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The Slotting Approach to IPRE Risk Weighted Capital

A UK Simulation Study Using IPD Data

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Executive summary

The FSA currently proposes that all UK banks should henceforth use the slotting approach to calculate their risk weighted capital for income producing real estate (IPRE) exposures. We believe it is of value to model what the implications of slotting might be going forward and hence we have produced this quantitative analysis.

This paper uses IPD evidence on the performance of 3,442 UK IPRE assets initially valued at £56.6 billion over the period Q2 2007 (the UK market peak) to the end of Q4 2011 to investigate some of the implications of using the slotting approach to risk weighted capital.

We have used a framework based on IPD property data to see whether the calibration of risk weights would have been sufficient, insufficient or overly conservative to absorb losses through the last cycle. We employ a quantitative approach to defining asset and location quality throughout the paper.

This investigation is conducted by constructing hypothetical loans made on actual IPRE assets contained in the IPD Quarterly Databank. There is a record of each asset’s quarterly valuation throughout the period as well as the associated income and capital expenditure.

This paper is in no way an attempt to assess the loans that were actually originated by banks in 2007. This is a ‘simulation experiment’ using hypothetical loans originated on the basis of a set of slotting ‘rules’. We use actual historic data on real assets, but we do so in an attempt to understand the *forward looking* implications of adopting a slotting approach to the allocation of risk weighted capital. We use a period of severe market stress in order to compare the amount of risk weighted capital that would have been allocated for each loan at origination with the associated downturn loss given default (LGD) where losses would have been incurred.

For this paper we ran three simulations. Two of the simulations use a subset of the former FSA draft guidance (now withdrawn) as LTV, ICR, DSCR and lease length parameters for each slot while the final simulation uses alternative lease length criteria based on UK market leasing norms as taken from the IPD Databank.

The first simulation assumes no amortisation, i.e. full bullet interest only loans. The second and third simulations assume partial amortisation on the hypothetical loans of 0.5% per quarter.

In each simulation we 'originate' hypothetical loans on every asset in the sample based on their actual values and net incomes at the peak of the market in Q2 2007. The construction of the hypothetical loans was done iteratively to comply with the framework we have used for asset and location quality, lease length, LTV and ICR or DSCR.

Our loan 'origination' exercise highlights how influential the ICR or DSCR is in determining the LTV when minimums are set for the former and a maximum for the latter. The net income streams generated by each asset dictate the amount of the loan that can be 'originated'. In every case the resultant LTVs are considerably lower than the chosen maximum for each slot due to the low market yields in evidence at the beginning of the simulation period in Q2 2007.

The proportion of simulated loan defaults is tracked over quarterly periods to estimate the pattern of default that would have been expected on loans through the downturn leg of the property cycle. The estimated defaults on these hypothetical IPRE loans are differentiated between an LTV breach and an ICR or DSCR breach.

The losses in each simulation are examined in light of the risk weightings prescribed by the slotting approach to estimate if the risk weighted capital implied would have given lenders sufficient capital to ride out the trough in the real estate cycle using a 'Through the Cycle' (TTC) approach. In each of our write down simulations we incorporate a 10% impairment charge for selling into a weak market.

In all three simulations we find that the risk weighted capital mandated for the Strong and Good slots is well in excess of downturn LGD, even at the nadir of the cycle using the restrictive assumption that any loan with an LTV greater than 100% immediately results in the collateral asset's possession and sale by the lender.

We also find that the risk weighted capital mandated for the Weak slot is in excess of downturn LGD at the cyclical low in both of our part-amortising simulations. Only in the bullet loan simulation does the risk weight appear about right for the Weak slot.

However, the risk weight for the Satisfactory slot is too low at the cyclical nadir in all three simulations if an LTV in excess of 100% triggers possession and sale at the bottom of the cycle.

When we assume that an LTV greater than 100% does not on its own immediately trigger possession and sale – i.e. forbearance is exercised - then all slots require the lender to hold risk weighted capital significantly in excess of LGD.

This is because in most cases asset values started to recover following the cyclical low and the write downs associated with the ICR or DSCR falling below 1.0 combined with an LTV greater that 100% are a small fraction of risk weighted capital required in each slot.

There are number of anomalies in slotting which surface in all three simulations. Principle among them is that the risk weights attached to each slot are not consistent with the loss behaviour of the assets which qualify for those slots in our simulations. Further, the 50% EL required for all loans in the Default slot is extremely high relative to aggregate simulated write downs.

It is also apparent that the DSCR criteria (which are based on the FSA's former draft guidance) are not consistent with the ICR criteria and imply that stricter underwriting is required for amortising loans than bullet loans. This provides a disincentive to conservative underwriting which in most circumstances would include amortization.

We show that the former FSA draft guidance on lease lengths was not consistent with leasing norms in the UK and we demonstrate that lease lengths need not be so restrictive. The IPD lease length simulation provides evidence that more realistic lease lengths can be used without a material increase in write downs.

We demonstrate that a methodological weakness in slotting is that LTV, unexpired lease term, asset quality and ICR/DSCR are given apparent equal weighting in the BIS criteria. Our simulations show that the LTV at any point in time is dominated by market conditions (systematic risk).

This can lead to indiscriminate changes in asset values when the market rises or falls rapidly and causes frequent slot migration if a 'Point in Time' (PIT) approach to risk weights is required.

The income and lease security measures are based on idiosyncratic (specific) risks which are far more indicative of loan servicing capacity on a through the cycle (TTC) basis. These income security factors are crucial in calibrating the specific credit risk of each exposure.

Rules similar to the former FSA draft guidance on LTV and DSCR could in principle provide the basis for a very useful countercyclical mechanism if adopted as general guidelines, provided that the issue of financial engineering through use of the swap curve and other derivatives/options can be dealt with.

We have demonstrated that the LTV and DSCR are separate mechanisms that independently moderate capital and income risk respectively if financial engineering is not employed to enable increased leverage. A rule that prevents the use of an interest rate swap with a large maturity mismatch might be worth exploring in this regard.

The impact of the DSCR on the maximum LTV would have been a powerful countercyclical force in the recent cycle, enforcing a sharp fall in the average maximum loan-to-value for loans as yields declined during the run up to the market's peak. The use of combined LTV and ICR guidelines could prevent repetition of some of the worst excesses in lending and moderate cyclical extremes.

In its present construction, the slotting method does not provide a useful methodology for improved risk management. Instead it may act to discourage IPRE lending altogether and it is likely to discourage low risk lending in particular.

Our simulations indicate that slotting as currently construed provides disincentives for underwriting Strong and Good IPRE loans due to high capital requirements relative to downturn LGDs.

A retreat from the market is a possible consequence for many lenders if the capital required to underwrite loans is not consistent with risk-adjusted prospective returns. Further, the incentives embedded in slotting could skew the remaining bank lending toward future exposure concentrations in the higher risk slots.

The aforementioned perverse incentives may also lead the already blurred line between corporate loans and IPRE loans to shift as lenders and their borrowers seek to redefine loans that were once deemed IPRE into the lower RWA designation of 'corporate loan'. This would rob CRE risk managers and regulators of valuable information needed to pre-empt a future property lending crisis.

It is notable that insurers, senior debt funds and the shadow banking system are increasingly willing to take on IPRE loan exposures. While a diversification in the sources of real estate finance is to be welcomed in many respects, it should also be noted that a number of these new lenders will be unregulated entities and the long term consequences of an expansion in 'shadow real estate banking' are unknown.

However, in the near term the aforementioned new entrants' lending capacity is limited. Thus the knock-on consequences from a further reduction in available bank finance for IPRE assets could undermine the values of existing bank exposures and engender negative feedback effects both for other IPRE investors (including pension funds, insurers and REITs) and in the wider economy.

This tendency will be accentuated as banks move to Basel III levels of capital. In this study we have used the current EBA required capital level of 9%, but as that level climbs to 10.5% and above, risk weighted capital must rise commensurately in each slot leading to a greater disconnect between specific risk attributes and risk weighted capital.

It is our view that the limited number of slots in the structure of slotting and the absence of weightings for each risk factor does not encourage a sufficiently detailed analysis of IPRE risks.

As such, the use of slotting as initially outlined by the BIS is a retrograde step in risk management and a potential threat to UK financial stability. It must also be noted that a PIT approach to slotting in which lenders are required to hold more risk weighted capital when real estate markets fall and loans migrate down to weaker slots is inherently pro-cyclical and likely to engender destabilising secondary effects.

However, we do see ample potential for a more a more risk sensitive UK slotting regime that would provide capital cost incentives to lend in a stabilising manner. Such a slotting regime would involve the use of more slots, and each slot would have a risk weight that is more finely calibrated to align with the downturn LGD for exposures with that slot's associated risk profile. Such a regime could operate on a TTC basis and thus avoid pro-cyclicality.

We hope to provide evidence to underpin the above alternative slotting methodology in a further paper. In this second paper we would employ further simulations using IPD data in which we will examine the sensitivity of defaults for variations in the LTV, ICR, DSCR, Tenant PD and Unexpired Average Lease Length to quantify the relative influence of each of these dimensions.

We will then use these simulations to provide insights into the weightings that should be attached to each risk factor in order to place each exposure in an appropriate slot.

Introduction

The UK FSA has proposed that all UK banks should be required to use slotting to calculate Income Producing Real Estate (IPRE) risk weighted capital. Slotting is an approach outlined in the original BIS Basel II documents to assign the risk weights applied to loans categorised as 'specialist lending' – a category that includes IPRE. As such, there is nothing new about slotting.

What is new (or relatively new) is the UK regulatory preference for slotting as opposed to the internal ratings based models which Basel II was designed to encourage.

The FSA proposal for a wholesale move to slotting has aroused considerable comment across the property investment community and the UK property banking industry. For the former, there are concerns that bank lending behaviour could alter in a manner that has adverse impacts on IPRE markets generally and depress values further in an already adverse economic climate. However, little formal analysis has been done to substantiate the dimensions of the impact.

In regulatory terms a move to slotting for all UK banks would certainly constitute a substantive change from the existing position which states that banks are "at liberty to develop their own models for specialised lending exposures provided that they can meet the requirements for estimating PD and LGD". Here again, scant formal analysis has been undertaken to ascertain what the consequences of a move to slotting might be in terms of behavioural incentives for UK bank lenders.

This paper uses IPD evidence on the performance of UK IPRE assets over the period Q2 2007 (the market peak) to the end of Q4 2011 to investigate some of the implications of adopting a slotting approach to the calculation of risk weighted capital. Our investigation attempts to quantify the amount of capital that would have been allocated under slotting to a £56.6 billion portfolio of hypothetical IPRE loans.

These loans are based on actual CRE assets in the IPD database on the basis of values reported at the peak of the UK property market in 2007. We use simulations to assess whether the calibration of risk weights using a slotting approach based on explicit property characteristics would have led to risk weighted capital allocations that were sufficient, insufficient or overly conservative to absorb losses through the downturn leg of the last cycle. We employ a quantitative approach to defining asset quality and income security throughout the paper.

This paper is in no way an attempt to assess the loans that were actually originated by banks in 2007. This is a ‘simulation experiment’ using hypothetical loans originated on the basis of a set of slotting ‘rules’.

These rules are deployed to achieve the most beneficial slot allocation possible for each asset given its quality and the length of the leases in place. We use actual historic data on real assets, but we do so in an attempt to understand the *forward looking* implications of adopting a slotting approach to the allocation of risk weighted capital. We use a period of severe market stress in order to compare the amount of risk weighted capital that would have been allocated for each loan at origination on the basis of objective criteria with the associated downturn LGD where losses would have been incurred.

Slotting categories

UK IPRE is a major exposure for UK banks. While many UK property lenders also have non-UK IPRE exposures, this paper focuses solely on UK exposures. However, a similar analysis could be undertaken for many other markets using IPD data.

There are five slots to which individual IPRE loans can be allocated: Strong, Good, Satisfactory, Weak and Default. According to the BIS these risk categories are meant to correspond respectively to rating agency equivalents of BBB- or better; BB+/BB; BB-/B+; B to C-; and default. The Strong and Good slots carry risk weights that are further dependant on the remaining maturity of the loan. However, we confine our analysis here to loans with remaining maturity of over 2.5 years.

