worth noting however that interest rates are often slightly lower in amortising loans than interest-only\(^1\), simply because they are considered more standard. This is because the risk is considered higher when the principal is not being reduced.

The debt service is equal to the interest cost per year, plus the yearly principal payments. The same loan with a shorter term would have a higher debt service, since the principle is paid back faster, requiring higher payments. To illustrate, consider paying back a loan of £100 over 25 years compared to 5 years. Regardless of the interest, smaller payments would be required for the 25-year loan since there is more time to pay it back. Loan constants are used to calculate debt service.

\[
\text{loan constant} = \frac{(\frac{i}{m})}{1 - \frac{1}{(1 + \frac{i}{m})^n}}
\]

Where \(i\) is the interest rate, \(m\) is the payments per year, normally 12, and \(n\) is the lifetime number of payments. Multiplying the loan constant by \(m\), gives the annual loan constant, the annual debt service as a percentage of the loan.

When the annual real yield of the property is more than the annual debt service, a positive leasing profit ensues, but if it is less, then a negative leasing profit means there is a cost to hold the property, but as long as annual capital growth is larger than the difference, then the total annual return \((Y_r - M_A + g)\) would still be positive. The example below illustrates the effect of an interest-only mortgage, but does ignore that interest rates may be higher with this
type of loan. Note that it is the real property yield, the income after expenses, that sets the upper limit for leasing profit.

<table>
<thead>
<tr>
<th>Loan Type</th>
<th>Real Property Yield</th>
<th>Loan Interest</th>
<th>Debt Service</th>
<th>Annual Leasing Profit</th>
<th>Annual Capital Growth</th>
<th>Total Annual Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amortizing</td>
<td>5%</td>
<td>4%</td>
<td>6.33%</td>
<td>-1.33%</td>
<td>3%</td>
<td>1.66%</td>
</tr>
<tr>
<td>Interest Only</td>
<td>5%</td>
<td>4%</td>
<td>4%</td>
<td>1%</td>
<td>3%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Finding the best Loan-to-Value ratio, LTV, is vital when deciding much to borrow. The incremental borrowing cost, much like the marginal cost in production economics, shows the extra interest payable on the extra funds. Consider two loans, one for £75,000 at 4% interest and another for £80,000 at 4.5%. Assuming interest-only for simplicity, the annual debt services are £3000 and £3600 respectively. The difference of £600 per year is what is paid to attain the extra £5000 loan.

\[
\text{annual interest rate} = \frac{\text{annual debt service}}{\text{loan amount}}
\]

The incremental interest on this extra £5000, is then 600/5000=0.12. Therefore, unless a property is generating very high returns over 12%, then the larger loan would be detrimental. Typical LTV ratios are around 80% (20% deposit), although higher leverage mortgages do exist, but come with the price of higher interest.

Income must be sufficient for the monthly loan payments. In the case of owner occupied mortgages, multiples of annual income are used, for example a multiple of 5 would mean a buyer with an annual income of £25,000 would be eligible for a maximum loan of £125,000. In the case of buy-to-let mortgages, the payments are supported by the leasing income. The interest rate is typically higher by one or two points, since the default risk is assumed to be higher. The deposit required is also often higher. But this is the type of mortgage that is legally required if the property is to be let. Credit ratings are also used to give an indication as to the creditworthiness of the borrower and thus the interest rate.

### 2.3) Renovation

Renovation increases the future sale price and rental value of the property. The aim is to add more value to the property than the cost of the renovation work. A lower cost of renovation can be achieved by selecting a property which requires only little renovation. This means that the return is largely made from the deposit, which is not necessarily detrimental, but properties in need of larger renovation are often sought, so that a return can be made from the renovation capital also. If the purchase price of a damaged property, plus the estimated cost of the work, is less than the expected market value in the renovated state, then renovations should be profitable. Efficient renovation can be achieved by cost saving renovation techniques for properties that are undervalued relative to the cost of the work needed. This is the primary reason that properties in need of renovation are chosen, where the expected market value is greater than the costs.
\[ P_T + Ren_C < MV_E \]

The renovation cost is not leveraged; it is simply improving the property using own capital. Although it may be possible to borrow for renovations, this typically carries a high interest rate. Hence, when renovations are made, the overall leverage changes, because the initial investment capital increases, and depending how much the renovations improve the property value, it can increase or decrease the leverage. Assume a deposit of \( D \) and a purchase price of \( 5D \), so the loan is \( 4D \), and renovation, \( Ren_C \), is zero. If the property is sold for \( 6D \) in the future, then we can formulate the return from the initial investment, ignoring fees.

\[
\frac{S_T - M_T}{D + Ren_c} = \frac{6D - 4D}{D} = 2
\]

This shows that the deposit has been doubled, a return of 100%. Now consider that the property is renovated, with the work costing the same as the deposit, \( R_c = D \), and adding the same value to the property as what the improvements cost. This means that the sale price has been increased by \( D \).

\[
\frac{S_T - M_T}{D + Ren_c} = \frac{7D - 4D}{D + D} = 1.5
\]

It is clear then, that no return has been made from the renovations, money has been invested, and only the same value has been received in the future, which when taking into account the time value of money, is actually a negative return on the money used for renovation. Therefore, the renovations must add more value to the property than the cost. If the renovation value added is greater than the return on the deposit, then the total return is increased. In particular, if it would increase inline, in this case by a factor of 2, we would have:

\[
\frac{S_T - M_T}{D + Ren_c} = \frac{8D - 4D}{D + D} = 2
\]

The moral is that the value added to the property from the renovations should be considered before the project is accepted. Some renovations are beyond the scope of the property itself and add less value than what they cost, for example an overly luxurious bathroom costing £20,000 might not be viewed in the same light by potential buyers and add a mere £10,000 to the value. When the standard of the property purchased is below the standard expected of the location, then renovations are normally profitable. For example, a damaged property might sell for much less than the cost of the renovations needed, and here a £30,000 restoration might result in a £60,000 increase in the property value. It is worth noting however, that even though the renovation work can decrease the leverage, the work is often necessary, and essential to making an investment.

Renovation can be extended further to include property development. Where new property is created from bare land, perhaps involving the demolition of old structures. The same principle still applies; the market value created must be more than the cost of construction. If it is possible to attain financing for the construction as well as the land, then the renovation can be leveraged, which makes the venture more profitable. If the land costs £100,000, and the construction another £100,000, and if a 50% mortgage is possible, and the resulting property sells for £250,000, then a \( \frac{100,000 + 50,000}{100,000} \) = 1.5 increase results.
(3) Trading

The actual market value of the property makes up the bulk of the property price exchanged, but deviations occur. Property may be bought below the market value that it is actually worth, and may be sold slightly above. These deviations occur because the market is decentralised, with participants having individual situations, incomplete information and high trading costs.

