Investment Timing and Foreclosure in UK "Buy to Let" Property

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Abstract

We model investment options and default/foreclosure options open to a landlord who has purchased a property financed by a mixture of debt from a lender (building society/bank) and their own equity, by combining two aspects of finance literature i.e. that of irreversible investment and debt pricing/capital structure.

Current real estate research into optimal mortgage lending usually starts with a stochastic house price process but we start with a stochastic rental income. Model parameters, such as bargaining power, taxation levels, asset volatility and default dead weight costs common to debt pricing/capital structure models are extended by the inclusion of a letting agent management fee and lender's loss severity percentage.

The model is applied to realistic UK "Buy to Let" (BTL) data. Lower landlord tax bands lower critical investment and default thresholds. Higher rental income volatility increases investment and default thresholds. The potential of increased loan loss severity will cause the entry-level threshold to increase only in the case where the lender's negotiation position is anticipated to be weak.

Optimal LTV ratios calculated using 2007 BTL data are consistent with the view that the private BTL market was overleveraged. However, the effect of lower market base rates and house prices have had a re balancing effect, whereby for new landlords overleveraging is significantly less of an issue with optimal LTV ranging from 65% to 80%.

The significant influence of rental income volatility on critical entry and default thresholds and LTV values results from the real option value added by the credible threat of renegotiation. This should be seen as an important parameter in government's efforts to manage the BTL property market being more effective than controlling landlord's income tax liabilities.

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1. Introduction

We model real options open to a private landlord who has purchased a property financed by a mixture of debt from a lender (building society/bank) and their own equity using the property as security. The "Buy to Let" (BTL) investor usually uses a letting agent to market and manage the property. The landlord receives an uncertain income (depending on rental terms and local vacancies) from the occupier and makes use of governmental tax policies, whereby letting expenses and mortgage interest payments are tax deductible, to maximise the monthly return net of tax.

The average LTV (Loan to Value) was 85% in 2007 with an average minimum rental cover of 120%. Both these figures are higher than the BTL market in previous years, and also than the larger residential housing market where the average LTV is 80%. [1]

Anecdotal evidence suggests that the BTL market has been particularly hard hit by recent credit scarcity and is more exposed to potential mortgage debt default. The private BTL housing market, due to successive government policy, has become very significant within the total UK housing market with total gross lending in 2005 of £25 billion (UK Housing Review 2009).

The private BTL market is a critical component in government policy for UK economic and social development (Miles 2004, Leece 2004). Private housing rental demand, due to both economic and demographic factors, although volatile, continues to grow and provides rented accommodation of similar quality to owner occupied accommodation at roughly a 20% discount (UK Housing Review 2009). In the absence of capital appreciation and high entry costs, many new households consider private housing rental.

We extend Sundaresan and Wang (2007a, 2007b) (focused on strategic corporate debt service rather than property funding) to cover the landlord's irreversible investment growth options as well as the default/foreclosure option available to the landlord/lender

[1] The UK mortgage market had a pool of 12m outstanding mortgages in 2007 of which 1 million (£120 billion) were BTL mortgages. (CML 2009)

in the UK BTL property market. The treatment of the irreversible growth option takes a real option approach as originally developed by Samuelson (1965) and later Tourinho (1979). The treatment of the default/foreclosure option either considers default as "ruthless" as in Patel et al. (2005) or draws on the theory of optimal leverage and corporate security pricing after the investment has been made which was developed originally by Leland (1994) and extended by Fan and Sundaresan (2000). A basic assumption is that both lender and landlord are aware of each other's options and will thus negotiate the initial mortgage contract and renegotiate the current mortgage contract should a credible threat of foreclosure/default exist.

Recent real estate research such as Piskorski and Tchistyi (2008) looks at mortgage lending under a stochastic house price processes. This paper looks at optimal mortgage lending under a stochastic rental income processes since mortgages are serviced out of rental income (or personal income in the case of private residential buyers) and many recent BTL investments still deliver a "good" rental income but may be worth less than the original investment due to the current and continuing property price slump.

Critically, a house asset is only independently valued once at the initial mortgage contract negotiation and then once again at the renegotiation stage should either party wish to foreclose or default. This observation underlies the use of the rental income as the main driver of the model as well as the assumption that the lender's loss severity α is taken as a % of the equivalent house value $F(x)$ implied by the rental income x.

We introduce an additional letting agent's management fee and by assuming that the lender's loss severity % is equivalent to dead weight costs, model in Section 2 the effect of these and other parameters such as rental income volatility and personal tax rate on the landlord's options. Section 3 examines sensitivities of the resulting equations and looks at the output sensitivity to various parameters. In Section 4, using realistic BTL data from the Council of Mortgage Lenders (CML 2009), possible policy options open to the UK government to encourage landlord's growth/investment options and mitigate default/foreclosure options by influencing timely and credible mortgage (re)negotiations are investigated. Finally, a summary and conclusions are drawn in Section 5.