The slotting simulation framework

The FSA issued draft guidance for industry consultation in June 2011 in a laudable attempt to clarify how firms might determine the appropriate slot for each IPRE exposure. This guidance was subsequently withdrawn, but no updated guidance has been issued at the time of writing. In the absence of updated guidance, we have borrowed and quantified a limited subset of the June 2011 draft guidance to provide an objective framework for loan origination and slot allocation in our simulation.

This does not constitute an IPD view of how a slotting framework should actually be specified but we seek to explore the implications of such a framework. We acknowledge that any new FSA guidance, should it be forthcoming, may be different than the previous guidance. However, we believe that the simulations we have undertaken can nevertheless provide some very useful insights.

We summarise our simulation framework below:

Strong:

- Loans are longer than 2.5 years. Risk weight is 70% - 6.3% (following the 2011 EBA change to 9% average RWC).
- The maximum LTV is 60%.
- The minimum ICR is 1.75x.
- The minimum DSCR is 1.50x.
- The average unexpired lease term is a minimum of 15 years.
- Location must be top quartile in IPD Database.

Good:

- Loans are longer than 2.5 years. Risk weight is 90% - 8.1%.
- The maximum LTV is 70%.
- The minimum ICR is 1.50x.
- The minimum DSCR is 1.25.
- The average unexpired lease term is a minimum term of 10 years.
- Asset characteristics – Location must be second quartile or above in the IPD Database.

Satisfactory:

- Risk weight is 115% - 10.35%.
- The maximum current LTV is 80%.
- The minimum ICR is 1.30x.
- The minimum DSCR is 1.00x.
- The average unexpired lease term is a minimum term of 10 years.
- Asset characteristics – Location is third quartile or above in the IPD Database.

Weak:

- Risk weight is 250% - 22.5%.
- The current LTV is above 80%.
- The ICR is less than 1.30x.
- The DSCR is less than 1.00x.
- The unexpired lease term is an average of 5 years or less.
- Asset characteristics – Location is fourth quartile or above in the IPD Database.

Sample attributes

As stated above, this investigation is conducted by constructing *hypothetical loans* made on actual IPRE assets contained in the IPD Quarterly Databank. These assets are the holdings of UK investors and there is a record of each asset's quarterly valuation throughout the period, as well as the net income associated with each asset on a quarterly basis from Q2 2007 to Q4 2011. As these are real assets held by investors, any lease events that occurred over the period such as lease breaks exercised, expiries, tenant defaults and vacancies are reflected in the data.

The IPD Quarterly Databank is comprised of 9,463 assets worth £118.3bn as at end December 2011. We have used a sub-set of this data comprised of 3,442 assets valued at £39.9bn as at end December 2011 (the original value at Q2 2007 was £56.6bn). This sub-set of the databank was used because each asset has complete records for all of the information required in this simulation.

The sample assets used are the holdings of institutional investors and property companies contributing to the IPD Databank. This distribution may not match the structure of any particular lender's IPRE exposure, but most loan books could be replicated by looking at relevant subsets of the IPD universe since the data set contains all types of property, all qualities of property - i.e. so-called 'prime', 'secondary' and 'tertiary' assets – as well as all unexpired lease lengths.

Simulation description

For these simulations we 'originated' hypothetical loans on every asset in the sample based on their actual values and net incomes at the peak of the market in Q2 2007.

Our simulation exercise ignores any cross collateral benefits or other credit enhancement techniques that may be used on actual IPRE loans. We ignore the 'Strength of Sponsor' and concentrate solely on the income generation, income security, asset quality and the valuation of each asset for the purpose of ascertaining the appropriate slot.

We used only slotting criteria that can be measured objectively:

1. Loan-to-value (LTV) defined as Loan Amount/Asset Value,
2. Interest cover ratio (ICR) defined as Net Income/Interest,
3. Debt service cover ratio (DSCR) defined as Net Income/Interest + Amortisation,
4. Weighted average unexpired lease term,
5. Asset/location quality defined as estimated rental value (ERV) per square metre relative to other assets of a similar asset type and location.

The interest rate is fixed at 6% for all loans over the whole simulation period. All loans are assumed to be for 7 years and will need to be refinanced in Q2 2014.

Three simulations

We ran three simulations - two of these using the lease rules described above for each slot which are based on the FSA 2011 draft guidance on lease (despite the withdrawal of this guidance it is still the only existing indication of what the regulator might deem appropriate):

- The first simulation assumes no amortisation, i.e. full bullet interest only loans.
- The second simulation assumes partial amortisation on the hypothetical loans of 0.5% per quarter.
- The third simulation again assumes partial amortisation of 0.5% per quarter but uses lease lengths based on current UK market leasing norms as taken from the IPD data bank.

Assigning the assets to slots

Finding the slot for each asset in our simulations was an iterative process. We assigned the loans in a manner such that an overall rating of Strong or Good required all financial and asset characteristics to be Strong or Good and the lease length (income security) had to be at least Satisfactory (10 years) for the loan to have a slot higher than Weak.

To allocate each hypothetical loan to a slotting category the quality of each asset was compared to other assets of the same type in the same region. The measure of asset quality was the asset's estimated rental value (ERV) per square metre. This measure picks up both relative asset quality and relative location quality. Typically, for retail assets the location quality will dominate, while for business space the asset quality will dominate.

If the asset was in the top 25% of ERV per square metre it was eligible for a Strong loan. If the asset was in the top 50% it was eligible for a Good loan. If the asset was in the bottom 25% the hypothetical loan was automatically allocated to the Weak slot.

The second test for the allocation to a slot was the security of income. Only if the asset's average (many assets are multi-let) unexpired lease term exceeded 15 years could the asset be allocated to the Strong category, greater than 10 years for both Good and Satisfactory while less than 10 years was automatically Weak.

The hypothetical loan amount was determined using the maximum loan amount that meets the minimum criteria for ICR or DSCR and does not exceed the maximum LTV as proposed in the FSA draft guidance.

The exercise was repeated to simulate loans meeting the criteria for Strong, Good, Satisfactory and Weak loans. The loans that were allocated to the Weak slot due to lease length and/or asset quality were originated at the highest LTV they could sustain while still meeting the ICR minimum and LTV maximum constraints in the framework.

The proportion of simulated loan defaults was then tracked over quarterly periods to estimate the pattern of default that would have been expected on loans through the downturn leg of the property cycle.

The estimated defaults on these hypothetical IPRE loans are differentiated between an LTV breach and a shortfall in the DSCR/ICR. For simplicity of exposition, an LTV breach occurs in this simulation when the property's asset value no longer exceeds the loan value, i.e. the LTV is greater than 100%. In practice many lenders would declare a loan in default when it breached an LTV covenant well below 100% LTV. However, LTV covenants vary from loan to loan and we have used 100% LTV because it neatly signals that possession would result in loss if a sale was made on the basis of that value.

Likewise we have defined a DSCR/ICR breach as a shortfall in the DSCR/ICR where the net income over the previous 4 quarters is less than 100% of debt service or income cover. In practice many lenders would impose and enforce covenants before debt service or interest cover was less than 1.0, but again such covenants vary so we have opted for a single definition of default.

LTV Breach – Loan Amount is greater than Asset Value, i.e. LTV>100%

DSCR/ICR Breach – Net Income over previous 4 quarters is less than Interest + Amortisation, i.e. <1.0

The losses in the simulation are then examined in light of the risk weightings prescribed by the slotting approach to estimate if the risk weighted capital implied would have given lenders sufficient capital to ride out the trough in the real estate cycle.

Simulation period – profile of a severe downturn

The behaviour of our sample from the IPD Quarterly Databank during the property downswing shows the severity of its impact on asset values across all segments. While there was some variation by segment, all assets experienced a dramatic decline in values. From the end of Q2 2007 to the cyclical trough in Q2 2009 the assets in the data set fell in value by an average of 41.9%.

In contrast, average net income continued to rise until Q4 2008 and at the All Property level incomes were 1.4% higher at the Q2 2009 cyclical trough than at the Q2 2007 cyclical peak.

Table 1: Peak to Trough Changes in Asset Values and Net Income

Segment	Count	Asset Value, Q2 2007, £bn	Capital change, Q2 2007 to Q2 2009, %	Net income change, Q2 2007 to Q2 2009, %
Standard retails: South east	341	2.944	-33.0	1.6
Standard retails: Rest of UK	479	4.016	-38.0	-4.0
Shopping centres	103	9.954	-43.6	1.0
Retail Warehouses	454	12.439	-46.3	3.6
Offices: City	60	1.318	-44.1	12.5
Offices: West End	156	5.039	-42.6	9.9
Offices: South East	388	4.912	-40.9	-0.3
Offices: Rest of UK	270	3.443	-40.8	0.4
Industrials: South east	533	6.451	-40.3	-0.7
Industrials: Rest of UK	546	4.134	-40.9	-3.3
Other	112	1.968	-35.8	3.0
All Property	**3,442**	**56.619**	**-41.9**	**1.4**

Average asset values thereafter experienced a rapid upward correction from their low point, rising by 21% at the All Property level between July 2009 and December 2011.

Asset values in London experienced a particularly rapid recovery; hence capital growth over the period was less negative for London than elsewhere. However, over the simulation period as a whole the collateral values in our sample fell by 29.6%.

Average net incomes behaved quite differently from asset values. These did not start to decline until Q4 2008 but their subsequent decline continued to the end of the simulation period falling by - 3.1% at the All Property level between Q2 2007 and Q4 2011. Income declines were particularly notable in offices outside of London, retail outside the South East and in industrials where lease lengths tend to be relatively short.

Table 2: Peak to End of Sample Period Changes in Capital Value and Net Income

Segment	Count	Asset Value, Q2 2007, £bn	Capital change, Q2 2007 to Q4 2011, %	Net income change, Q2 2007 to Q4 2011, %
Standard retails: South east	341	2.944	-16.1	2.6
Standard retails: Rest of UK	479	4.016	-31.4	-7.6
Shopping centres	103	9.954	-31.8	-0.7
Retail Warehouses	454	12.439	-27.6	2.7
Offices: City	60	1.318	-21.9	7.0
Offices: West End	156	5.039	-19.4	3.6
Offices: South East	388	4.912	-39.7	-14.0
Offices: Rest of UK	270	3.443	-41.4	-10.0
Industrials: South east	533	6.451	-29.5	-5.5
Industrials: Rest of UK	546	4.134	-35.6	-9.5
Other	112	1.968	-19.3	4.4
All Property	**3,442**	**56.619**	**-29.6**	**-3.1**

I. Bullet loan simulation

Table 3: Simulation Parameters

	Strong	Good	Satisfactory	Weak
Maximum LTV	60%	70%	80%	n/a
Minimum ICR	175%	150%	130%	n/a
Minimum Unexpired Lease Term	>15 years	>10 years	>10 years	n/a
Minimum Quality	Top quartile	Upper Quartile	Mid Quartile	Lower Quartile
Risk Weight	70%	90%	115%	250%
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.35%	22.5%

The first point of note is how influential the ICR is in determining the amount of the loan. The net income streams dictate the amount of the loan that can be ‘originated’ given the low level of yields that existed in Q2 2007.

For our hypothetical loans that met the Strong criteria in our framework for asset quality and income security (lease length) the LTV advanced on our simulated bullet loans could only average 44% at the market yields seen in Q2 2007, i.e. well below the 60% maximum allowable. In practice it was the minimum ICR that determined the amount of the loan for the majority of assets.

Table 4: Simulation Results for Bullet Loans from Combined Slotting Constraints on LTV & ICR

	Strong	Good	Satisfactory	Weak
LTV	44	51	64	63
ICR	1.76	1.51	1.32	1.32

To illustrate the sensitivity of LTVs on the simulated loans to the minimum ICR and maximum LTV the table below calculates the resulting average LTV for different combinations of LTV and ICR restrictions.

Table 5: Variation in simulated LTV for changes in ICR based on entire data set

		Minimum ICR		
		175%	150%	130%
Maximum LTV:	60%	46%	52%	56%
	70%	47%	54%	60%
	80%	47%	54%	62%
	90%	47%	55%	63%

A second point to note is that the loan amount is also sensitive to changes in the interest rate on loans (either the market determined level of interest rates or the risk premiums and margins demanded by lenders).

To illustrate the point, the average LTV in our simulation exercise is just under 60% for bullet loans when 6% interest rates are assumed, but this would fall to 52% if a 7% interest rate was assumed and rise to 68% for a 5% interest rate.