3.1) Market value

The market value is the natural price people would pay. A property may be listed for a price that is never reached, and so the best estimate of the market value is the price actually paid for the exchange, although this may still be considered a too low, or high, price. The price encompasses the supply and demand in the area, and in urban areas, is dominated from the land price, plus the physical building value. Real estate cannot be moved, and so location is naturally the most important aspect of a property. The main factors are the size of the land, desirability, closeness to employment and amenities, safety, prestige etc.

The value of the building comes from the size, age and condition, plus the cost of the fixtures and standard of the interior. The size of the building determines the liveable space, number of bedrooms, bathrooms, etc. This space, especially in urban locations is a major factor after location, because it defines how many people can live in the property and determines the overall usefulness of the property.

3.2) Purchasing

The sum transferred to the seller in exchange for their property is less than the total sum needed to make the purchase. The total needed is the agreed purchase price, $P_P$, plus the purchasing costs, $P_P + P_C = P_T$. The return should be calculated from this total purchase sum. The purchasing costs are relatively fixed in comparison to the purchase price, which varies considerably. A seller can patiently wait for a higher sale price, or sell for a lower price to obtain a quick sale. This is one of the main reasons why the exchange price may be lower than the market value, since the seller may be under pressure. This often occurs in foreclosures where mortgage payments are unpaid and the property must be liquidated.

Another way buyers receive value is when large groups of properties are sold, often from property developers or agents selling new apartment blocks, giving below market value properties to buyers and convenience to sellers who wish to quickly move to another project. In addition, some neglected properties may be undervalued. When the estimated cost of the renovation is less than the market value for the improved property, then gains can be made by renovation. However, estimating the cost of the renovation, and expected market value can be difficult, often with unforeseen problems increasing costs.

The costs associated with purchasing are:

Land Tax\(^1\) is paid upon purchase. In England, Stamp Duty Land Tax is paid in increasing percentages depending on the property price. There is no tax on properties which cost less than £125,000, but from £125,00 to £250,000 the rate is 2%. From £250,000 to £925,000 the
rate is 5%. From £925,000 to £1.5M the rate is 10%, and it is 12% for properties beyond £1.5M².

Broker Costs are paid if a real estate agent broker is used. The fees are normally a percentage of the exchange price, ranging from 0.75% to 2.5%. It can be advantageous to hire a broker who knows the market to find suitable properties and negotiate prices. However, the sacrifice is significant, a 1.5% fee on a price of £190,000 would be £2,850. Brokers are normally utilised since they can often negotiate and find properties effectively enough to warrant their fees.

Conveyancing fees are the legal fees required to transfer and register the title deeds to the new owner. The cost is estimated at between £250 to £1300 depending on the property. It includes legal searches and various other checks designed to protect the new owner.

Surveying Costs are for examining and checking the building. These range from basic reports and valuations to full structural surveys, typical costs range from £100 to £1000. A survey is required by the lender if a mortgage is to be used.

3.3) Selling

The total sum received from the sale, is the selling exchange price less the cost of selling and the outstanding mortgage $S_p - S_c - M_T = S_T - M_T$. Like purchasing, the return should be calculated from the actual sum received, and it is the sale price that varies the most compared to rather fixed selling costs. The price may often be slightly higher than the market value estimated from fair property appraisals. The primary way to increase the sale price is to simply allow more time for a sale, and make the property as desirable as possible for the target buyers. A well renovated property with a style that tempts buyers, along with solid marketing, assists in increasing the sale price. Properties are often listed for a higher than market value price, especially in high demand areas, in addition to being much psychology in sales, price setting, and knowledge of this would enable a higher sale profit.

As expected, property is often exchanged at a higher percentage below the market value than above. Sellers can be desperate and willing to take a much lower price, at the same time buyers are keen to take advantage of a desperate situation by offering low prices. Compared to desperate buyers and those who fall in love with a property and are willing to pay more, but not as much more. Buyers have the advantage of being able to look for another property, while sellers have to rely on buyers for a sale.

The costs associated with selling are:

Broker Costs are the same for purchasing and selling, sometimes they are split between two realtors, or it is decided beforehand whether the buyer or the seller bears the costs. Hiring a broker gives the advantage of saving the seller time and most likely may market the property better in order to achieve a higher price. Sellers can of course opt to market the property themselves, putting in the time and bypassing the fees, but whether the property would reach as many potential buyers, and therefore sell for the same price, is debatable. It would depend on the experience of the seller, and indeed the competence of the broker. Many owners hire an agent by default, simply because they are not aware of how to sell on their own.
3.4) Bargaining

Bargaining exists in the exchange of real estate, and given the high value of real estate, it is no doubt wise to attempt to get a better price. Knowing the other party and their position is vital in understanding what exactly they are looking for. Participants have different motivations that are not always financial, there are many factors and reasons for a sale or purchase. Possessing more patience and indifference than the other party regarding the exchange puts one in a position of power. If a seller needs a fast sale, they would be more open to accepting concessions than a seller who is indifferent about a sale. Conversely, buyers who fall in love with a property would be willing to pay more than a buyer who is only concerned about the price. This emotional trading is prevalent since many people are dealing with their home rather than a financial investment.

When analysing properties, it is important to realise that participants frequently lie and deceive in order to make themselves, and the property, appear different. A real estate agent will most likely share more information with another agent than directly with the owner or potential buyer, and this is one of the advantages for hiring a broker. Nevertheless, there is still a risk, since not all agents are skilled negotiators that achieve a better price or terms of sale. While it is important to have rapport with other parties, the key to effective negotiation is emotional detachment, in order to view the property as an investment in purely financial terms. Although in many cases, homeowners are offended by low offers, which makes further negotiations difficult.

Research completed in the UK from Merlo and Ortalo-Magne (2004) shows that 40% of all first offers are accepted, and out of the remaining 60% that are rejected, two thirds then increase their offer, up for four times until either accepted or not. Research by Genesove and Mayer (1997) also confirms this. Perhaps we may infer that first offers are rarely the maximum offer a buyer is willing to pay, and therefore the strategy should be to wait for a better offer. In addition, equity invested in a property has an effect on the sale price. Those with a lower mortgage and higher equity, accept a lower price for their property than those who are more financially constrained and have lower equity in their property. Furthermore, those with a lower mortgage sell faster. Waiting for a higher price takes a longer time. It may therefore be deduced that sellers who need the high price, for perhaps another down payment on a property, will be less inclined to accept a lower offer than those who do not.

(4) Income

Leasing, or renting out, is subject to the same speculation as trading, in that the future income is unknown and can only be estimated. Nonetheless, it is still essential to use current market data to analyse if a property will be profitable to lease in the present time. The market rental value is derived primarily from the market sale value of the property, but also vice versa, the rental income affects the value of the property. This is because property may be valued using comparable properties sales approach or a rental income approach.

4.1) Property Yield
The rent received may deviate from the rental market value, depending on the use of the property and indeed the expertise of the landlord. However, the bulk of the rental income stems from the rental market value, which in turn, is proportional to the sale market value. This proportion is known as the yield, and is subject to great variation, with different properties possessing different property yields. This ratio of the rental market value to the sale market value should be considered before possible deviations from the rental market value are contemplated. This is because any attempts to increase the rent received are still dependant on the inherent property value rental and sale value.