2. Model Derivation

The letting agent is generally an independent party managing the property on the landlord's behalf for an agreed fee of $f\%$, generally a % of the yearly rental income. This fee $f\%$ is assumed to cover all expenses of the agent in managing and maintaining the property to the satisfaction of the occupier, landlord and lender. The landlord may also be the letting agent - in which case the management fee $f\%$ is the equivalent of a reoccurring marketing operating expense. The fee is treated as a dividend payable to the letting agent reducing the long-term property asset value.

The lender knows that the property has been purchased for letting and will agree and manage the mortgage contract in a different manner from the more common "residential" mortgage, charging higher interest rates and agreeing minimum initial rental covers. The mortgage contract covers the relationship between lender and landlord, whereby the BTL landlord has limited liability and can default on the mortgage contract at any time. The mortgage debt is assumed to be perpetual, with the landlord making a monthly interest-only payment to the lender.[2]

We do not consider options whereby the landlord voluntarily may sell the house, being less costly than liquidating through repossession due to extra administration costs, or the landlord deciding to make a balloon payment at sometime in the future to repay the lender.

When the property is performing well, landlords will collect all the excess cash flows after servicing the debt payments and paying taxes and fees. On the other hand landlords also supply the needed funds to service the debt and pay taxes when the property has shortfalls in rental income provided that it is in their interest to do so. Therefore the model does not look at retained earnings.

The price process is exogenous and the landlord, lender and letting agent have rational expectations and are sufficiently small to have no effect on the local rental income.

[2] Within the UK mortgage pool 65% of mortgages are of the repayment type, 15% endowment, 15% interest only and 5% mixed (CML 2009).

The rental income will typically accrue monthly and be subject to variation depending on local property markets and occupation rates. The UK tax code allows UK tax resident landlords to receive monthly rental income gross of tax in contrast to non- tax resident landlords who invariably receive monthly rental income net of imputed tax.

The rental income x will have the letting agent's fee $f\%$ and mortgage payment to the lender c deducted monthly. The interest element c is tax deductible on a yearly basis along with other expenses that are all included in the management fee f. We assume that on a yearly basis, gross receipts minus gross payments lead to a taxable profit, or the investor has other taxable income. We assume that the mortgage contract is of the "non-recourse" type whereby the landlord can default with no consequences to a subsequent credit rating.

The landlord thus chooses a mixture of equity and (risky) debt to finance the property investment I at an endogenously chosen time T.

We assume that the firm or business consists of one house/asset with potential net rental income before interests and taxes given by a gBm (geometric Brownian motion)

$$dx = (\mu - f)\, xdt + \sigma x dW \qquad (1)$$

where W is a standard Brownian motion, μ the instantaneous rate of return gross of all payouts, f is the letting agent's management fee with $f \leq \mu$ and σ is the rental volatility.

The landlord decides when to exercise an investment option by purchasing the property for a fixed cost I and then mandates the letting agent to collect the stochastic rental stream of x ($x \geq 0$). Let r > 0 denote the risk free interest rate. Assume r > $\mu - f$ for convergence. Let the tax rate be τ > 0.

After tax without option value, the all equity financed house value E(x) is given by

$$\mathrm{E}(x) = \left(\frac{1-\tau}{r-(\mu-f)}\right)x \qquad (2)$$

However, by using debt to part finance the property purchase, additional tax benefits can be due to the tax deductibility of the mortgage interest payments, so the landlord chooses a mixture of equity and mortgage finance at investment time T_i.

After purchasing the property and taking on the mortgage liability, if the rental income x is sufficiently or consistently low, the landlord may consider defaulting on the mortgage payments, forcing the lender to consider repossession or foreclosure. In a booming property market, the landlord might consider increasing equity but this course of action is unlikely in the current decreasing and volatile market.

Following Leland (1994) we assume that the property's liquidation value is

$$(1-\alpha)\mathrm{E}(x) \qquad (3)$$

which the lender can expect to realise should the landlord default.

The loss severity level α will depend on a multitude of (local) factors. In this regard only the initial LTV ratio is important, with higher initial LTV's correlated to increasing probability of default and if incorrectly assessed also to the loss severity level.[3] The (loss severity) coverage level of standard private mortgage insurance policies (covering 20% of UK residential mortgages) is reported as 30%. A α between 0.3 and 0.6 is reasonable in the current economic climate.

Finally, if landlords threaten to default, lenders may not, in the current economic climate and with current government policy, wish to repossess but instead renegotiate the mortgage contract. The surplus generated by avoiding costly liquidation is essentially divided between landlord and lender based on their relative negotiating position denoted respectively by ϕ and $1-\phi$.

[3] Reported (assessed by a surveyor) LTV's are often lower than actual LTV's due to initial overvaluation of the property during the UK property boom period. The actual loss severity to the lender can then be very high even at lower reported initial LTVs.

The negotiation between landlord and lender is modelled as a Nash game (Fan & Sundaresan, 2000). Foreclosure or default results in a debt–equity swap whereby the lender acquires the property. We assume that the lender, as is common, will require any sitting tenants to leave and place the property immediately on the market. No further rental cash flows or tax benefits accrue, no further foreclosure is possible and the value of the property is exactly the asset value $E_t(x)$ just before default then foreclosure less liquidation (lender's loss severity % α) costs. Landlord and lender bargain over the optimal sharing rule at the trigger point x_s with both willing to change the contract terms. The lender would charge a renegotiated coupon S(x), lower than the initial coupon c (agreed at the investment threshold x_i), and the landlord would continue to operate the property.