In this context a little history should be recalled. Lender margins fell on average for several years as the market moved toward its peak in Q2 2007. This enabled loans to be originated on higher LTVs than would otherwise have been the case by increasing the capacity of net incomes to meet minimum ICR covenants.

The impact of these margin declines was compounded for some time by the additional relationship between the value of IPRE assets and the level of gilt yields which were on a declining trend throughout the period H2 2004 through early 2006. Lower gilt yields are associated with higher asset values as the discount rate applicable to real estate is theoretically set as a risk premium over gilt yields. Lower gilt yields therefore lead to *both* higher LTVs and a higher stock of debt.

A further point of importance is the frequent use of the swap curve to engineer the lowest interest rate and therefore the highest stock of debt consistent with an asset's income stream. This enables the borrower to maximise leverage and the lender to maximise loan size along with its associated lending and fee income. As the shape of the swap curve changes, the 'sweet spot' on the curve moves and the least cost maturity for a swap changes.

During periods of an inverted yield curve, swaps are often put in place at the long end of the yield curve where interest rates are lower even though hedging much shorter term loans. This use of the swap curve enables greater leverage for any given net income stream, thus leading to a higher stock of debt.

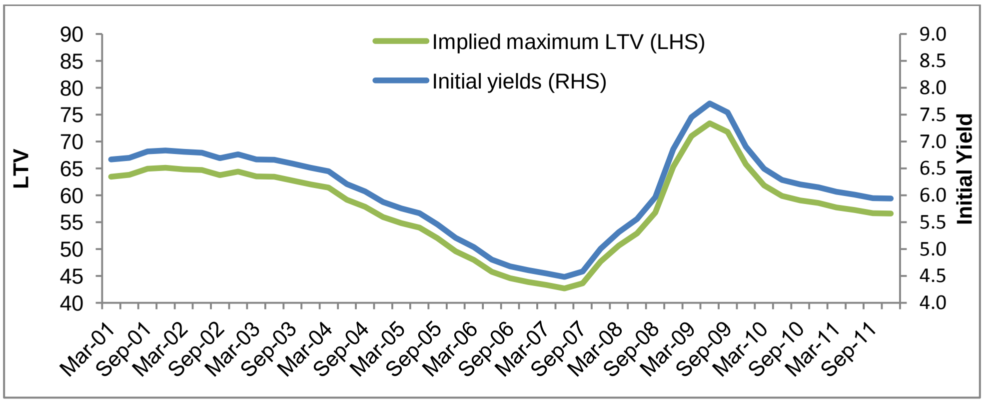
The interaction of LTV and ICR constraints – Countercyclical attributes

Returning to our simulation, the interaction between the minimum ICR criteria, the maximum LTV criteria and yields exhibits some very useful countercyclical attributes. The LTV & ICR are separate mechanisms that independently moderate capital and income risk respectively. However, the actual impact of the LTV and ICR slotting criteria on a lender's exposure will also depend on the level of interest rates, the use of the swap curve and asset values.

The impact of the ICR on the maximum LTV would have been countercyclical in the recent cycle with the maximum loan-to value falling sharply for any loan that would have met the 'Strong' criteria of a 175% ICR.

The chart below calculates the implied maximum LTV for the market based on the market initial yield, an interest rate of 6% and minimum interest cover of 175%.

Chart 1: The Interaction of Property Yields and LTVs with Constant Interest Rates



(Initial Yield/ICR)/Interest Rate = LTV e.g. March 2001 (6.7%/175%)/6% = ***64%***

The actual stock of debt advanced is **flat**.

The main insight to be gained here is that the application of an ICR constraint modifies the LTV on which a loan can be originated through the cycle. This is in stark contrast to typical past lending behaviour where an LTV of 60% was deemed to be relatively 'conservative' regardless of prevailing market yields.

Of course poorer quality assets have higher initial yields to reflect the reduced security of their income stream. Arithmetically this implies that a higher LTV can be supported initially by these high yielding assets as the ICR does not pose such a substantial constraint.

However, our simulation framework (based loosely on the FSA draft guidance) ensures that a 'Satisfactory' loan must have a lease with a minimum of 10 years remaining, so a loan on an asset with a shorter unexpired lease would immediately fall into the Weak slot. This removes perverse effects with regard to LTV but poses a problem for financing an asset class in which the weighted average lease length for new leases signed in 2007 was only 6.2 years and by 2011 this had fallen to 4.8 years.

In fact, 76% of new leases signed in 2011 were for periods of less than five years. Lease lengths have been falling consistently over the past two decades and the weighted average unexpired lease length for the market as a whole is now only 10.2 years. This fact alone indicates that a very substantial percentage of all assets are going to be allocated to the Weak slot if the FSA draft guidance on lease lengths were to be used for slot allocation.

Simulation: Slot allocation

Out of our 3,442 hypothetical loans on assets in the IPD simulation data set, only 80 loans (2%) met the criteria to be allocated to the Strong slot and only 421 (12%) could be allocated to the Good slot while 2,743 (80%) had to be allocated to the Weak slot.

However, when viewed by the aggregate value of the collateral allocated to each slot the picture changes somewhat. The assets meeting the Strong slotting guidance are by definition of better quality and with more secure income streams so they tend to be of higher value (they also tend to be physically larger).

This reduces the allocation to the Weak category by collateral value to 67% and increases the combined allocation by value to the Strong and Good slots to around 27%.

Interestingly, the Satisfactory slot becomes something of an orphan in our simulation with only 198 assets or 6% of the sample. This is due to the low market yields in Q2 2007 which lead to the dominant importance of the 130% ICR and the requirement for a 10 year unexpired lease length.

While the FSA draft guidance actually stated that the asset should have or be capable of attracting stable tenants for a minimum lease of 10 years, we have used objective criteria and limited the Satisfactory slot to existing unexpired leases of 10 years or more. We explore later in this paper what happens when we use different average unexpired lease criteria.

Table 6: Allocation of Loans by Slot

	Strong	Good	Satisfactory	Weak
Number of loans	80	421	198	2,743
Percentage of loans	2%	12%	6%	80%
Collateral, £m	2,058	12,751	3,599	38,211
Percentage of collateral value	4%	23%	6%	67%

The assets within each slot display different capital trends through the cycle. However, the differences do not reveal themselves in the peak to trough movement in collateral values which range narrowly from a decline of -39.1% in the Strong slot to -42.3% in the Weak slot.

The differentiation is observed in the period following the market low point as asset values recover more rapidly following the Q2 2009 cyclical low in the Strong, Good and Satisfactory slots than in the Weak slot during the simulation period.

The differentiation in income trends across the slots is more marked than in asset values. Net incomes on the assets allocated to the Satisfactory and Weak slots decline -0.5% and -6.1% respectively over the simulation period while incomes increase in the Strong and Good slots by +4.4% and +5.1%. Clearly high quality assets with long leases do deliver superior income security.

Table 7: Capital Value and Net Income Change by Slot for Bullet Loans

Slot	Capital change, Q2 2007 to Q2 2009, %	Net income change, Q2 2007 to Q2 2009, %	Capital change, Q2 2007 to Q4 2011, %	Net income change, Q2 2007 to Q4 2011, %
Strong	-39.1	3.1	-23.4	4.4
Good	-41.7	4.3	-25.4	5.1
Satisfactory	-40.4	-0.3	-25.2	-0.5
Weak	-42.3	0.5	-31.7	-6.1
All	**-41.9**	**1.4**	**-29.6**	**-3.1**

Simulation for bullet loans: Collateral value falling below loan amount

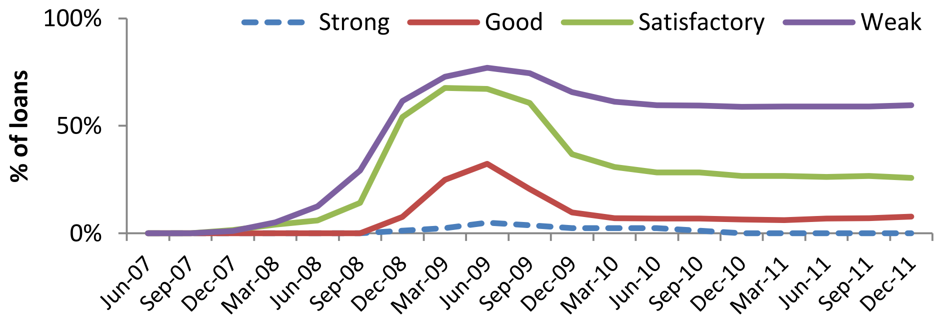
As asset values fall rapidly in the early part of the simulation period, many of our hypothetical loans quickly move into negative equity. For the hypothetical loans initially meeting the Strong and Good slotting criteria derived from the FSA draft guidance, the proportion of loans that exceed their reduced collateral asset values peaks at 5% (4 loans) and 32% (136 loans) of their respective slots in Q2 2009.

Against the sample as a whole this is only 0.1% and 4% of all our hypothetical loans. In the Satisfactory and Weak slots of our simulation, this proportion peaks at the much higher levels of 67% (133 loans) and 77% (2,113 loans) of their respective slots. Against the sample as a whole this is 3.9% and 61% of all the hypothetical loans.

Analysing negative equity by aggregate current collateral value at the Q2 2009 market nadir, we see a somewhat less daunting picture. By value only 0.2% of the Strong slot is in negative equity, 2.6% of the Good slot, 15% of the Satisfactory slot and 16.5% of the Weak slot. This indicates that smaller assets exhibited a higher incidence of negative equity.

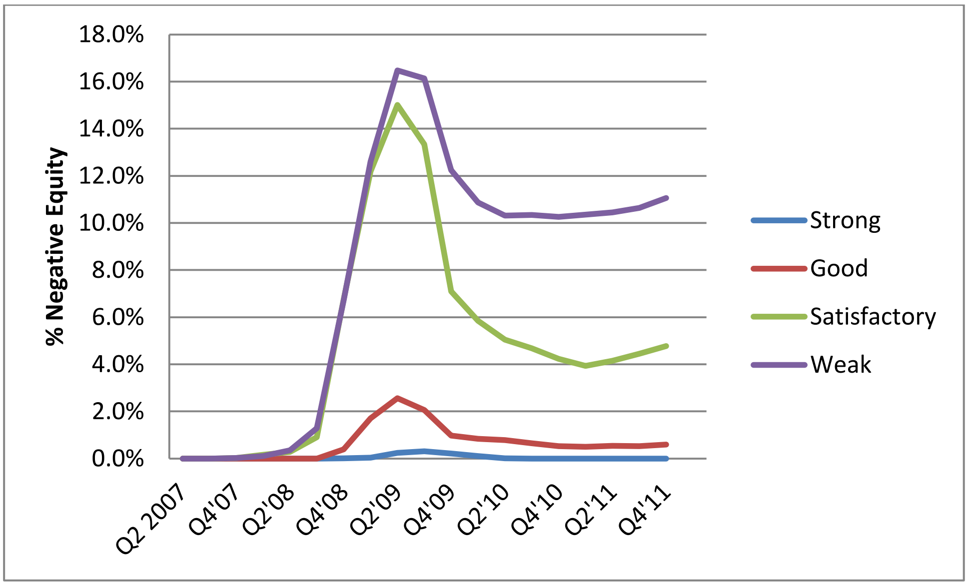
The proportion of loans that exceed 100% LTV subsequently falls as asset values start to recover after Q2 2009. In the initial Strong slot, the 4 hypothetical bullet loans that defaulted with negative equity at the market low have all recovered some equity by the end of 2010. The number of loans in the lower slots with LTVs greater than 100% falls rapidly to end the simulation period at 7.8% of the Good slot (33 loans), 25.8% of the Satisfactory slot (51 loans) and 59.5% of the Weak slot (1,633 loans).

Chart 2: Proportion of hypothetical full bullet loans in excess of current collateral value



However, if we examine these defaults by the amount of negative equity a somewhat different picture emerges. The Weak and Satisfactory slots have a much higher percentage of negative equity.