A higher yield means greater income for the same property value. The market yield, $Y_m$, is often quoted and is equal to the leasing income divided by the purchase price, $Y_m = \frac{L_t}{P_p}$. This simple yield is useful for research, but the real yield, $Y_r$, or capitalisation rate, takes into account the annual expenses, $L_E$, upkeep, $L_U$, and the full cost of purchasing.

$$Y_r = \frac{L_t - L_E - L_U}{P_p + P_c}$$

Note that the mortgage is excluded, since this is the unleveraged real property yield needed to see how the mortgage yield compares. For example, if this yield is 6% and borrowing costs 5%, then a difference of 1% is made on the borrowed funds, but if the property yield is less than the mortgage yield, then the return is negative on the loan, and overall leasing yield decreases. The annual (leasing) profit yield, $Y_p$, takes into account the annual mortgage cost, $M_a$, and is equal to the annual leasing profit, $L_p$ relative to the initial investment, $II$

$$Y_p = \frac{L_t - L_E - L_U - M_a}{D_0 + P_c} = \frac{L_p}{II}$$

The rental market is dependent on different factors than the purchasing market. It has different elements and different people, the rental market is faster, more dynamic, and often more competitive. In contrast, the purchasing market moves slower and depends on more than how much rental income can be received. It is the nature of all property to have a value of ownership and a value for using it, the proportions of which vary. Properties with a lower value and higher rent are often found in areas where the buying market has a lower demand than the rental market. This makes tenants pay more for a property than their counterparts who live in an area with a lower demand for rental properties.

4.2) Occupancy

High occupancy is a primary goal, since income is lost during vacancy. A low rent will entice tenants and reduce vacant periods. While a high rent will take more time to find a tenant, and perhaps will encourage tenants to move if they find a better offer elsewhere. It is important therefore to find the optimal balance, which may be achieved by investigating the local sensitivity to prices. Assume two properties with a monthly market rent of £600, one in a location with a lower rental price sensitivity, and another in a more competitive location with a higher sensitivity.
<table>
<thead>
<tr>
<th>Location A - Less Sensitive</th>
<th>Location B - More Sensitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent, monthly</td>
<td>Months occupied per year</td>
</tr>
<tr>
<td>550</td>
<td>11.5</td>
</tr>
<tr>
<td>595</td>
<td>11.25</td>
</tr>
<tr>
<td>600</td>
<td>11</td>
</tr>
<tr>
<td>650</td>
<td>10.5</td>
</tr>
<tr>
<td>700</td>
<td>9</td>
</tr>
</tbody>
</table>

In this example, charging a higher rent in location A outweighs the reduced occupancy. When the market is more sensitive, however, the increased rent does not cover the losses of the vacant periods, and should be reduced slightly to attract tenants and achieve a higher collective annual rent. A large reduction in rent does reduce vacant periods, but if vacancy is already low, then further reductions have little effect and only reduce the collective rent. There will always be some small period of vacancy needed to find a tenant. If vacancy periods are so brief, then it is likely that the demand is high, and the rent should be increased. The optimal rent in the price sensitive location of B is a slightly reduced rent that attracts tenants a little faster, while still receiving close to the market rent.

### 4.3) Property Use

How a property is used, and the tenants chosen influences the utility of a property, and thus the rental market value. A single family home is the most typical and basic type. In the unfurnished state, a basic rent may be charged, however this arrangement may be improved by *adding more value* to the property. If the property is furnished, a higher rent may be charged, and a return may be made on the furnishings. Assume a property can be equipped with modest furniture for £5000. If the basic rent was £600/month but £750/month can be charged for the furnished state, then a £150/month can be made for the furnishings. Perhaps the occupancy is a little lower in the furnished state, but if more overall income is received and the cost of furniture is recovered, then it would be a profitable choice. In this case it would take 2 years and 10 months of occupancy to earn back the furniture cost (ignoring interest), which is no doubt much less than the lifespan of the furniture. On the downside, a furnished home attracts different tenants, plus the risk of furniture damage because people are more inclined to damage property they do not own.

A shared home is where tenants rent one bedroom each and share the rest of the property. They may either be strangers or affiliated with each other, perhaps corporately, socially, work colleagues, students, etc. In this arrangement, adding value to the property is appropriate, since it alleviates the difficulties involved with the tenants working together to arrange necessities. Furnishings are often a necessity and the value added can be extended further to include amenities such as housekeeping, laundry, internet, and utilities. Assume an internet connection, satellite television, and weekly housekeeping can be arranged for £250/month, and the total property and services can now be rented for £1200/month, with three bedrooms paying £400 each. This is a step up from £750/month, giving an extra £200/month over the costs. This is essentially a long stay hotel, and not only is a return being made on the property and furnishings, but commissions are taken for the arrangement of services.
4.4) Expenses

The property type dictates certain expenses. Apartments have expenses for the maintenance of the whole building and communal areas, which is offset by lower upkeep/maintenance costs, since the owner is only responsible for the interior of the property. On the other hand, a house has less expenses, but higher upkeep costs since the whole building is owned and needs to be kept in good condition.

Upkeep/maintenance, $L_{ij}$, is the cost for maintaining the condition of the building, which offsets depreciation, and consists of repairing the building, walls, windows, roof, replacing broken appliances, periodic redecoration, etc. Costs that do not maintain the value of the property are classified as leasing expenses rather than leasing upkeep, e.g. local taxes, energy certificates, ground rent, agency and legal costs, etc.

Property Management Commission$^4$ is the percentage taken each month for an outside company to manage the property for the investor. While commonly employed, the cost significantly affects the return. Services range from finding a suitable tenant, providing tenancy contracts and moving the tenant in, to full service management including collecting rent, dealing with repairs and problems. Fees start from a single payment of one month’s rent for a basic matching service to 10% or 15% of the monthly rental income for full management. While hiring an agency to perform these duties will save considerable amounts of time for the owner, the costs are worth highlighting; assuming a property with a rental income of £600 and mortgage payments of £300 (0.045/12 of £80,000), along with a generous £200 for expenses and upkeep, this leaves £100 a month leasing profit. A 10% monthly commission is £60, which, when taken from our profit becomes 60%.

4.5) Interest Rates

The current interest rate of 0.5% set by the Bank of England is at a historic low. Higher interest rates are thus inevitable, and tests can be made to see how high rates may go before leasing is unprofitable. The problem in testing however, is that with higher interest rates comes the possibility of a higher rent. Therefore, the annual profit at higher interest rates becomes difficult to see, the connection between the two is loose and rather uncorrelated.