The equity value $\mathrm{F}(x)$ satisfies the following ODE

$$\frac{1}{2}\sigma^2 x^2 \mathrm{F}_{xx}(x) + (r-f)x\mathrm{F}_x(x) - rF(x) - fx - c(1-\tau) = 0 \quad (4)$$

Let $E_0(x)$ be the property value before investment. The landlord chooses the optimal investment threshold x_i and the optimal mortgage repayment to maximise $E_0(x)$ assuming that he has a contractual relationship with various break clauses and may have to renegotiate terms in the future. The contractual perpetual mortgage coupon is c.

As the rental income x approaches infinity, the mortgage becomes riskless and hence the property value must satisfy

$$\lim_{x\to\infty} F(x) = x - \frac{c(1-\tau)}{r}$$

Lower boundary conditions also follow from the results of the bargaining game

$$\lim_{x\to x_s} F(x) = \phi\alpha x_s \ \ and \ \ \lim_{x\to x_s} F_x(x) = \phi\alpha$$

where x_s is the critical rental income at which the landlord and lender renegotiate under the credible threat of a default or foreclosure, α is the lender's loss severity and φ their relative bargaining strength.

The methodological approach to solving the problem is similar to a basic real perpetual American (scale) option entry/exit problem and the following closed form equations are consistent with Samuelson (1965), Tourinho (1979) and Sundaresan & Wang (2007a) whereby a solution is found to the ODE in terms of the critical thresholds x_i and x_s.

a) The landlord's investment threshold x_i is given by

$$x_i = \frac{\beta}{\beta - 1}\left(\frac{r - (\mu - f)}{1 - \tau}\right)\left[1 + \tau\frac{1 - \phi\alpha}{1 - \tau(1 - \phi)}\frac{1}{g}\right]^{-1} I \qquad (5)$$

where $$g = \left[\frac{\beta}{\beta - \gamma}(1 - \gamma)\right]^{-\frac{1}{\gamma}} = \frac{x_i}{x_s} \qquad (6)$$

$$and\ \ \beta > 1, \gamma < 0\ are\ the\ roots\ of\ \ \frac{\sigma^2 x^2}{2} + ((\mu - f) - \sigma^2/2)x - r = 0$$

b) The perpetual mortgage coupon (for $x \geq x_s$) is given by

$$c = r\frac{\gamma - 1}{\gamma}\frac{\beta}{\beta - 1}\left[g\left(\frac{1 - \tau(1 - \phi)}{1 - \phi\alpha}\right) + \tau\right]^{-1} I \qquad (7)$$

c) Landlords renegotiate with lenders when $x(t) \leq x_s$, where x_s is the endogenously determined renegotiation threshold given by

$$x_s = \frac{\beta}{\beta - 1}\left(\frac{r - (\mu - f)}{1 - \tau}\right)\left[g + \tau\frac{1 - \phi\alpha}{1 - \tau(1 - \phi)}\right]^{-1} I \qquad (8)$$

d) The reduced mortgage payment in the renegotiation region is given by

$$S(x) = (1 - \phi\alpha)(1 - \tau)x \quad x \leq x_s \qquad (9)$$

Assume that the critical LTV_i occurs when landlord and lender, who are both risk neutral, reach agreement when rental income hits x_i and coupon c whereupon

$$LTV_i = \frac{c}{c+x_i} \;\; or \;\; \frac{1}{1+k_i} where \; k_i = \frac{x_i}{c} \; and \; k_i > 0 \qquad (10)$$

e) The factor k_i is given by

$$k_i = \frac{x_i}{c} = \frac{g}{r}\left(\frac{\gamma}{\gamma - 1}\right)\left(\frac{r-(\mu - f)}{1-\tau}\right)\left(\frac{1-\tau(1-\varphi)}{1-\varphi\alpha}\right) \qquad (11)$$

Assume that when the actual x rental hits x_s, the renegotiation threshold, that both landlord and lender can reach agreement on a reduced coupon $S(x)$ whereby the renegotiated LTV_s is

$$LTV_s = \frac{S(x)}{S(x)+x_s} \;\; or \;\; \frac{1}{1+k_s} where \; k_s = \frac{x_s}{S(x)} \; and \; k_s > 0 \qquad (12)$$

f) The factor k_s is given ($at \; x_s = x$) by

$$k_s = \frac{1}{(1-\phi\alpha)(1-\tau)} \qquad (13)$$

The model demonstrates the relationship between the investment and financing decisions whereby the initial investment decision is dependent on the (future) strategic optional renegotiation between lender and landlord.