Chart 3: Hypothetical full bullet loans with LTV>100% by % of negative equity



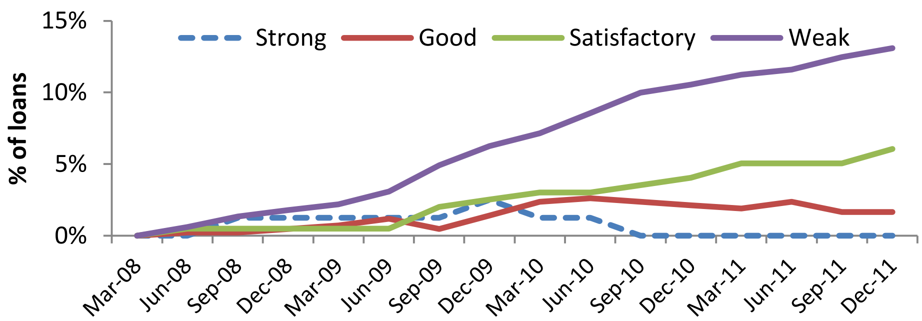
Simulation for bullet loans: Net Income falls below interest payments

The pattern of stress pertaining to interest cover shows the differentiation across slots noted earlier. The peak stress for our hypothetical bullet loans initially qualifying for the Strong slot occurs in Q4 2009 at 2.5% (2 loans) but by Q3 2010 both loans have an ICR of over 1.00.

The peak stress for the initial Good slot shows 2.6% (11 loans) have an ICR lower than 1.00 in Q2 2010 but by the end of the simulation only 7 loans (1.7%) have income cover of less than 1.00.

In contrast, net incomes generated by assets in the Satisfactory and Weak slots decline through to the end of the simulation period. The proportion of assets no longer generating enough cash to meet simulated interest payments reaches 6.1% (12 loans) in the Satisfactory slot and 15% (359 loans) in the Weak slot by end 2011.

Chart 4: Proportion of hypothetical bullet loans where net income in each of the past four quarters is below the interest payable



Market risk versus idiosyncratic risk

The different patterns of distress emanating from declines in asset values versus declines in interest cover highlight a couple of issues. First, there is a much greater likelihood of a cyclical downward migration to a lower slot or default based on deterioration of LTV than interest cover.

The overwhelming influence of market risk in a downturn results in an outturn in which all asset values fall in veritable lock-step. Hence, in the initial downswing there is no place to hide in terms of asset quality, lease length or any other specific characteristic that will shield assets from a decline in value. Only a low level of leverage can protect the lender from write downs.

The indiscriminate fall in asset values during periods of market stress underlines the distinction between CRE *market risk* and the specific *credit risk* attributes of individual CRE assets along with the loans they collateralise. The distinction between these two types of CRE risk is frequently underappreciated or confused.

However, as the market begins the long slow climb back to trend following a major dislocation, specific or 'idiosyncratic' risk becomes far more influential. These idiosyncratic risks of individual properties are hidden by declining market yields at the height of an upswing, but become very apparent in the recovery period after a cyclical downturn.

The assets with vulnerabilities such as a short lease length and capital expenditure requirements will lag (or languish if the asset is outdated). In contrast, assets of good quality with a high degree of income security reduce the likelihood of experiencing a loss of income cover through the cycle. At the same time, the underpinning conferred by the long lease also bolsters the asset's relative value in the recovery phase of the cycle.

Write downs

To estimate losses on our hypothetical full bullet loans, the gap between asset value and loan amount was calculated as a proportion of original loan amounts. Added to this was an impairment charge of 10% of asset value to simulate the impact of selling into a weak market.

Full Bullet Loans simulation at the cyclical trough

Table 8: Simulated write downs where LTV>100% as at Q2 2009 by slotting category, % original loan value

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where loan value > collateral value	**0.8%**	**5.4%**	**19.5%**	**21.0%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

In the table above we examine our hypothetical write downs in Q2 2009 at the bottom of what was the most severe UK property cycle in recent history. *This can be considered the equivalent of downturn LGD*. It is immediately noticeable that even at the trough of the cycle, the risk weighted capital that would be held for Strong exposures from the time of origination under the proposed slotting criteria is well in excess of the downturn LGD for our hypothetical Strong bullet loans. In the Good slot the risk weight is also well in excess of what would be required to cover unexpected loss.

In contrast, the risk weight for the Satisfactory slot is less than adequate to provide for downturn LGD if possession and sale is triggered by LTV being in excess of 100%. However, the risk weight for Weak exposures would appear to be more than adequate.

The above analysis assumes that possession will be taken when a breach of 100% LTV occurs and the asset is immediately sold.

However, if forbearance is practised at the low point in the cycle, then write downs decline as asset values start to recover. By the end of our simulation period write downs are nil in the Strong slot and greatly reduced in the Good and Satisfactory slots. Even in the Weak slot write downs are reduced by a quarter.

Table 9: Simulated write downs where LTV>100% as at Q4 2011 by slotting category, % original loan value

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where loan value > collateral value	**0.0%**	**1.5%**	**8.4%**	**15.9%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

If we examine the net income cover for each slot at the trough of the cycle we see that most assets are generating enough income to service their debt. If forbearance is exercised where ICR is greater than 1.0 then write downs are negligible in all slots.

Table 10: Simulated write down ICR<1.0 as at Q2 2009 by slotting category, % original loan value

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where interest > asset income	**0.0%**	**0.0%**	**0.3%**	**0.8%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

However, the write downs where net income is inadequate to cover the interest payments (and the asset value is also below the loan value) continue to rise through the simulation period. The exposure of lenders to write downs due to LTV>100% will have fallen from peak levels but the ability of borrowers to service their debt fully from asset income is still declining.

Nevertheless, the original risk weighted capital allocated for each slot is greatly in excess of write downs if possession and sale is only exercised when both LTV>100% and ICR<1.0.

Table 11: Simulated write down ICR<1.0 and LTV>100% as at Q4 2011 by slotting category

(% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where interest > asset income	**0.0%**	**0.3%**	**1.3%**	**3.8%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

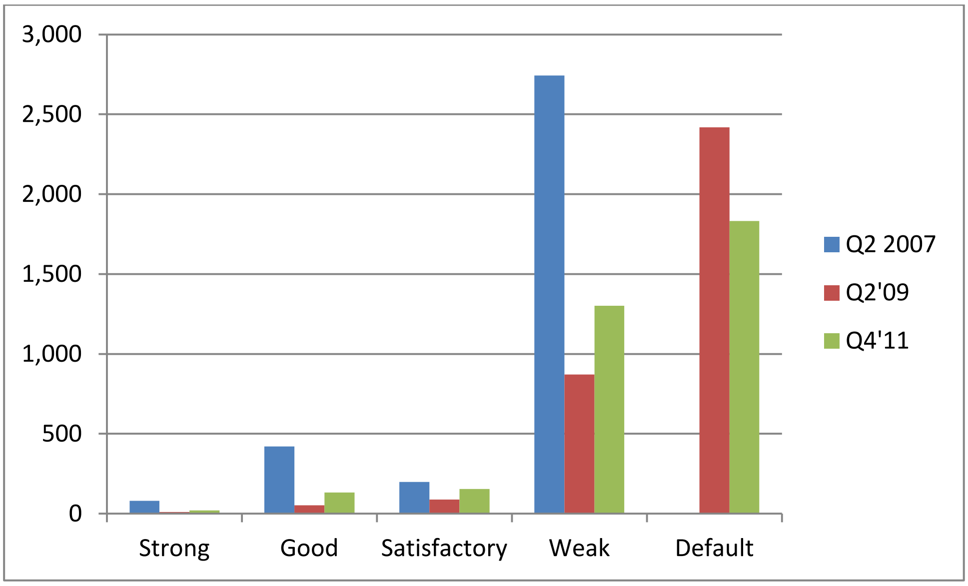
Change in slotting category

Thus far we have taken a 'through the cycle' (TTC) view of risk weighted assets – i.e. we have not moved the loans in breach of their original criteria to lower slots and increased risk weighted assets accordingly as the migration between slots occurs.

However, the FSA draft guidance implied that as asset values and net incomes fall over the simulation period, the slotting category for each loan that no longer meets the criteria for its original slot should change – i.e. a 'point in time' (PIT) approach. Here we assume that an LTV in excess of 100% constitutes a default and that default results in possession and sale.

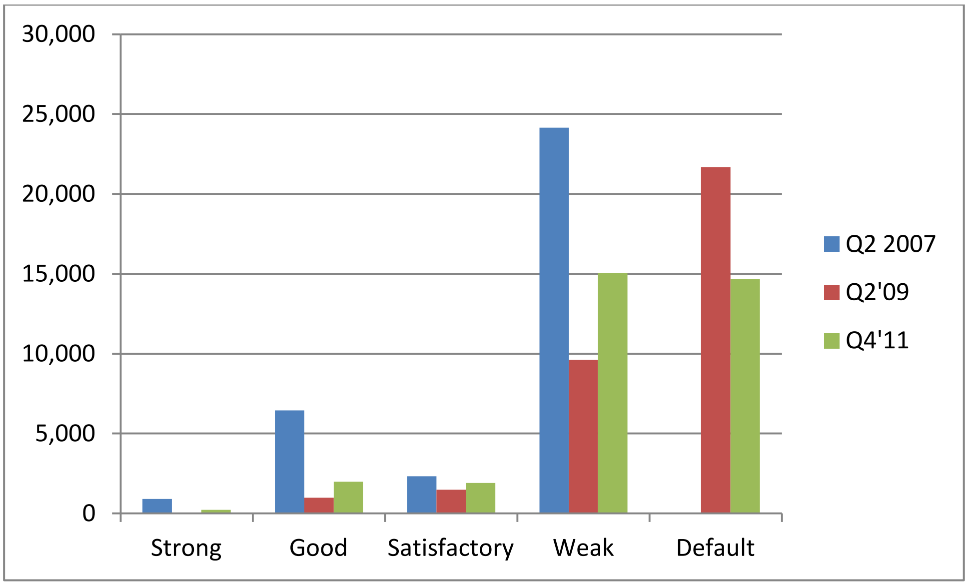
Change in slotting category by number of simulated loans

Chart 5: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011



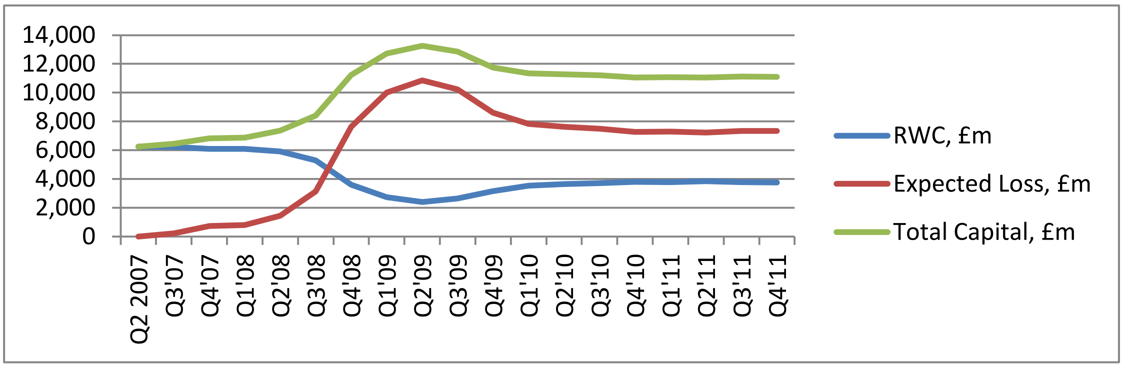
Change in slotting category by value of simulated loans

Chart 6: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011



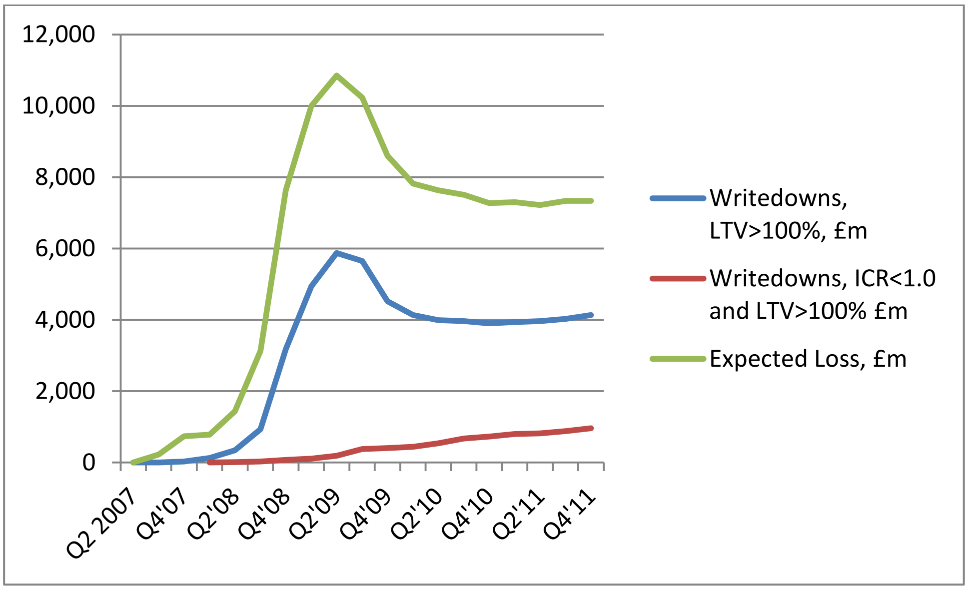
If we continue with this PIT approach, the overall capital plus provisions – i.e. risk weighted capital + expected loss (EL) of 50% for the Default slot - required for our hypothetical loan book of bullet loans rises from £6.25 billion in Q2 2007 to a peak of £13.25 billion in Q2 2009 and subsequently falls to £11.1 billion at the end of the simulation in Q4 2011 (assuming losses are not crystallised at the bottom of the cycle).