The real yield of the property dictates how high interest rates may rise before running losses are incurred. If the cap rate of the property does not increase proportionally to the increased mortgage costs, then interest rates do not have to rise so far to cause problems. However, if cap rates do increase along with interest rates, then the additional cost of the mortgage is passed along to the tenant. An increase in cap rates should be expected with higher interest rates, perhaps not directly proportionally, or at exactly the same time, but rents generally do increase in a higher interest rate economy$^5$. This means the cost is shared between the landlord and the tenant, meaning that higher interest rates may be tolerated.
(5) Utilising the Market

Taking advantage of market swings is the key to making a good return, especially for capital appreciation. The market can be looked at as the whole country, or the larger geographical region, down to specific neighbourhoods and streets. The constantly changing supply and demand is what makes properties have different prices at different times. Research from Mei and Liu (1994), shows that there is a degree of predictability in real estate market timing, that leads to higher returns. In addition they show that real estate stocks have higher profits compared to all other stocks.

5.1) Market Timing

Appreciating location value when the property is held is the chief aim, so it’s important to time the market, both in the sense of neighbourhood values and national property prices. Essentially, it is not the market value that matters, it is the change in market value that is important, anything else would not contribute to capital return. Market timing therefore is one of the main influences for the return.

Property prices in the whole country experience cycles, from undervalued (relative to the average) troughs, to overpriced peaks. Both of which are unmaintainable and thus prices swing between the two, obeying the laws of greed and fear like bulls and bears present in all markets. Prices in cities and towns go through similar changes, with rising values in certain neighbourhoods and declining values in others. It is wise to take advantage of these changes, Furthermore, buying a below market value property when average market values as a whole are also at a low point, and selling a high priced property when average prices are high maximises return in both aspects.

The below chart shows historical prices from 1975 to 2015, in both nominal values and adjusted for inflation. The peaks and troughs are more defined for the latter because the inclusion of recent prices diminishes the appearance of historical movements. For example, if nominal prices for the historical smaller period were plotted, say 1976-1983, then the peak here would be seen sharper. It is for this reason that adjusted for inflation historical data allow trends to be seen more clearly, and comparisons to be made between present and historical movements.
The above chart shows the inflation-adjusted data with the inclusion of a trend line, similar to a simple moving average. The trend line can be thought of as the natural progressive average market value which is absent the swings of market behaviour.
Consider an imaginary trade. A shrewd time to buy was 1996. The average property price in the first quarter was £51,367, which when adjusted using the Retail Price Index has a value today of £88,414. This purchase price compared to the trend line average (adjusted values) of £124,443, indicates the market is under-priced by a difference of £36,029. And assuming the market will indeed turnaround to surpass its previous heights, then selling six years later (not peak, and selling in 2007 would yield even higher returns) in 2002 when average first quarter adjusted prices were £142,422 (£3,380 below the trend of £145,802), would realise a capital gain of £54,007. (£43,989 in nominal terms with a sale price of £95,356)

If market swings and fluctuations did not exist and instead were replaced by a smooth average, the gains would have been the difference between the trend line averages in 1996 and 2002, which would be £145,802-£124,443=£21,359. Compared with £54,007, the difference is substantial and illustrates that market timing can be used increase gains.

Research from Bracke (2011), shows the district peaks and troughs in market timing, and also the historic lengths of property cycles. Bracke shows that in periods of appreciation, there are high transaction volumes and increasing supply. Whereas in periods of falling prices, transaction volume is low. Additionally, the more prices deviate from their fundamental value, the more likely a correction is to take place, and thus making market cycles defined and more predictable.

Return is derived from the combination of capital growth and accumulated leasing income. While some investments have a fairly balanced blend of the two, others are dominated by one. The graph, from the University of Cambridge, shows the volatility of capital growth compared with income return. The graph data matches the data above for real estate prices.

It would seem that market value plays the role in the capital change, enabling large gains or losses, and can be considered a riskier approach to achieving the return. Income on the other hand, is more consistent every year and shows stability. Knowing these market swings and volatility is crucial, selling a property around the bottom peaks of 1991 or 2009 would impact the return in a very harmful way. Likewise, overpaying for a property would damage the return when the property cannot be sold for a higher price later. Even if rental income were high, it would be a minor revenue relative to the low future sale price.

5.2) Predictions

Speculation is commonly wrong, and real estate forecasts are no exception. Predicting when the market will change is naturally difficult. Fundamental and technical analysis techniques are used by investors and institutions around the world in an effort to forecast market prices. For the country as a whole, information about the health of the economy, such as changes in employment, consumer sales and property sales, may give clues as to whether market prices
will form a trough and start turning upwards, or when a peak has been reached and prices are likely to fall.

For specific neighbourhoods, a decreasing crime rate, new developments and new businesses, along with fresh residents moving in, are signs that the area is improving. Property heat maps are an aid to monitor prices and find potential locations. The below maps\(^9\), show the listing price (left) and monthly rents (right) of residential property for the Upper East side in Manhattan. Darker red indicates a higher listing price or higher monthly rent.

These maps show two things, firstly the left map of listing prices shows how prices appear spacially, showing zones that are relatively cheap compared with their more expensive neighbours. This may be used to predict neighbourhoods for faster potential growth. Locations like the one highlighted are an example of such a situation, it would seem likely that prices here would catch up with closeby prices as the demand for properties in the adjacent areas natually spreads into the surroundings. This process could be named price-osmosis, after the natural chemical phenomena. It’s worth noting that the dark red prime locations will no less also increase in value in line with the city market, but the locations cheaper locations will appreciate faster.

The second use of these maps is to see the correlation between the listing price and monthly rents, in an effort to find the properties whose yield deviates the most from the city average. For example, the highlighted two blocks from 98th to 100th street, show a location that experiences higher rent for the same current asking price than other locations in the city.

(6) Return

This section brings all the concepts together to give the total return. Estimations of the total return are made before a purchase. It is of course only in retrospect that the actual return will be known, but these estimations are necessary to gauge feasibility and make comparisons between property alternatives. For these estimations to be made, many assumptions must be made about future economic conditions, so naturally there is a degree of error as to the reliability of the estimations that increases with time. This is an uncertainty that is present is all investments to a varying degree.
6.1) Measuring Return

Measuring the return depends on when the investment start time and end time is defined. The timeline for the investment begins with researching prospective locations and properties, then confirming a property through the use of appraisals, surveys etc. Together with a mortgage application this forms the conception stage of the investment. Once the mortgage is granted, the property is then purchased and renovated in preparation for the rental stage or holding period. This stage may continue indefinitely with its own cycles where tenants come and go and periodic renovations are completed. Finally, should a sale be decided upon, the final tenants vacate and the property is renovated again before a sale.

It would be difficult and imprecise to calculate the return from the early conception stage, since the initial investment has yet to start, with only time and small preliminary costs invested at this stage. It would instead be reasonable to start the return from the purchase stage, but since income has not yet been received, the investment is still in the preparation stage and so the return is solely made up of costs. Therefore, the return is calculated from when the first tenants occupy the property and begin paying rent, with the inclusion of all the accumulated costs until this time. It is only at this stage that the total setup costs are known and the first year’s yield can begin to take shape. Given this, it is important to start receiving income as quickly as possible, especially once a property has been purchased, a lengthy purchase and renovation period is undesirable as it delays income being received on the invested capital.