The following conclusions can be drawn by examining the model dynamics some of which are specifically and graphically illustrated (Section 3) using realistic base case UK BTL data.

a) The investment threshold x_i, the renegotiation threshold x_s, and the mortgage payment c are all proportional to the (investment option) property cost I.

b) The ratio between the investment threshold x_i and the renegotiation threshold x_s is constant and larger than 1.

c) The factor g = x_i/x_s is independent of the (re)negotiating power ϕ.

d) The lender loss severity α enters directly into the determination of the optimal investment threshold x_i, the optimal leverage c, the debt concessions (c-S(x)) and the critical LTV* **even though default merely acts as a credible threat** and does not/need not occur in equilibrium/practice.

e) Taxes lower property value $E(x)$ significantly with the reduction greater when the landlord's bargaining power is stronger thus lowering debt capacity offered by the lender and property value more leading to conclusions f) and g).

f) Stronger landlord (re)negotiating power lowers mortgage capacity/availability, reduces the house value and delays new investment option exercise.

g) Conversely, stronger lender power increases mortgage capacity/availability, increases house value and hastens new investment option exercise.

h) In this model the initial LTV_i can never be greater than 100%.

i) The renegotiated $LTV_{s,}$ at $x_s = x$ is only dependent on the landlord's tax liability τ, the lenders likely loss severity α and relative negotiation power φ.

j) Property value is increased by allowing for renegotiation, if landlords have no bargaining power. However when the landlord's bargaining power is high, the property value $E_0(x)$ under future default/foreclosure renegotiation may be lower whereby the landlord's behaviour can dominate the benefit of avoiding costly default or foreclosure.

3. Illustrative Sensitivities

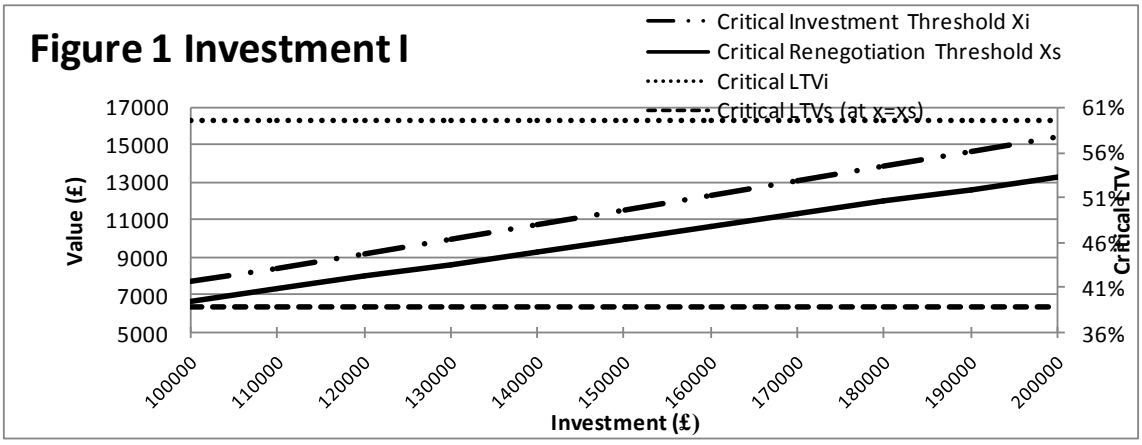
The effects of model parameters on property value and debt capacity were discussed in more general terms at the end of the previous section. In this section the sensitivity of the critical thresholds x_i and x_s, initial LTV_i and renegotiated LTV_s to varying parameters are examined and have been found to (almost) linearly vary with all parameters except volatility σ and tax rate τ.

Figures 1 to 6 illustrate the relationship by varying parameters around the base case described in Section 4 Table 1(a) but (crucially) at φ = 0.5 where landlord and lender have equal bargaining power.

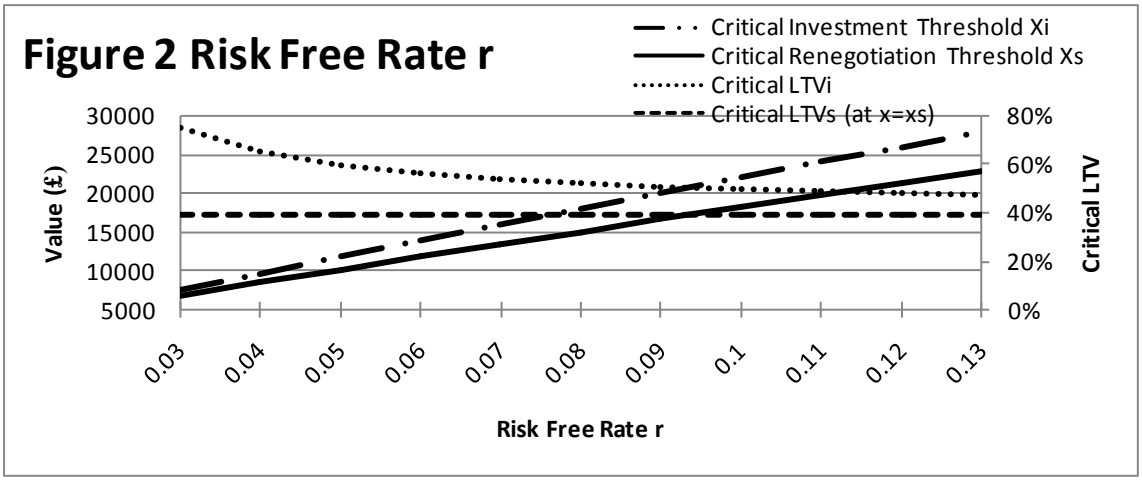
Thresholds increase linearly or non linearly with all parameters whereby rental income volatility σ has the biggest effect which (demonstrated in Section 4(d)) can easily outweigh potential beneficial macro economic effects from lowered risk free rates.