Chart 7: Risk Weighted Capital and Expected Loss Provisions for Bullet Loan Simulation



The considerable increase in provisions dictated by the slotting approach and illustrated below is well in excess of the write downs actually required in our simulation.

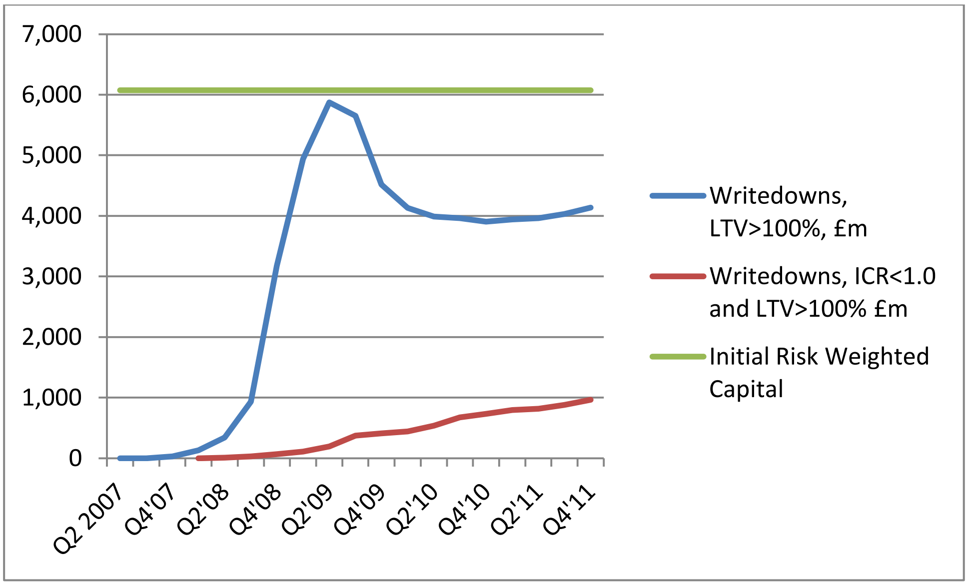
Chart 8: Bullet Loans - Expected Loss Provisions as compared with Write downs



The initial risk weighted capital allocated in Q2 2007 fully covers write downs on the very restrictive basis of exercising possession and sale whenever LTV is greater than 100% - even at the nadir of the cycle.

If a more pragmatic approach is taken and forbearance is exercised until ICR=1.00 is breached, then the amount of risk weighted capital is well in excess of that needed to ride out this leg of the cycle in our bullet loan simulation.

Chart 9: Bullet Loans - Initial Risk Weighted Capital Compared with Write downs



Excess capital and provisioning requirements - Negative feedback effects

The requirement to allocate 50% provisioning for all defaults and to hold risk weighted capital in excess of that required to cover downturn LGD on a TTC basis has negative implications for lending capacity.

The consequences are even more severe if a PIT approach is mandated and risk weighted capital must be increased as LTVs deteriorate. A PIT approach to risk management is inherently pro-cyclical and likely to engender destabilising secondary effects which in turn have a deleterious impact on market values generally as a dearth of finance tends to trigger negative feedback throughout the markets affected.

All of the loans in our simulation that did not breach 100% LTV over the simulation period will have financing requirements at the end of the 7 year loan term as these are bullet loans. If asset values do not recover further (or even decline) from Q4 2011 levels, the refinancing equity required to obtain a new loan on each asset that meets the criteria for the original slot may not be forthcoming.

At Q4 2011 the amounts of refinancing equity required for the performing bullet loans are non-negligible in our simulation (despite conservative underwriting at origination) and represent 2.7% of the Strong slot by end-period collateral value, 3.2% of the Good slot, 4.0% of the Satisfactory slot and 4.2% of the Weak slot.

If the regulatory capital required to lend on these assets is in excess of that justified by downturn LGDs, then loans will of necessity be priced at a level that could trigger a structural upward shift in yields (i.e. a downward shift in CRE asset values).

The consequences of such a shift could have unintended consequences for wider financial stability. It also invites a move to financing the lowest risk assets outside of the banking system in the future (e.g. to funds, insurance lenders and the shadow banking sphere) as it is the Strong and the Good slots where the requirement to hold excess regulatory capital is greatest.

II. Simulation 2: Part-Amortising Loans

The part-amortising simulation again begins with allocation to each slot using the iterative process described before. The starting point is again asset quality. Only the properties that are top quartile in terms of asset quality and location are eligible for the Strong slot and they must have an average unexpired weighted average lease term of 15 years or greater.

The rest are allocated to a lower slot consistent with their asset/location quality band and their lease length. We then calculate the maximum loan amount for each asset that will meet the criteria for each slot.

The same loans qualify for each slot as in the non-amortising simulation. And again it turns out that net income is the pivotal determinant of the loan amount when property yields are low.

However, it is now the minimum DSCR that is crucial. This is because the 150% minimum DSCR constraint is actually more restrictive than the 175% minimum ICR. In fact, the ICR consistent with a 150% DSCR is 200%, so amortising loans are treated more stringently than bullet loans under the draft guidance that was floated and withdrawn by the FSA in 2011.

To understand this, we outline the relationship between DSCR and ICR using our simulation assumptions:

0.5% of the loan amount is repaid each quarter

LTV = Loan / Value

ICR = Rent / Interest

DSCR = Rent / Interest + Amortisation

Amortisation = 2% * Value

Interest = 6% * Value

ICR = Rent / [6% * Value]

DSCR = Rent / ([2% * Value] + [6% * Value]

= Rent / (8% * Value)

If DSCR = 150%

150% = Rent / (8% * Value)

Rent = 150% [8% * Value]

Rent = 12% * Value

Then:

ICR = Rent / (6% * Value)

= (12%* Value) / (6% * Value)

= 12% / 6%

= 200%

Similarly:

If DSCR = 125% then ICR = (125% * 8%) / 6% = 166%

If DSCR = 100% then ICR = (100% * 8%) / 6% = 133%

As a result of the more stringent criteria for ICR that follow from the DSCR constraints, our hypothetical part-amortising loans must be originated at even lower LTVs than our bullet loans.

Table 12: Simulation Results from Combined Slotting Constraints on LTV & ICR

	Strong	Good	Satisfactory	Weak
LTV Part-Amortising	**39**	**46**	**63**	**62**
LTV Bullet	**44**	**51**	**64**	**63**
ICR Part-Amortising	**2.01**	**1.68**	**1.35**	**1.35**
ICR Bullet	**1.76**	**1.51**	**1.32**	**1.32**

Simulation for Part-Amortising Loans: Collateral value falling below loan amount

Again, as asset values fall rapidly in the early part of the simulation period, many of our hypothetical loans quickly move into negative equity.

However, as the loans are underwritten more conservatively than the bullet loans due to the DSCR constraint and are now amortising at 0.5% per quarter, there are fewer loans where LTV is greater than 100%.

For the hypothetical loans initially meeting the Strong and Good slotting criteria, the proportion of loans that exceed their reduced collateral asset values peaks at 1.3%% (1 loan) and 5.9% (25 loans) of their respective slots in Q2 2009.

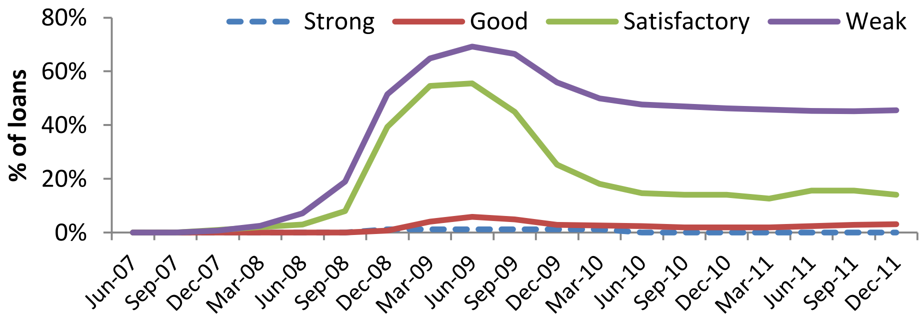
Against the sample as a whole this is only 0.03% and 0.7% of all our hypothetical loans. In the Satisfactory and Weak slots of our simulation, this proportion peaks at the much higher levels of 56% (110 loans) and 69% (1,900 loans) of their respective slots. Against the sample as a whole this is 3.2% and 55% of all the hypothetical loans.

Analysing negative equity by aggregate loan value less current collateral value for our amortising loans at the Q2 2009 market nadir, we see that negative equity is a negligible proportion of the loan exposure to the Strong slot, 0.8% of the Good slot, 10.5% of the Satisfactory slot and 12% of the Weak slot.

The proportion of loans that exceed 100% LTV again falls in our simulation as asset values start to recover after Q2 2009. In the initial Strong slot, the 1 hypothetical loan that defaulted with negative equity at the market low has recovered some equity by Q2 2010.

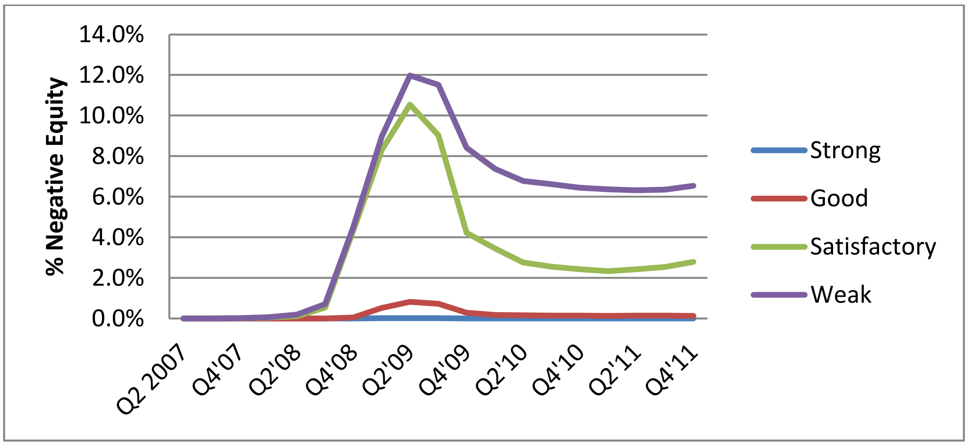
The number of loans in the lower slots with LTVs greater than 100% falls rapidly to end the simulation period at 3.1% of the Good slot (13 loans), 14.1% of the Satisfactory slot (28 loans) and 45.6% of the Weak slot (1,250 loans).

Chart 10: Proportion of hypothetical part-amortising loans in excess of current collateral value



It can also be seen that the proportion of negative equity in each slot is lower than that in our bullet loan simulation.