There are a number of ways to contemplate the return. The simplest way is the price sold minus the price paid, divided by the price paid. Since leverage is being used, this can be expressed as \( \frac{Amount \ received - Amount \ invested}{Amount \ invested} \), a basic formula of course, but the principle is there, and is analogous to the \( \frac{New \ Value \ of \ investment}{Old \ Value \ of \ investment} \).

The return factor is a measure of the return expressed as a multiple of the initial investment. For example, a value of 1.5 indicates a 50% return and may be converted to a percentage return using the formula, where \( R_f \) is the return factor:

\[
R_{%} = 100 \times (R_f - 1)
\]

The return includes both the investment value at the initial start time, and the profits in the future, and since money changes value over time, it would be flawed to compare these two different values. Therefore, all values need to be converted into one time or the other, and it is the present value that is typically chosen. To calculate \( R_f \), the present value of all the future profits, \( PV_0 \), are summed and divided by the initial investment.

\[
R_f = \frac{PV_0}{D + Ren_c + P_c}
\]
Both $R_f$ and $R\%$ give the return over the entire period, but it is often useful to make comparisons between investments that extend different time periods. For a standardised measure of return over a set time period, the annual return may be used. This annual return would be compounded each year for the total period.

\[
\text{Annual } R\% = 100 \times ((R_f)^{\frac{1}{T}} - 1)
\]

Where $T$ is the number of years, a 50% total return therefore, equals an 8.45% annual return for five years. It is this Annual $R\%$ that is needed when considering property and loans, as most are measured and compared annually.

### 6.2) Present Value

The present value of payments at different future times may be calculated using the formula:

\[
\text{Present Value} = \sum_{t=1}^{T} \frac{X}{(1 + r)^t}
\]

Where $X$ is the nominal value in year $t$, $r$ the discount rate and $T$ the number of years. This formula assumes a constant discount rate for predictions, but when looking retrospectively, the reality is that each year the discount rate changes depending on inflation, interest rates etc.

The present value of total investment payoff is the discounted sale total, $S_T$, minus the outstanding mortgage, plus the present value of the accumulated leasing profit.

\[
P V_0 = L_{PVS} + \frac{S_T - M_T}{(1 + r)^T}
\]

Where $S_T = S_p - S_c$ and $L_{PVS}$ is:

\[
L_{PVS} = \sum_{t=1}^{T} \frac{L_t}{(1 + r)^t}
\]

And $L_t$ is:

\[
L_t = L_{It} - L_{Et} - L_{Ut} - M_t
\]

Giving a comprehensive present value formula of:

\[
P V_0 = \sum_{t=1}^{T} \frac{L_{It} - L_{Et} - L_{Ut} - M_t}{(1 + r)^t} + \frac{S_p - S_c - M_T}{(1 + r)^T}
\]

This value may only be calculated accurately when the property is sold and all values are known. However, predications may be made as to what the sale price and leasing profit may be.
6.3) Predicting Return

The future property value is unknown. It may be much higher than predicted, or indeed much lower. The longer the time period, the less accurate the estimates. It is therefore wise to underestimate the returns. It is much better to have a higher return than anticipated, than lower. A base estimate for the growth rate may be formulated from average property values over time. This ignores national market swings, and changing location values, and any unexpected turns for better or worse. Nonetheless, average prices are the best and simplest way to judge what to expect from the market, and provide a baseline from which to aim to improve from using timing and other techniques. From the property data above, the growth rate per year, in nominal terms, was 7.46%. The adjusted rate was 2.02%. The discount rate used in the calculations may be deduced and averaged approximately 5% each year.

The growth rate, \( g \), chosen for the estimations is a modest 4.5% (nominal), and is set lower than the historic average in an effort to air on the side of caution. The discount rate used is that which is recommended by the UK Treasury\(^{10} \), and is equal to 3.5% annually. Again, the real discount rate that depicts the changing value of money will not be known until the future, and so all rates are estimates. The future value may be estimated using the annual growth rate compounded each year.

\[
S_p = MV_0(1 + g)^T
\]

Where \( MV_0 \) is the initial market value. Note that the purchase price is not used, because this may be different from the actual market value. If the purchase price is less than \( MV_0 \), as expected, then an equity jump will result in the first year. The same is true if efficient renovation is completed. Note that the mortgage and selling costs must be taken into consideration, therefore:

\[
S_T - M_T = MV_0(1 + g)^T - S_C - M_T
\]

If the property will not be sold, then only the asset value (equity, \( D_T \)) is relevant, and the selling costs may be omitted. Note that the selling total is what is received from the sale, and the asset value takes the mortgage into consideration.

\[
D_T = MV_0(1 + g)^T - M_T
\]

This equation considers only capital growth, a situation where perhaps the leasing profit is consumed. But if reinvested, the return greatly increases. It may be invested in many ways, perhaps saved for another property, invested in another vehicle altogether, but at the very least it should be invested in a vehicle that grows at the discount rate, \( r \).

Therefore, the total future asset value, at time \( T \), is

\[
D_T = MV_0(1 + g)^T - M_T + L_{FVS}
\]

Where \( L_{FVS} \) is the future value of the accumulated annual leasing profits that grow at the discount rate.

\[
L_{FVS} = \sum_{t=1}^{T} L_t (1 + r)^t
\]
Note the difference between present value and future value, a sum of 100 today is equal to $100(1.035)^5$ in five years time, when saved at 3.5%. While the sum of $100(1.035)^5$ five years in the future is worth $\frac{100(1.035)^5}{(1.035)^5}$ in today’s money.

6.4) Predicting Present Value Return

The present value and the predictions may be brought together. It is assumed that the leasing income and expenses grow in line with inflation, $\pi$. The annual mortgage payments, $M_t$, remain constant in nominal terms, since the interest rate, $r_m$, is assumed to remain constant. This means that the mortgage becomes more affordable as time progresses.

\[ L_t = (1 + \pi)^t(L_{t0} - L_{E0} - L_{U0}) - r_m M_T \]

which may be substituted inside the sum for the total leasing profit.

\[ L = \sum_{t=1}^{T} \frac{(1 + \pi)^t(L_{t0} - L_{E0} - L_{U0}) - r_m M_T}{(1 + r)^t} \]

The initial leasing profit may then be extracted.

\[ L = (L_{t0} - L_{E0} - L_{U0}) \sum_{t=1}^{T} \frac{(1 + \pi)^t}{(1 + r)^t} - \sum_{t=1}^{T} \frac{r_m M_T}{(1 + r)^t} \]

This is an equation for how the leasing profit is expected to grow with inflation, if the cap rate of the property is to remain constant, then the leasing profit should grow in line with the market growth rate. Both may be used, as the cap rate would surely change over time depending on many factors. In the estimates the leasing profit is assumed to grow with $g$.