The initial LTV_i decreases with increasing risk free rate r, tax liability τ, loss severity α and bargaining power φ. It remains constant for initial investment I and increases sharply with increasing volatility σ.

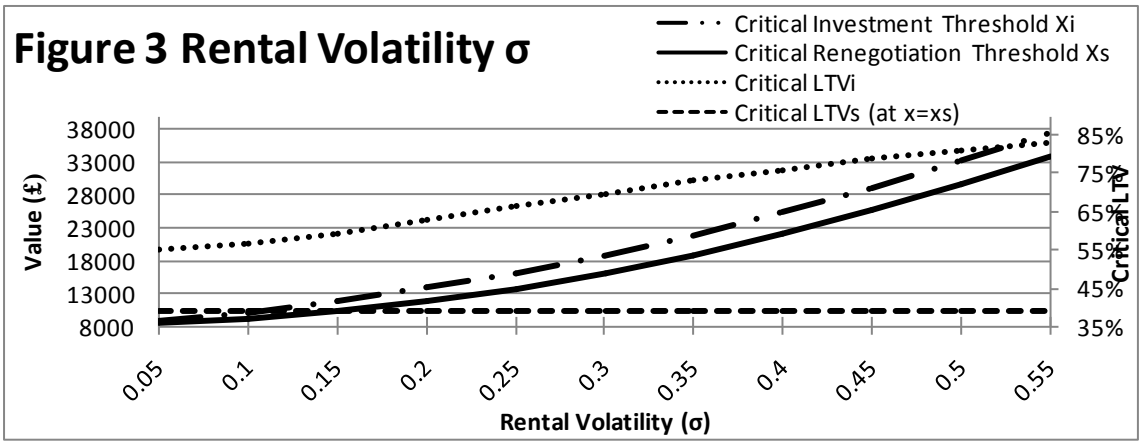
Increasing investment (Figure 1) increases option thresholds but leaves the LTV unaffected.



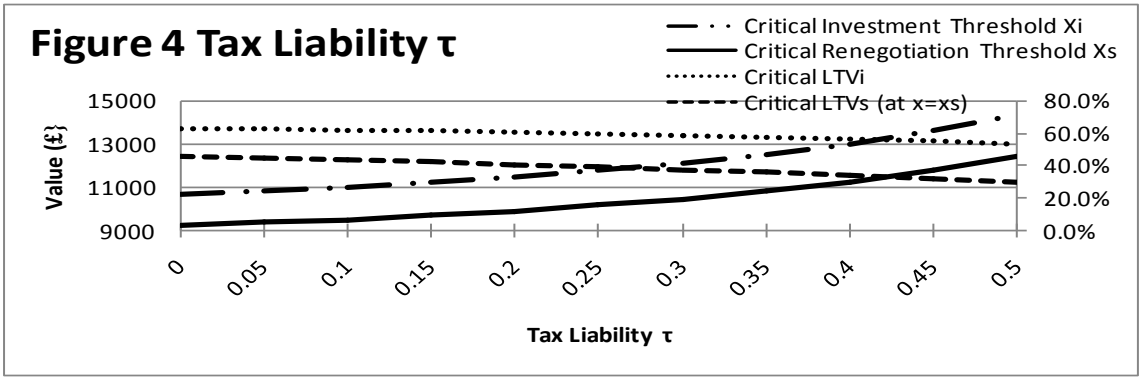
Increasing risk free rate r (Figure 2) also increases option thresholds. The optimal LTV_i decreases non linearly induced by the landlord's tax liability (25% in this illustration) thus increasing the proportion of equity used to make the initial investment. The LTV_s after a possible default/foreclosure renegotiation is unaffected by the risk free rate.



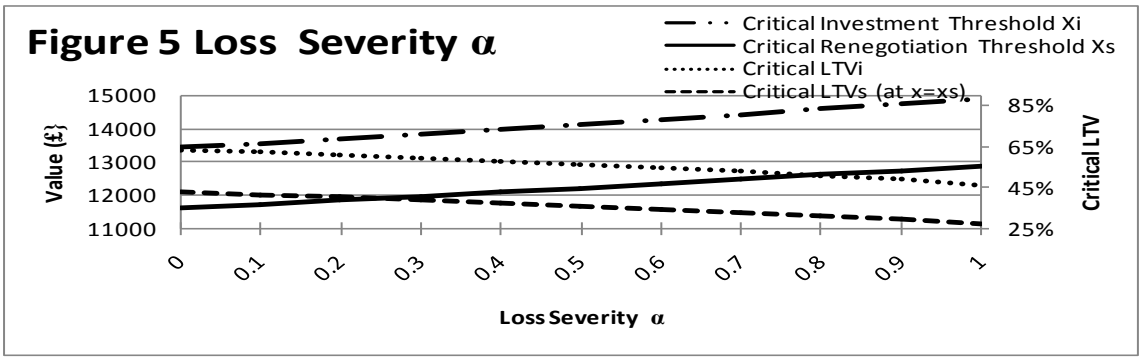
Increasing rental volatility σ (Figure 3) increases option thresholds very sharply. The optimal LTV_i increases (sharply at first) but flattening out after σ = 0.5 reaching 93% at σ = 1. This reflects the "real option axiom" that more volatility increases potential returns and thus higher volatility justifies higher debt capacities and a high LTV_i. On the other hand LTV_s is unaffected by volatility as the lender and landlord are negotiating based on a known rental income x. (assumed to be x_s).