Chart 11: Proportion of negative equity by slot, hypothetical part-amortising loans

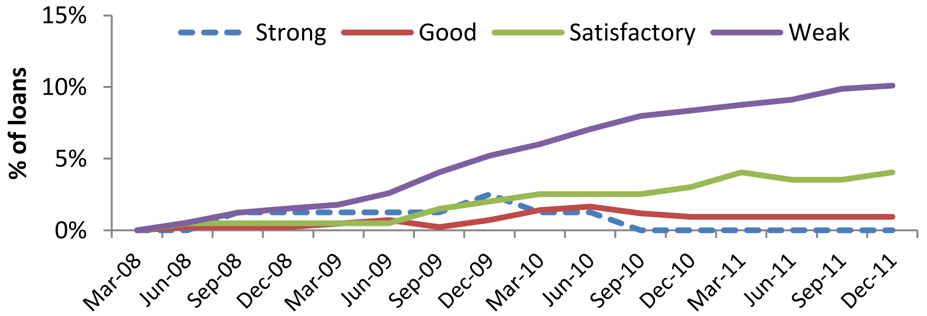


Simulation for Part-Amortising Loans: Net Income falls below interest payments

The pattern of stress pertaining to interest cover shows the differentiation across slots described earlier. The peak stress for our hypothetical amortising loans initially qualifying for the Strong slot occurs in Q4 2009 at 2.5% (2 loans) but by Q3 2010 both loans have an ICR of over 1.00. The peak stress for the initial Good slot occurs in Q2 2010 when 1.7% (7 loans) has an ICR lower than 1.00, but by the end of the simulation only 4 loans (1.0%) have income cover of less than 1.00.

In contrast, the net incomes generated by assets in the Satisfactory and Weak slots declines through to the end of the simulation period. The proportion of assets no longer generating enough cash to meet simulated interest payments reaches 4.0% (8 loans) in the Satisfactory slot and 10% (277 loans) in the Weak slot by end 2011.

Chart 12: Proportion of hypothetical part-amortising loans where net income in each of the past four quarters is below interest payable and LTV>100%



Simulation for Part-Amortising Loans: Net Income falls below interest plus amortisation

The pattern of stress pertaining to DSCR cover shows somewhat greater differentiation across slots than interest cover alone.

The peak distress for our hypothetical part-amortising loans initially qualifying for the Strong slot occurs in Q2 2011 at 3.8% (3 loans) but by Q3 2011 two of the three loans again have a DSCR over 1.00.

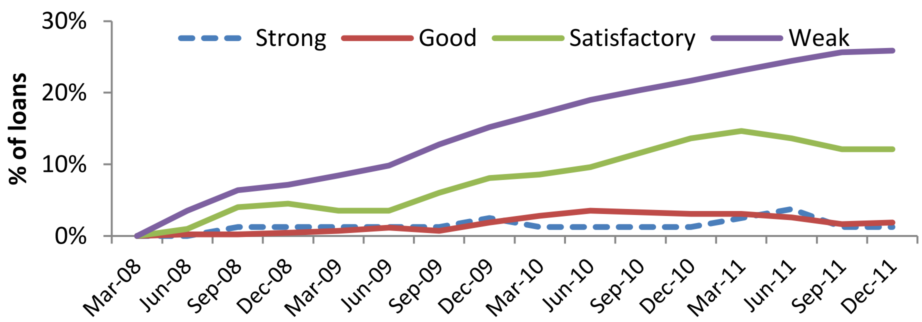
The peak stress for the initial Good slot shows 3.6% (15 loans) have an DSCR lower than 1.00 in Q2 2010 but by the end of the simulation only 8 loans (1.9%) have debt service cover of less than 1.00.

In the Satisfactory slot, distress peaks in Q1 2011 with 14.6% (29 loans) unable to generate income greater than interest plus amortisation but 5 of these loans recover by Q3 2011 leaving 12.1% of the slot in distress.

In contrast, net incomes from assets in the Weak slot decline through to the end of the simulation period.

The proportion of assets no longer generating enough cash to meet simulated interest plus amortisation payments reaches 25.9% (710 loans) in the Weak slot by end 2011.

Chart 13: Proportion of hypothetical part-amortising loans where net income in each of the past four quarters is below DSCR=1.0 and LTV>100%



Write downs

To estimate losses on our hypothetical part- amortising loans, the gap between asset value and loan amount was calculated as a proportion of original loan amounts. Added to this was an impairment charge of 10% of asset value to simulate the impact of selling into a Weak market.

Table 13: Simulated write downs as at Q2 2009 by slotting category, part-amortising versus bullet loans, LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Part-Amortising Simulated write downs where loan value > collateral value	**0.0%**	**1.6%**	**15.0%**	**16.3%**
Bullet Simulated write downs where loan value > collateral value	**0.8%**	**5.4%**	**19.5%**	**21.0%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

In the table above we examine our hypothetical write downs on part-amortising loans in Q2 2009 at the bottom of the cycle if an LTV greater than 100% triggers possession and sale.

As with the bullet simulation, it is immediately noticeable that even at the trough of the cycle, the risk weighted capital that would be required for Strong and Good exposures under the slotting framework used is well in excess of the downturn LGD for our hypothetical part-amortising loans.

In contrast, the risk weight for Satisfactory is less than adequate to provide for downturn LGD if possession and sale is triggered by LTV in excess of 100%. However, the risk weight for Weak exposures in our amortising simulation would appear to be well in excess of that required.

The above analysis assumes that possession will be taken and the property will be sold when a breach of 100% LTV occurs. However, if forbearance is practised at the bottom of the cycle, then write downs decline as asset values start to recover.

Table 14: Simulated write downs as at Q4 2011 by slotting category, part-amortising versus bullet loans, LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Part-Amortising Simulated write downs where loan value > collateral value	**0.0%**	**0.3%**	**4.5%**	**9.9%**
Bullet Simulated write downs where loan value > collateral value	**0.0%**	**1.5%**	**8.4%**	**15.9%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

In the above table we see that if possession and sale are not exercised at the nadir of the cycle when LTV exceeds 100%, the recovery in asset values leaves the initial risk weighted capital allocated to each slot greatly in excess of that required at the end of the simulation. Even the Satisfactory slot now has excess risk weighted capital of nearly 6%.

This risk weighted capital excess is even greater if possession is not triggered until the ICR is less than 1.0 and the LTV is higher than 100%.

Table 15: Simulated write down as at Q4 2011 by slotting category, part-amortising versus bullet loans, ICR<1.00 and LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Part-Amortising Simulated write downs where interest > asset income	**0.0%**	**0.1%**	**0.7%**	**2.1%**
Bullet Simulated write downs where interest > asset income	**0.0%**	**0.3%**	**1.3%**	**3.8%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

By the end of our simulation period write downs are greatly reduced in all slots if paying interest is deemed sufficient to exercise forbearance. However, for many of the loans amortisation has ceased.

If forbearance is confined to loans where the DSCR is at least 1.00, then write downs double in the Good slot and more than double in the Satisfactory and Weak slots, but remain a small percentage of the risk weighted capital allocated at origination.

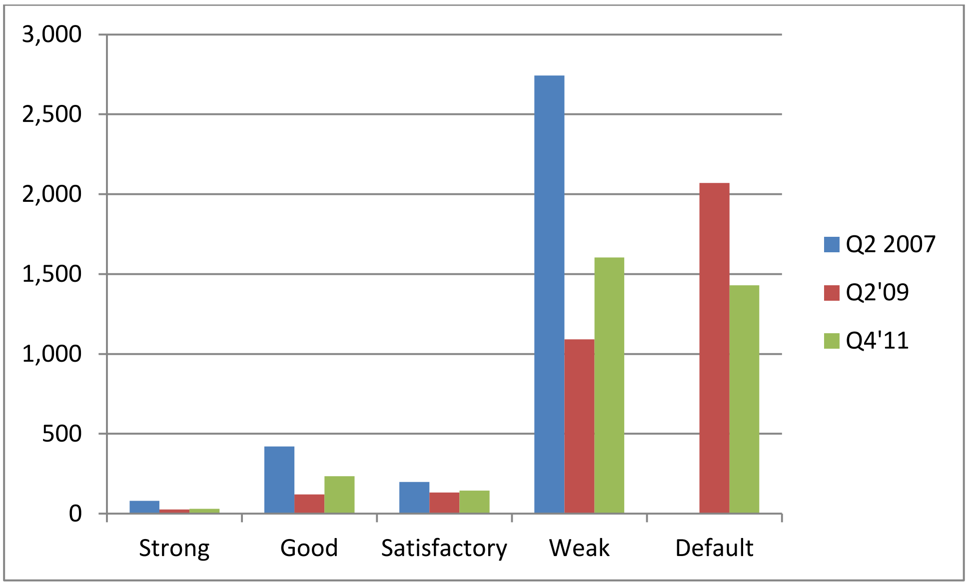
Table 16: Simulated write down as at Q4 2011 by slotting category, part-amortising, DSCR<1.00 and LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where debt service > asset income	**0.0%**	**0.2%**	**1.6%**	**5.1%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

We now move from a 'through the cycle' (TTC) view of risk weighted assets – i.e. where we do not move the loans in breach of their original criteria to lower slots and increase risk weighted assets – to a 'point in time' (PIT) view. Recall that the withdrawn FSA draft guidance implied that as asset values and net incomes fall over the simulation period, the slotting category for each loan that no longer meets the criteria for its original slot should change – i.e. a PIT approach.

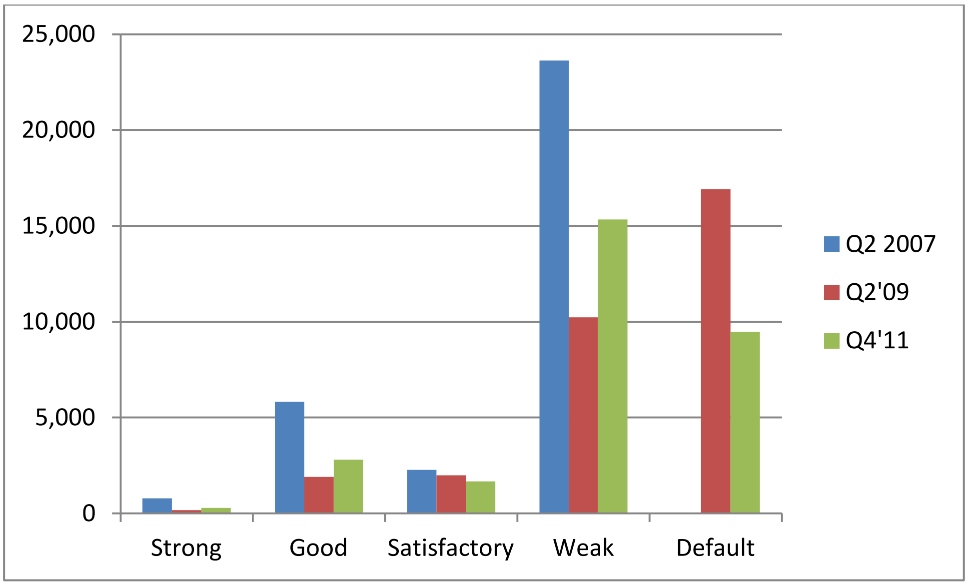
Change in slotting category by number of part-amortising loans:

Chart 14: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011, part-amortising



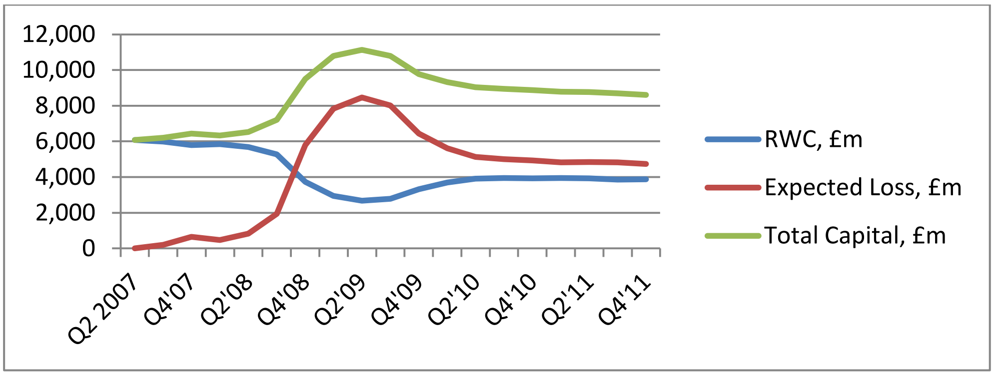
Change in slotting category by value of part-amortising loans:

Chart 15: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011, part-amortising