Adding the capital growth on the right hand side;

\[ PV_0 = (L_{t0} - L_{E0} - L_{U0}) \sum_{t=1}^{T} \frac{(1 + g)^t}{(1 + r)^t} - \sum_{t=1}^{T} \frac{r_m M_T}{(1 + r)^t} + \frac{S_T - M_T}{(1 + r)^T} \]

And substituting the predicted capital growth;

\[ PV_0 = (L_{t0} - L_{E0} - L_{U0}) \sum_{t=1}^{T} \frac{(1 + g)^t}{(1 + r)^t} - \sum_{t=1}^{T} \frac{r_m M_T}{(1 + r)^t} + \frac{MV_0 (1 + g)^T - S_C - M_T}{(1 + r)^T} \]

The last term of this formula refers to the capital growth of the property, while the first two represent the leasing profit and mortgage, respectively. This formula may be used to numerically determine the present value when the variables change, for example to see the effect the growth rate has on the return.

The present value return is then;
\[ \text{Return}_m = \frac{PV_0}{D + \text{Ren}_c + P_c} \]

Where \( D = P_p - M_T \), so the denominator may be expressed as \( P_p + \text{Ren}_c + P_c - M_T \).

### 6.5) Interest Rate Effects

The formula may be used (with or without \( g \)) to analyse how the return is affected by interest rate changes.

\[
R_f = \frac{1}{P_p + \text{Ren}_c + P_c - M_T} \left( (L_{t0} - L_{E0} - L_{U0}) \sum_{t=1}^{T} \frac{(1 + \pi)^t}{(1 + r)^t} - \sum_{t=1}^{T} r_m M_T + S_T - M_T \right)
\]

\[
R_f = \frac{1}{P_p + \text{Ren}_c + P_c - M_T} \left( (L_{t0} - L_{E0} - L_{U0}) \sum_{t=1}^{T} \frac{(1 + \pi)^t}{(1 + r)^t} - M_T \sum_{t=1}^{T} r_m (1 + r)^t + S_T - M_T \right)
\]

The outstanding mortgage total is extracted from the sum, while the interest rate remains.

\[
\frac{\partial R_m}{\partial M_T} = \frac{P V_0}{(P_p + \text{Ren}_c + P_c - M_T)^2} - \frac{1}{P_p + \text{Ren}_c + P_c - M_T} \left( \sum_{t=1}^{T} r_m + \frac{1}{(1 + r)^t} \right)
\]

\[
\frac{\partial R_m}{\partial M_T} = \frac{1}{(P_p + \text{Ren}_c + P_c - M_T)^2} \times \left( PV_0 + M_T \sum_{t=1}^{T} \frac{r_m}{(1 + r)^t} + \frac{1}{(1 + r)^t} \right) - \left( P_p + \text{Ren}_c + P_c \right) \left( \sum_{t=1}^{T} \frac{r_m}{(1 + r)^t} + \frac{1}{(1 + r)^t} \right)
\]

\[
\frac{\partial R_m}{\partial M_T} = \frac{1}{(P_p + \text{Ren}_c + P_c - M_T)^2} \times \left( (L_{t0} - L_{E0} - L_{U0}) \sum_{t=1}^{T} \frac{(1 + \pi)^t}{(1 + r)^t} + \frac{S_T}{(1 + r)^t} - (P_p + \text{Ren}_c + P_c) \left( \sum_{t=1}^{T} \frac{r_m}{(1 + r)^t} + \frac{1}{(1 + r)^t} \right) \right)
\]

The derivative is positive if \( r_m \) is small enough.

\[
\frac{\partial R_m}{\partial M_T} > 0
\]

Which is the same as;
\[(L_{t0} - L_{E0} - L_{U0}) \sum_{t=1}^{T} \frac{(1 + \pi)^t}{(1 + r)^t} + \frac{S_T - (P_p + \text{Ren}_c + P_c)}{(1 + r)^T} > (P_p + \text{Ren}_c + P_c) \sum_{t=1}^{T} \frac{r_m}{(1 + r)^t}\]

The right hand side is the present value of the mortgage payments if the loan is 100%. The left hand side is the net present value of the leasing and selling. If the inequality holds it is desirable to borrow at 100%, if the inequality is reversed, then a loan should not be taken.

6.6) Risk

Risk is present in any investment and while real estate typically has a lower risk than common stocks, individual properties carry a higher risk than a portfolio of many properties. A portfolio of any asset is more stable. A single property has the risk of acute depreciation of land value. Upon witnessing this situation difficult decisions become necessary. One could sell and realise a loss, only to find the location improving soon after. Or one could hold, only to find market values dropping even further. This phenomenon is alleviated when a portfolio is held, as it’s much less likely that many different locations will acutely depreciate in value relative to their neighbours (not nationwide) at the same time. Just like the comparative risk of holding one stock vs holding many. The national market swings will still be present, but the portfolio loss is smaller if one property out of many depreciates.

And whether a single property or a portfolio is held, interest rate risk applies. A portfolio would have perhaps more dexterity to reduce debt by selling properties to reduce debt on others, thereby surviving the austerity period, while a single high leveraged property might have more problems paying increased mortgage payments.

Research by Ross & Zisler (1991), estimates the volatility in real estate returns to be 9-13%. With a portfolio, this risk could be mitigated, and spread across multiple properties. Specific risk is omitted in the return predictions, but it is implicit that the actual return would fluctuate from the estimates, and if a portfolio were held, then return setbacks would occur if a single property is eventually considered a bad investment and a loss is taken.

6.7) Return Decisions

Maximising return extends further than the efficiency of a single property. Once a property has been purchased at the best possible price, and leased as effectively as can be, the decisions turn to what to do with the profits. Funds are generated in the form of equity in the property, and in the form of dividends paid out: Both of which may be utilised to further the return.

The leasing profit may be spent to increase the owner’s income, which would lead to a consideration of the proportion of income that should be consumed or invested. Assuming however that the entire leasing profit is reinvested, then the return may be analysed with no deductions for consumption and the portfolio return will no doubt increase.

The leasing profit may be invested at a low rate with low risk, or possibly invested into stocks, either large stable corporations or smaller, risker stocks. This is an owner choice, but one thing is certain, the leasing profit may be saved with the goal of purchasing another...
property, repeating the cycle and building a portfolio. The low risk saving is expressed by the future value, where the leasing profit is saved at $r$, the discount rate.

To extend the notion of gathering funds for another property, the current property held may be re-mortgaged to access funds, assuming the interest rate available is low enough to make a return on. The leverage of the current property would increase in this situation, which provides the benefit of an increased equity growth rate (since the equity is now lower for the same increasing property value). Naturally, the leasing profit is now lower due to higher mortgage payments, but this reduced annual profit is offset by the increased capital returns both of this property and the new one being acquired.

When a rapid capital growth occurs upon purchasing an undervalued property, including renovation, it may be more profitable to sell the property and repeat the cycle, ignoring the leasing period completely. This practice of undervalued property seeking, renovating and selling quickly is common. Although the same principals of trading are used when building a portfolio, ‘property flipping’ gives discrete capital gains from selling rather than gradual gains from holding and leasing.

(7) Estimates

This section applies the theory to real world data. The data is hypothetical, but based on actual investments available\(^{11}\). Estimates should be made for many properties in an effort to choose one to purchase. That, together with neighbourhood predictions and other speculative elements, leads to a purchase. After analysing a property’s immediate financials, projections may then be made about the future performance.