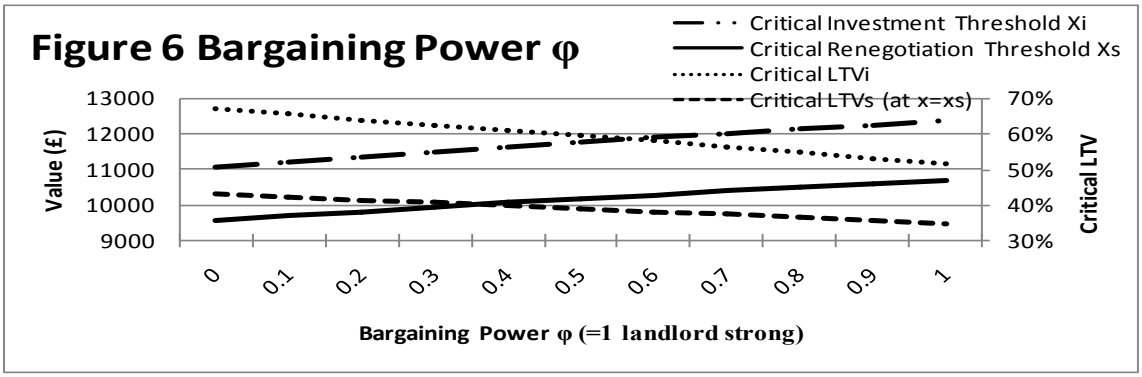
Lower tax liability τ (Figure 4) lowers the critical thresholds but increases both the initial and renegotiated LTV level reflecting the intuition that the lender can lend more (greater debt capacity) when the landlord pays less to the government.



Higher loss severity α (Figure 5) increases investment thresholds as both lender and landlord will discount this ex ante in their initial negotiations and as would be intuitively expected both LTV_i and LTV_s decrease reflecting lower debt capacity.



Bargaining power φ (Figure 6) moving from the lender to the landlord causes investment thresholds to rise and LTV to drop reflecting lower debt capacity.



4. Application to the Private UK Buy to Let Market

a) Parameter/Data Selection

Realistic mortgage data pertaining to the UK "Buy to Let" market from the Council of Mortgage Lenders website (CML 2009) has been used to drive the base model. This helps promote comparison and understanding of the model optimal rental entry thresholds and debt structure in relation to actual (average) rental entry thresholds and mortgage advances.

From CML data for 2007 the average BTL mortgage advance was £130000 which at the indicated maximum LTV of 85% implies a property price (initial investment I) of £153000 or landlord equity of £23000. The average market mortgage rate was 6.5% and the risk free rate (10 year UK bonds) was approximately 5% in the same period. The private landlord will expect some net positive drift in the gross yield (to perhaps cover inflation) of 2%.

The yearly mortgage payment at 6.5% is £8500/year. If we assume that the letting agent management cost is 20% of the gross rent then the landlord would require a minimum rental income of £10500 to cover payments to the lender and letting agent. This is incidentally equivalent to a 125% rental cover which is slightly higher than the indicated average minimum of 120%. At a (recommended by lenders) rental cover of 150% and approximate letting agent costs of 20% the gross rental return would be £12700/year with £8500 going to the lender, £2500 on letting agent costs and the balance (before tax) of £1700 to the landlord. The £1700 (after tax) would represent a return of 4.4% ($\tau = 40\%$) or 5.5% ($\tau = 25\%$) on the landlord's equity (excluding any capital appreciation). From a modelling viewpoint the management fee f% is taken as 0.01 or 20% of the 5% risk free return for that period. Note that all LTV_s are shown at $x=x_s$.

The tax rate of the landlord is assumed to be either 25% or 40%, rental volatility of 15% or 30% and a lender's loss severity α of 30% or 60%. These parameters have been applied to two cases (a) a landlord with no bargaining power ($\phi = 0$) and (b) a lender with no bargaining power ($\phi = 1$).

The general model dynamics are as predicted and constrained by the model setup.

b) Effect of Varying the Landlord's Tax Liability

Taking the base case setup in Table 1(a) it is clear that a rental income of £10500 (or the general minimum lender prescribed 120% rental) is slightly lower than the model predicted investment entry threshold at both weak (£11045) and strong (£12358) bargaining powers. So currently, investors (with tax rate, base rate, yield and volatility expectations anno 2007) should be observed as inactive in the BTL.