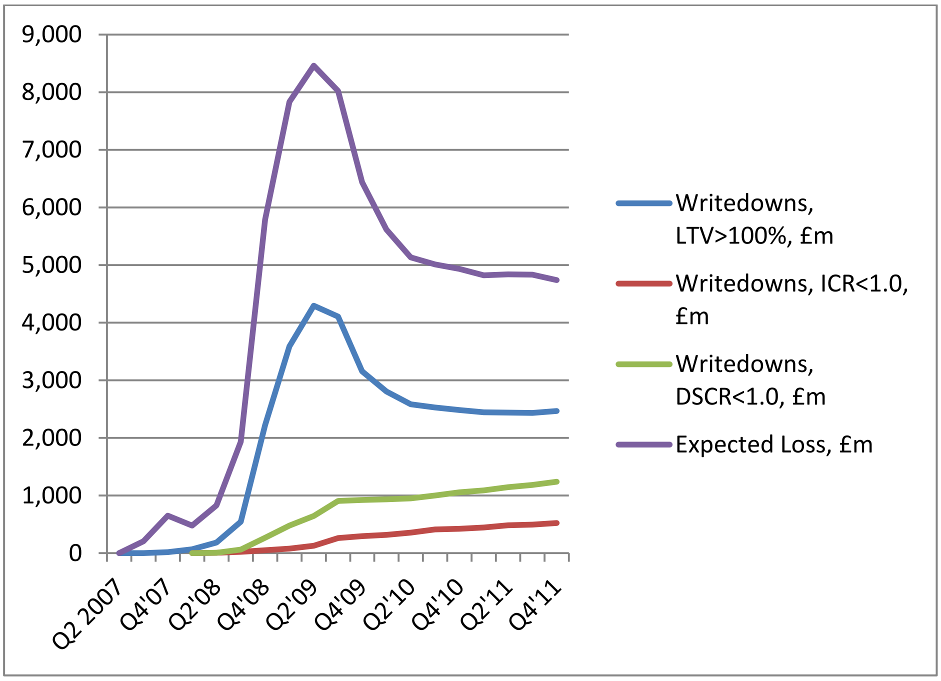
If we take a PIT approach, the overall capital plus provisions (risk weighted capital + EL of 50% for the default slot) required for our hypothetical loan book of part-amortising loans rises from £6.07 billion in Q2 2007 to a peak of £11.13 billion in Q2 2009 and subsequently falls to £8.6 billion at the end of the simulation in Q4 2011 if we assume losses are not crystallised at the bottom of the cycle.

Chart 16: Risk Weighted Capital and Expected Loss for Part-Amortising Loan Simulation



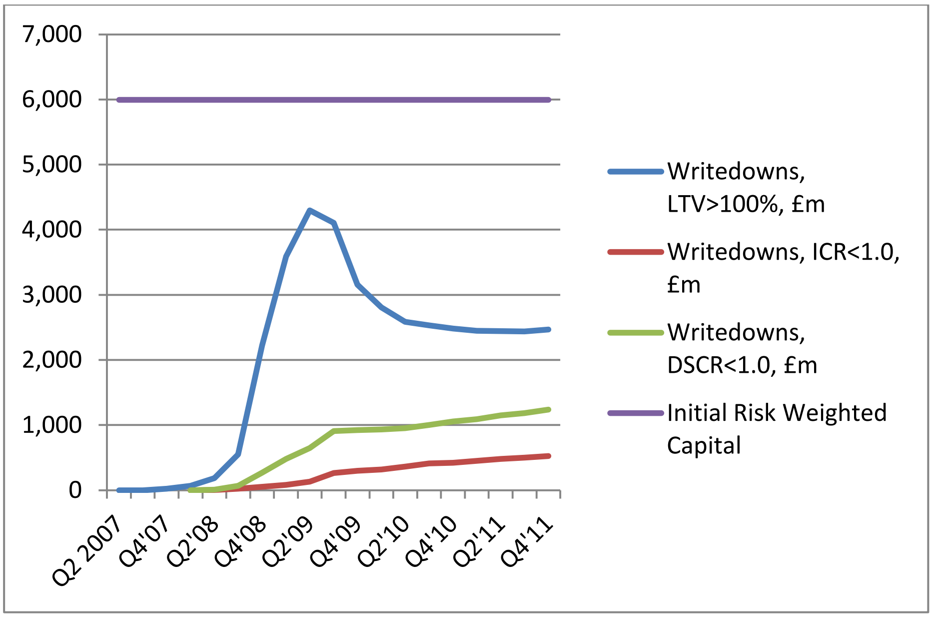
The considerable increase in provisions dictated by slotting and illustrated below is greatly in excess of the write downs actually required in our part-amortising simulation. This excess is even more pronounced than in our bullet simulation because the implied criteria for ICR - as opposed to that stated in the FSA's withdrawn draft guidance - is far more stringent due to the DSCR constraint. In addition, these loans are amortising at 0.5% each quarter and thus reducing the loan exposure on each asset.

Chart 17: Expected Loss Provisions as compared with Write downs, Part-Amortising



The initial risk weighted capital allocated in Q2 2007 is also considerably in excess of write downs as shown in the chart below, even on the very restrictive basis of possession and sale whenever LTV is greater than 100% at the nadir of the cycle. If a more pragmatic approach is taken and forbearance is exercised until the DSCR is less than 1.00, then the amount of risk-weighted capital is greatly in excess of that needed to ride out this leg of the cycle in our part-amortising loan simulation.

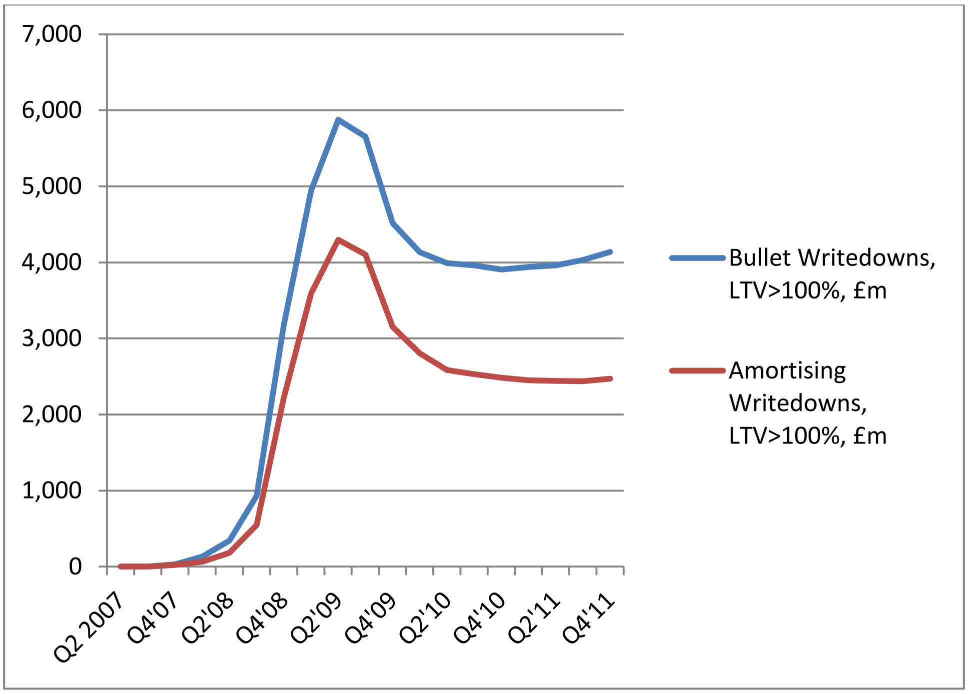
Chart 18: Initial Risk Weighted Capital Compared with Write downs for Part-Amortising Loans



Part-Amortising versus bullet loans

It is somewhat surprising that no mention is made of amortisation in the former FSA slotting draft guidance. Amortisation is an important risk mitigant through the cycle which can be seen by comparing the performance of our simulated bullet loans against our simulated part-amortising loans. These loans are all made on the same group of assets so the only differences are in the underwriting (the implicit ICR criteria are stricter for part-amortising loans due to the DSCR constraint) and the fact that one group of loans is amortising at 0.5% each quarter.

Chart 19: Bullet versus Part-Amortising Loan Write Downs



Slotting calibration issues

There are number of anomalies that have surfaced in the above simulations:

1. The risk weights attached to each slot are not consistent with the simulated loss behaviour of the assets which qualify for those slots in accordance with our framework based on former FSA draft guidance;
2. The 50% expected loss attached to the Default slot is well in excess of the write downs that are consistent with the simulated loans originated according to the former FSA draft guidance;
3. The DSCR maxima are not consistent with the ICR maxima and imply that stricter underwriting is required for amortising loans than bullet loans;
4. The majority of loans are not eligible for a slot higher than Weak due to current lease lengths in the UK which are only 10.2 years on a weighted average basis and even lower on a simple average basis;
5. LTV, unexpired lease term and ICR/DSCR are given apparent equal weighting in the former FSA slotting draft guidance, yet the simulation shows that LTV is dominated by market conditions (systematic risk) and far more likely to trigger slot migration than lease term, ICR or DSCR which are specific risks that are more indicative of loan servicing capacity in the medium term.

III. New simulation: An IPD approach to lease term for slot allocation

We observed earlier in this paper that the only FSA draft guidance offered (now withdrawn) on the lease terms attached to each slot were very challenging when viewed in the context of 21st century UK lease lengths. As a result, the vast majority of loans could only be assigned to the Weak slot using this guidance regardless of the strengths in asset/location quality, debt service cover and conservative underwriting. We now examine how the simulation outcomes would change if the lease term criteria attached to each slot were more in keeping with current UK market norms.

Below we modify the lease length criteria to a position more in keeping with the past decade according to the IPD Databank. In this simulation assets are allocated to slots according to the ranking of their average unexpired lease term.

Table 17: Alternative Average Unexpired Lease Lengths by Slot based on IPD Data

Slot	*Lease Length, Years*
Strong	*>10 years*
Good	*>7.5 years*
Satisfactory	*>5 years*
Weak	*<5 years*

We proceed with the same iterative process as in the previous simulations, allocating assets to slots first by asset/location quality (ERV quartile), then by our new lease length criteria. If we examine the first step of the allocation process, we see the distribution of slots by asset/location quality alone in the table below.

Table 18: IPD Allocation by Asset/Location Quality

	Strong	*Good*	*Satisfactory*	*Weak*
Number of assets by quality	*935*	*906*	*874*	*727*

As we proceed to the next step we use the lease term to see the distribution across the slots prior to combining with the quality distribution.

Table 19: IPD Allocation by Unexpired Lease Term (income security)

	Strong *> 10 years*	*Good* *>7.5 years*	*Satisfactory* *>5 years*	*Weak* *<5 years*
Number of assets by unexpired lease term	*914*	*433*	*634*	*1,461*

We now combine the criteria to finally allocate the assets to their slot. We then 'originate' hypothetical part-amortising loans.

Table 20: IPD Allocation by Combined Asset/Location Quality and Unexpired Lease Term

	Strong *> 10 years*	*Good* *>7.5 years*	*Satisfactory* *>5 years*	*Weak* *<5 years*
Number of assets by asset/location quality and lease terms combined	*263*	*500*	*827*	*1,852*

It can be seen from the above slot distribution based on combined criteria that the majority of assets that qualify for the Strong slot on asset/location quality or lease length alone have to be allocated to lower slots.

The interest rate is again fixed at 6% for all loans over the whole simulation period.

All loans are assumed to be for 7 years and will need to be refinanced in Q2 2014.

Amortisation is 0.5% per quarter as in our previous simulation.

Table 21: Simulation Parameters - IPD Lease Term

	Strong	Good	Satisfactory	Weak
Maximum LTV	60%	70%	80%	n/a
Minimum ICR	175%	150%	130%	n/a
Minimum Unexpired Lease Term	>10 years	>7.5 years	>5 years	<5 years
Minimum Quality	Top quartile	Upper Quartile	Mid Quartile	Lower Quartile
Risk Weight	70%	90%	115%	250%
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.35%	22.5%

The table below compares the new number of loans in each slot as the result of our change to IPD lease criteria with the allocation to slots based on the former FSA draft guidance on lease lengths. Both distributions use IPD asset/location quality quartiles to determine the distribution.