7.1) Leasing Estimates

Apartments in the newly renovated Sterling Building come furnished and rent efficiently at £625 ($L_{1}/12$) each month. They value at £110,000 ($MV_0$) each, yet a discount is available through the construction company, such that an apartment may be purchased for £95,000 ($P_p$). It is assumed that the property may not be sold soon after.

The company requires £4500 ($P_C$) to make a purchase which covers legal fees and initial costs, in addition to a 7% property management fee, and £1100 annually to cover the service charges and leasing expenses($L_4$).

Interest-only financing is available, costing 5% per year ($r_M$), and requiring a 30% deposit ($D_0$). The market value of the property is expected to grow by 4.5% per year ($g$). A savings route is also available that gives 3.5% per year. The discount rate is the same, at 3.5% ($r$).

From this information, the first thing that should be calculated is the property yield. The market yield is $Y_m = \frac{i_L}{P_p} = \frac{625 \times 12}{95000} = 7.89\%$. 

---

\(^{11}\) Estimates should be made for many properties in an effort to choose one to purchase. That, together with neighbourhood predictions and other speculative elements, leads to a purchase. After analysing a property’s immediate financials, projections may then be made about the future performance.
After expenses, a real yield of \( Y_r = \frac{L_F - L_E - L_U}{P_P + P_C} = \frac{(625\times12) - 0.07(625\times12) - 1100}{95000 + 4500} = \frac{5875}{99500} = 5.91\% \).

This is the real yield, or capitalisation rate of the investment, equal to the net operating income divided by the asset cost. It instantly gives the ability to see the limit for the mortgage debt service. The mortgage loan is \( 0.7\times95000 = £66,500 \), and costs \( 0.05\times66500 = £3325 \) annually.

This leaves £2550 after the mortgage is deducted from the annual income. Which gives an annual leasing yield from the initial investment, \( Y_l = \frac{L_F}{L_I} \) of \( \frac{5875 - 3325}{0.3\times95000 + 4500} = \frac{2550}{33000} = 7.73\% \).

If the mortgage interest rate rises by more than the real yield, then the leasing profit from the loaned money becomes negative. In this case the difference is 0.91% that is made annually on the mortgage. \((Y_r - r_m)\) That’s not to say that the leasing profit becomes negative if the interest rate rises by more than 0.91%, just that the leasing profit from the mortgage becomes zero at the time, the leasing profit would turn negative when the interest rises so much as to eliminate the leasing profit completely. In this case the annual mortgage would have to increase by £2550, which relates to loan rate of 8.83%. \((5875/66500)\). If the rate rose by more than this, the loan would still enable capital growth and even a negative leasing profit may lead to a positive overall return.

### 7.2) Capital Estimates

In the first year an instant capital growth is made because of the discount from the market value. The initial investment is £33,000, but the equity in the house once purchased is \( 110,000 - 66,500 = 43500 \). This is a growth of 31.82%. For the following years, the equity grows along with the market value growth, (equal to 4.5% annually). It’s this instant capital growth that makes purchasing undervalued properties so attractive, either by the discount offered from a building company, or by self-renovation.

The market value growth for the second year is equal to \( 0.045\times110,000 = £4950 \). And for the third year, another 4.5% on the previous year’s value. This growth is not realised until the property is sold, but even if the property is never sold, the asset still grows and so is added to the return.

The market yield of the property is assumed to remain constant, making the leasing income also increase by 4.5% each year. The expenses are assumed to follow the same trajectory and increase proportionally with income. The interest-only mortgage however, has a constant outstanding balance and debt service (same as the interest). This makes the leverage decrease over time, due to an increasing property value with a constant debt. It is because of this decreasing leverage, that the growth of the annual leasing profit decreases over time, since as the leasing income grows, the debt service has a smaller impact. The equity growth would eventually (at infinity) converge to the growth rate of the market value, 4.5%, and it is for this reason that maintaining leverage is so important, so that a higher-than-the-market equity growth will persist.
The discount and saving rate here is a constant 3.5%, and in reality the saving rate could be higher depending on the investment, nonetheless even with a low rate, when compounded each year, the gradual saving adds significantly to the return. Furthermore, once a deposit-sized sum has been reached, another property may be purchased in an effort to start a portfolio.

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Value</th>
<th>Equity</th>
<th>Equity in Property Market Value</th>
<th>Annual Equities Growth</th>
<th>Annual Equity Growth %</th>
<th>Annual Leasing Profit before Debt (NOI)</th>
<th>Annual Interest Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>£110,000</td>
<td>£33,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.00%</td>
</tr>
<tr>
<td>1</td>
<td>£114,950</td>
<td>£48,450</td>
<td>46.82%</td>
<td>£15,450</td>
<td>46.82%</td>
<td>£5,875</td>
<td>£3,325</td>
</tr>
<tr>
<td>2</td>
<td>£120,122</td>
<td>£53,622</td>
<td>10.68%</td>
<td>£5,172</td>
<td>10.68%</td>
<td>£6,139</td>
<td>£3,325</td>
</tr>
<tr>
<td>3</td>
<td>£125,528</td>
<td>£59,028</td>
<td>10.08%</td>
<td>£5,405</td>
<td>10.08%</td>
<td>£6,415</td>
<td>£3,325</td>
</tr>
<tr>
<td>4</td>
<td>£131,177</td>
<td>£64,677</td>
<td>9.57%</td>
<td>£5,648</td>
<td>9.57%</td>
<td>£6,704</td>
<td>£3,325</td>
</tr>
</tbody>
</table>

The yield is initially very high due to the equity jump from the market value discount, and then sharply falls to a (still high) but decreasing annual yield. When discounted, the trend is the same, but with a lower growth.

The selling costs are omitted in the investment value.

### 7.3) Variable Estimates

Using the equations for the present value return;

\[ PV_0 = (L_{10} - L_{E0} - L_{00}) \sum_{t=1}^{T} \frac{(1 + g)^t}{(1 + r)^t} - \sum_{t=1}^{T} \frac{r_m M_T}{(1 + r)^t} + \frac{MV_0(1 + g)^T - S_C - M_T}{(1 + r)^T} \]

\[ R_m = \frac{PV_0}{P_p + Ren_c + P_c - M_T} \]
The return may be analysed with respect to changes in the growth rate, discount rate, and interest rate, or any other variable desired. Using the property values in the estimates above, the present value after 10 years is £105,602, giving a return multiple of 3.20 of the initial investment of £33,000. Which is equivalent to 12.3% per year.

The effect of the interest rate on the return is more substantial as the interest rate rises. When interest rates are low, and increase from 5% to 6%, the return decreases by 0.58% percentage units. However, when interest rates increase from, say, 15% to 16%, the return decreases by 1.14% percentage units. The explanation is that mortgage payments take up more from the revenue when interest rates are high, and so a further increase leads to even more taken.