Conversely, a rental income of £12700 (the recommended 150% rental cover) is above the model predicted entry level at both powers. Interestingly should the rental cover fall from 150% to 120% (a not uncommon level in the recent housing boom) then the model predicts that the new rental income is at the renegotiation threshold level $x_s$where a strong landlord would want to renegotiate with a weak lender.

The effect of tax policies (Tables 1(a)-(c)) is as expected with lower tax reducing the entry-level rental income threshold. Higher rate band (40%) landlords should decide not to invest earlier than lower band landlords in the case of weak lender bargaining power. This could also be construed to suggest that landlords moving from the lower to the higher tax band might want to renegotiate their mortgage contract with their lender in the light of the sharply increased renegotiation threshold level x_s.

Finally after renegotiation (calculated at $x = x_s$) a weak landlord will agree a higher LTV_s than a stronger landlord who will agree a lower LTV_s.

Table 1(a) Base Case - UK BTL 2007 Average(25%) Tax Rate

	τ=0.25	α=0.3	σ=0.15	(units £)
	I=153000	r=0.05	μ=0.03	f=0.01

	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
$E_0(x)$	262500	317500	262500	317500
x_i	11045	11045	12358	12358
LTV_i*	67%	67%	51%	51%
x_s	9548	9548	10683	10683
LTV_s*	43%	43%	34%	34%

At a zero tax rate (Table 1(b)) the minimum rental cover of 120% (x=£10500) and the rental income threshold x_i are very close indicating that (only in a low volatility environment) tax free holidays would have encouraged new BTL housing constructions.

Table 1(b) Base Case - UK BTL 2007 Zero Tax Rate

τ=0.0 α=0.3 σ=0.15 (units £)
I=153000 r=0.05 μ=0.03 f=0.01

	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
E_0(x)	350000	423333	262500	423333
x_i	10671	10671	10671	10671
LTV_i*	67%	67%	58%	58%
x_s	9225	9225	9225	9225
LTV_s*	50%	50%	41%	41%

Table 1(c) Base Case - UK BTL 2007 Higher (40%) Tax Rate

τ=0.40 α=0.3 σ=0.15 (units £)
I=153000 r=0.05 μ=0.03 f=0.01

	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
E_0(x)	210000	254000	210000	254000
x_i	11282	11282	14318	14318
LTV_i*	67%	67%	46%	46%
x_s	9753	9753	12378	12378
LTV_s*	38%	38%	30%	30%

Higher tax liability would as expected erode the value of the investment $E_0(x)$ to the landlord.

Both landlord and lender agree the highest initial LTV_i at the landlord's weakest bargaining position (φ=0) and where the investment threshold x_i is relatively flat. At φ=1, weak lender bargaining power, all other initial LTV_i are lower - reducing with increasing landlord tax liability and with a sharply increasing investment threshold x_i. This is consistent with general conclusions e) and f) from the previous section.

Incidentally, a strong landlord (φ=1) achieves the lowest renegotiated coupon payment S(x) (LTV_s=30%) with the highest tax liability a situation which would indicate that zero tax holidays are more beneficial for investment options than foreclosure options.

c) Effect of Higher Loan Loss Severity and Rental Volatility, No Management Fee

Table 2(a) shows that higher rental volatility (comparing with 2007 parameter results in Table 1(a)) would have invariably delayed any investment but increased the initial LTV_i without affecting the renegotiated LTV_s.

Table 2(a)) Base Case - UK BTL 2007 Higher Rental Volatility

τ=0.25 α=0.3 σ=0.3 (units £)
I=153000 r=0.05 μ=0.03 f=0.01

	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
$E_0(x)$	262500	317500	262500	317500
x_i	17715	17715	19779	19799
LTV_i*	76%	76%	63%	62%
x_s	15124	15124	16903	16903
LTV_s*	43%	43%	34%	34%

Table 2(b) shows that the potential of increased loan loss severity will cause the entry level threshold x_i to increase only in the case where the lender's negotiation position is anticipated to be weak. A significant reduction occurs in the initial LTV_i that both parties can agree from 51% to 38% with a weak lender conceding higher LTV_s from 34% to 23%.

Table 2(b) Base Case - UK BTL 2007 Higher Lender Loss Severity

τ=0.25 α=0.6 σ=0.15 (units £)
I=153000 r=0.05 μ=0.03 f=0.01

	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
$E_0(x)$	262500	317500	262500	317500
x_i	11045	11045	13095	13095
LTV_i*	67%	67%	38%	38%
x_s	9548	9548	11321	11321
LTV_s*	43%	43%	23%	23%

Table 2(c) shows that dispensing with the letting agent will reduce the entry-level threshold x_i more than the rather small change in the renegotiation threshold level x_s but increase the initial LTV_i at which both parties can agree. The management fee f has no affect on the LTV_s.