The same analysis may be done for the growth rate, with similar results. When the growth rate increases from a low value, 0%-1%, the effect on the return is 1.98%. In contrast to an increase from a high value, 10%-11%, the return increases by 1.29%. The explanation is that the marginal increase in growth is much higher when values are low, and plays less significance when values are high.
The same may be done for the discount rate, with similar results.

The table below shows the data used to make the graphs with the change of the return from the previous value. For example, holding the rates constant at 4.5% growth and 3.5% discount, if interest rates were 0%, then the return would be 15.207% per year. And this is a drop of 0.460 percentage units from if interest rates were -1%. If the growth rate was 0%, and holding interest rates constant at 5% and discount rates at 3.5%, then the return would be 4.661% per year, and so on.

<table>
<thead>
<tr>
<th>Rate in %</th>
<th>Annual Return for Changing Rates while the others are fixed ($r_m$ of 5%, $g$ of 4.5% and $r$ of 3.5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>16.541, -2.915, 19.289, -1.098</td>
</tr>
<tr>
<td>-2</td>
<td>16.112, -0.430, 2.905, 18.191, -1.098</td>
</tr>
<tr>
<td>-1</td>
<td>15.667, -0.444, 2.478, 17.120, -1.071</td>
</tr>
<tr>
<td>0</td>
<td>15.207, -0.460, 4.661, 2.193, 16.075, -1.045</td>
</tr>
<tr>
<td>1</td>
<td>14.729, -0.478, 6.651, 1.989, 15.056, -1.019</td>
</tr>
<tr>
<td>2</td>
<td>14.233, -0.496, 8.488, 1.837, 14.061, -0.994</td>
</tr>
<tr>
<td>3</td>
<td>13.717, -0.516, 10.207, 1.719, 13.092, -0.970</td>
</tr>
<tr>
<td>4</td>
<td>13.178, -0.538, 11.832, 1.626, 12.146, -0.946</td>
</tr>
<tr>
<td>5</td>
<td>12.616, -0.562, 13.382, 1.550, 11.224, -0.922</td>
</tr>
<tr>
<td>6</td>
<td>12.027, -0.589, 14.870, 1.488, 10.324, -0.899</td>
</tr>
<tr>
<td>7</td>
<td>11.409, -0.618, 16.306, 1.436, 9.447, -0.877</td>
</tr>
<tr>
<td>8</td>
<td>10.758, -0.651, 17.699, 1.393, 8.592, -0.855</td>
</tr>
<tr>
<td>9</td>
<td>10.071, -0.687, 19.054, 1.355, 7.758, -0.834</td>
</tr>
<tr>
<td>10</td>
<td>9.343, -0.728, 20.378, 1.324, 6.945, -0.813</td>
</tr>
<tr>
<td>11</td>
<td>8.569, -0.774, 21.675, 1.296, 6.152, -0.792</td>
</tr>
<tr>
<td>12</td>
<td>7.741, -0.827, 22.947, 1.273, 5.380, -0.772</td>
</tr>
<tr>
<td>13</td>
<td>6.852, -0.889, 24.199, 1.252, 4.627, -0.753</td>
</tr>
<tr>
<td>14</td>
<td>5.891, -0.961, 25.433, 1.234, 3.894, -0.734</td>
</tr>
<tr>
<td>15</td>
<td>4.845, -1.046, 26.651, 1.218, 3.179, -0.715</td>
</tr>
</tbody>
</table>
The growth rate has the largest effect on the return. Increasing the interest rate by 1 percentage unit, decreases the return by less than 1 percentage unit, except for high values. In contrast, increasing the growth rate by the same amount, leads to an increase in the return by more than 1 percentage unit. This may be understood by considering that interest rates relate to the mortgage debt, while growth rates relate to the property value. And since the debt is less than the property value, then a 1% change will have a larger effect on the largest asset.

(8) Comparisons with other investments

The stock market is the major alternative to the real estate market. The main reason why someone would invest in real estate directly is if they have the inclination and expertise to handpick and manage their own portfolio. Of course in the stock market it is also possible to select stocks, buying and selling as one sees fit, but the control that one has over the companies is limited, whereas in property, as the sole owner one has complete control, and renovations and changes become possible anytime. Naturally, this control has advantages and disadvantages. For a skilled and knowledgeable investor who makes the right decisions, it’s advantageous, but in for an inexperienced owner, it might be burden. Here the owner might be indifferent between property and stocks, and perhaps would take a different level of involvement, from using a property manager to help with the day-to-day tasks, to a completely managed portfolio.

The stock market has comparable mechanisms to the real estate market in that a purchase must be made to receive dividend payments and capital growth. Leverage is also used in similar proportions, perhaps 25%, 33% or 50% equity in an account.

The advantage of investing in stocks is that they are easier and cheaper to trade, stocks may be traded instantly from anywhere in the world with miniscule trading fees. Leverage is easier and cheaper to obtain, with brokerage accounts offering instantly accessible, low interest funds. This is possible because should the brokerage funds come under threat, the position may be automatically closed by the broker, unlike real estate property. This is a double-edged sword however, since a high leveraged trading account may be subject to a margin call when positions are moving against the owner. This may be rectified by adding additional funds of course, but in real estate a ‘margin call’ will only happen if loan payments are not met, not if the property value drops below a certain threshold.

The advantage of investing in real estate is that property may be bought below market value, unlike stocks, where the floating market price is the same to everyone. That is not to say the stock market cannot be timed, but rather the real estate market may be timed and bought below this timed value. In that sense, each property in the real estate market gives unique opportunities that may be used by an investor. In addition, real estate may be more relevant to many investors who are able to see the neighbourhood and physical property to judge the
potential. Attempting to have *that* much knowledge about a company may be difficult unless one is acquainted with the running’s of a particular company.

Unlike stock ownership, where involvements are primarily financial, real estate owners often do not see their home as an investment, and neglect the financial benefits of owning such a valuable asset. There is no reason why a property cannot be both a home and an investment. Stocks are unable to be physically occupied, so a stock owner with no property needs to pay rent for their home, whereas the home owner does not, and would most likely out perform the stock owner who has to pay rent, providing a strong investment property is chosen.

(9) Conclusion

Real estate has long been a requirement for humans, and as close to certain as can be, always will be. No doubt then, it is a great way to invest, providing the *right* property is chosen. The purchasing stage is the most crucial. Picking the wrong property, or the wrong location might lead to disastrous consequences. Even if the right property *is* chosen, the return is still influenced by many factors and natural unpredictability gives way to large deviations from the estimates. Nonetheless, when interest rates are low, and the location and market are on the upswing, an investment in real estate has a great chance of giving a good return.
(10) References


---

6. The charts are made from excel data provided by Nationwide.
   http://www.nationwide.co.uk/about/house-price-index/download-data#xtab:uk-series
7. The RPI Adjusted values are produced by Nationwide using a variable discount rate each year.
   The Trend line is an exponential function produced by Nationwide.
10. The maps are courtesy of Zillow data and Google Maps, mappping the current listing price for sales and lettings in the USA.