Table 2(c) Base Case - UK BTL 2007 No Mangement Fees

τ=0.25 α=0.3 σ=0.15 (units £)
I=153000 r=0.05 μ=0.03 f=0.00

	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
$E_0(x)$	393750	476250	393750	476250
x_i	10325	10325	11620	11620
LTV_i*	75%	75%	61%	61%
x_s	9495	9495	10686	10686
LTV_s*	43%	43%	34%	34%

d) Effect of a Stylised BTL Base Case 2009

The UK BTL Base Case 2007 in Table 1(a) is compared with a stylised UK BTK Base Case 2009 (Table 3(a) overleaf) with the only difference being that the risk free rate (5% → 3%) and gross return (3% → 2%) are lower, reflecting present market expectations. This also reflects government policies to mitigate both residential and commercial foreclosures by lowering interest rates which benefit owners with existing floating debt.

From Table 3(a) it would appear that rational landlords and lenders would conclude that rental incomes from 2007 would be more than sufficient to maintain investment with little or no change in LTV_i or LTV_s.

However, one of the by-effects of the current economic environment has been an increase in perceived and actual rental volatility (as a result of higher unemployment and desire or requirement to downsize). The effect predicted by the model can be seen in Table 3(b) whereby the investment thresholds x_i are sharply increased above the average rental cover of 150% and the renegotiating thresholds x_s are breached. Provided the landlord can achieve the initial higher rental x_i then a higher LTV_i is possible.

Finally a 20% reduction in house prices is assumed (153000 →123000) which counters the effect of the higher volatility bringing the investment and renegotiation thresholds back down to 2007 levels but leaving a residual higher LTV_i (67% → 79%). Thus (paradoxically) the new equilibrium in 2009 would indicate that lenders should be in a position to offer higher LTV loans to new landlords as a result of higher rental volatility

In a climate of higher rental volatility, current government policy directed at lowering base rates and increasing credit availability may indeed be the most effective instrument in encouraging lenders back to the table. Maximum LTV levels at the 65% to 80% would appear justified from this model's perspective. Overleveraging is not a problem for new landlords while existing landlords, assuming that they can and will renegotiate their mortgage contract, should be able to agree a more favourable coupon and LTV.

Table 3(a) Revised Case -UK BTL 2009 Low Rental Volatility

	τ=0.25	α=0.3	σ=0.15	(units £)
	I=153000	r=0.03	μ=0.02	f=0.01
	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
$E_0(x)$	393750	476250	393750	476250
x_i	7824	7824	8725	8725
LTV_i*	67%	67%	52%	52%
x_s	6521	6521	7272	7272
LTV_s*	43%	43%	34%	34%

Table 3(b) Revised Case -UK BTL 2009 High Rental Volatility

	τ=0.25	α=0.3	σ=0.30	(units £)
	I=153000	r=0.03	μ=0.02	f=0.01
	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
$E_0(x)$	393750	476250	393750	476250
x_i	13999	13999	15649	15649
LTV_i*	79%	79%	66%	66%
x_s	11980	11980	13392	13392
LTV_s*	43%	43%	34%	34%

Table 3(c) Revised Case -UK BTL 2009 High Rental Volatility

	τ=0.25	α=0.3	σ=0.30	(units £)
	I=123000	r=0.03	μ=0.02	f=0.01
	Landlord Weak(ϕ=0)		Lender Weak (ϕ=1)	
x	10500	12700	10500	12700
$E_0(x)$	393750	476250	393750	476250
x_i	11254	11254	12580	12580
LTV_i*	79%	79%	66%	66%
x_s	9631	9631	10766	10766
LTV_s*	43%	43%	34%	34%

5. Summary and Conclusions

We combine two aspects of real options that of irreversible investment and debt pricing/capital structure to generate a simple parsimonious model of the investment growth option open to a private landlord in the UK "Buy to Let" market, who wishes to use a substantial amount of debt to fund the investment.

A key aspect and difference of this model is that it uses concepts from corporate capital structure and a stochastic rental income process which initially appear to provide intuitively reasonable structural explanations for private BTL market phenomena.

Using realistic UK data, from a real options viewpoint, many of the BTL investments (anno 2007) may have been made at or around critical rental entry thresholds and furthermore with initial LTV at higher than predicted levels (over leveraged).

It further demonstrates by way of a stylised case, assuming that risk has been "repriced", and house prices have decreased that landlords should now be considering investment in the current more volatile economic climate. Although many landlords may be ruing decisions made last year, the strength of the real option (irreversible) approach is that it also indicates whether an involuntary exit decision or in this case a renegotiation decision is appropriate. The rational landlord will consider whether his own lender is in a weak or strong bargaining position and decide whether a credible threat of foreclosure may be sufficient to extract further debt payment concessions.

The policy options or parameters open to the government need to be used carefully. Lower taxes will always help but the single biggest factor is perceived rental income volatility. However higher rental volatility without accompanying low base rates, lower house prices and lower inflation only increases investment and renegotiation thresholds thus delaying investment and reducing optimal LTV levels further. Government's efforts to strengthen lender's credit/mortgage capacity is good in that a strong lender can create more value in this model helping a new landlord to invest and an existing landlord to renegotiate. However a key element to this renegotiation "game" is that the lender is not so (financially) strong that they feel able to ignore the landlord and take a 100% write-off ignoring landlords benefits such as his tax shelter and industry.

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