Table 22: Slot Allocation - IPD Lease Criteria compared with Former FSA Lease Draft Guidance

	Strong	Good	Satisfactory	Weak
Number of loans	FSA – 80 **IPD - 263**	FSA – 421 **IPD - 500**	FSA – 198 **IPD - 827**	FSA - 2,743 **IPD – 1,852**
Percentage of loans	FSA - 2% **IPD – 8%**	FSA – 12% **IPD – 14%**	FSA – 6% **IPD – 24%**	FSA – 80% **IPD – 54%**
Collateral Value, £m	FSA-2,058 **IPD-8,600**	FSA-12,751 **IPD-14,149**	FSA-3,599 **IPD-15,010**	FSA-38,211 **IPD- 18,860**
Percentage of total collateral value	FSA - 4% **IPD - 15%**	FSA -23% **IPD -25%**	FSA – 6% **IPD - 27%**	FSA – 67% **IPD - 33%**

In line with our previous simulations, the assets within each slot display different capital trends through the cycle. And again, the differences do not reveal themselves in the peak to trough movement in collateral values which range narrowly from a decline of -41.2% in the Strong slot to declines of -42.4% and -42.1% in the Satisfactory and Weak slots respectively.

The differentiation becomes apparent in the period following the Q2 2009 market cyclical low as asset values in the Strong and Good slots recover more rapidly than those in the Satisfactory and Weak slots. The asset values in the Strong and Good slots end the simulation down -24.5% and -26% respectively while the Satisfactory and Weak asset values end the period down -31.1% and -33.3% respectively.

The differentiation in income trends across the slots is more marked using the IPD lease criteria than that which resulted from using the former FSA draft guidance. For the simulation period as a whole, net income on the assets allocated to the Satisfactory and Weak slots declines -1.4% and -12.3% respectively in the IPD simulation as compared with -0.5% and -6.1% in the FSA simulation.

In contrast, the income increases in the Strong and Good slots are similar, rising by +4.3% and +5.0% in the IPD simulation as compared with +4.4% and +5.1% in the FSA former draft guidance simulation. *Given that our change in lease criteria has increased the aggregate allocation to these two slots from 27% of the assets by collateral value in the FSA former draft guidance based simulations to 40% in the IPD simulation, the similar outturns would appear to justify the eligibility of the leases with more realistic (i.e. shorter) unexpired terms.*

Table 23: Capital Value and Net Income Changes by Slot Using IPD Lease Criteria

Slot	Capital change, Q2 2007 to Q2 2009, %	Net income change, Q2 2007 to Q2 2009, %	Capital change, Q2 2007 to Q4 2011, %	Net income change, Q2 2007 to Q4 2011, %
Strong	-41.2	3.2	-24.5	4.3
Good	-41.6	3.9	-26.0	5.0
Satisfactory	-42.4	1.8	-31.1	-1.4
Weak	-42.1	-1.3	-33.3	-12.3
All	**-41.9**	**1.4**	**-29.6**	**-3.1**

In this simulation we again 'originate' hypothetical loans that part-amortise at 0.5% per quarter. To meet the stringent criteria for the DSCR constraints, our hypothetical amortising loans must be originated at very low LTVs as a result of the low property yields that were a feature of the market in 2007. The LTVs and ICRs are very similar to those in our previous part-amortising simulation.

Table 24: IPD Simulation Results from Combined Slotting Constraints on LTV & ICR versus Part-Amortising Simulation based on Former FSA Draft Guidance

	Strong	Good	Satisfactory	Weak
LTV IPD Part-Amortising Simulation	37	46	61	65
LTV FSA Part-Amortising Simulation	39	46	63	62
ICR IPD Simulation	2.01	1.67	1.35	1.37
ICR FSA Part-Amortising Simulation	2.01	1.68	1.35	1.35

IPD criteria simulation: Collateral value falling below loan amount

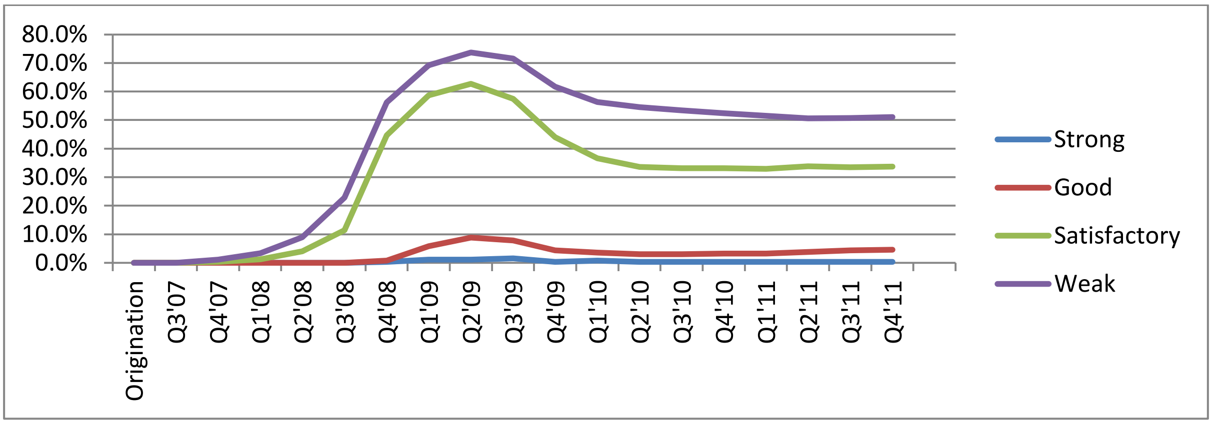
As in our previous simulations, many of our hypothetical loans quickly move into negative equity in the early part of the simulation period. The proportion of Strong loans that exceed their reduced collateral asset values peaks at 1.5% (4 loans) of the enlarged slot in Q3 2009 while the proportion of Good loans in negative equity peaks at 8.8% (44 loans) of their enlarged slot in the same quarter. This compares with our part-amortising simulation based on the former FSA draft guidance in which 1.3% and 5.9% of the respective Strong and Good slots are at peak negative equity in Q2 2009.

Against the sample as a whole, the IPD criteria simulation shows peak defaults for the Strong and Good slots are only 0.1% and 1.3% of all our hypothetical loans. Recall that the equivalent FSA draft guidance based simulation figures for peak defaults on the much more restrictive lease criteria for Strong and Good loans were 0.03% and 0.7% of all loans.

In the Satisfactory and Weak slots of our IPD simulation, negative equity peaks at the much higher levels of 62.8% (519 loans) and 73.7% (1,364 loans) of their respective slots in Q2 2009. Against the sample as a whole this is 15.1% and 39.6% of all the hypothetical loans.

Recall that the equivalent FSA simulation figures for peak defaults on part-amortising loans against the sample as a whole were 3.2% of a much less populated Satisfactory slot and 55% of the Weak slot.

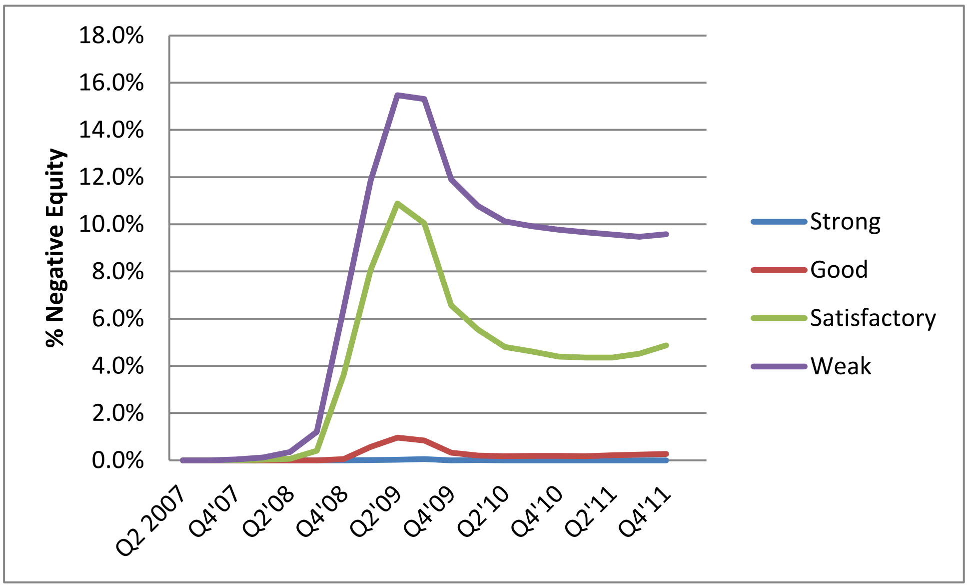
Chart 20: Proportion of IPD criteria loans with LTV>100% in each slot



The proportion of loans that exceed 100% LTV again falls in our simulation as asset values start to recover after Q2 2009. In the initial Strong slot, 3 of the 4 hypothetical loans that defaulted with negative equity at the market low recover some equity by Q2 2010. The number of loans in the other slots with LTVs greater than 100% rapidly declines to end the simulation period at 4.6% of the Good slot (23 loans), 33.7% of the Satisfactory slot (279 loans) and 51.0% of the Weak slot (945 loans).

Analysing negative equity by aggregate current collateral value for our IPD criteria loans at the Q2 2009 market nadir, we see that a negligible proportion of the Strong slot is in negative equity, 1.0% of the Good slot, 10.9% of the Satisfactory slot and 15.5% of the Weak slot. *It is again apparent that the lower value (and probably physically smaller) assets are more prone to negative equity.*

Chart 21: Proportion of negative equity by slot based on current collateral values, IPD lease criteria



Simulation for IPD criteria loans: Net Income falls below interest payments

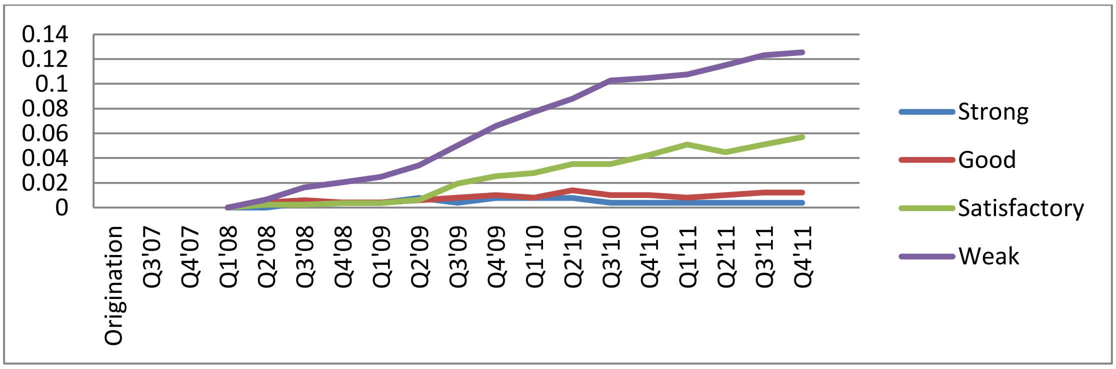
The peak stress in ICR for our hypothetical IPD criteria loans initially qualifying for the Strong slot occurs during the period Q4 2009 - Q2 2010 at 0.8% (2 loans) but by Q3 2010 only one of these loans has an ICR of less than 1.00. The peak stress for the initial Good slot occurs in Q2 2010 when 1.4% (7 loans) have an ICR lower than 1.00 and by the end of the simulation 6 loans (1.2% of the slot) still have income cover of less than 1.00.

In contrast, net incomes generated by the assets in the Satisfactory and Weak slots decline through to the end of the simulation period. The proportion of assets no longer producing enough cash to meet simulated interest payments reaches 5.7% (47 loans) in the Satisfactory slot and 12.5% (232 loans) in the Weak slot by end 2011.

Recall that the peak stress for the FSA former draft guidance part-amortising loan simulation on an ICR basis is 2.5% in the Strong slot at Q4 2009, 1.7% in the Good slot at Q2 2010, 4.0% at Q4 2011 in the Satisfactory slot and 10% in the Weak slot at the end of the simulation in Q4 2011.

The reallocation by lease criteria in the IPD simulation thus results in a distribution of outcomes across the slots similar to the FSA part-amortising results even though the allocation of the loans has changed considerably in all of the slots.

Chart 22: Proportion of hypothetical IPD criteria loans where ICR<1.0 and LTV>100%



Simulation for IPD criteria loans: Net Income falls below debt service

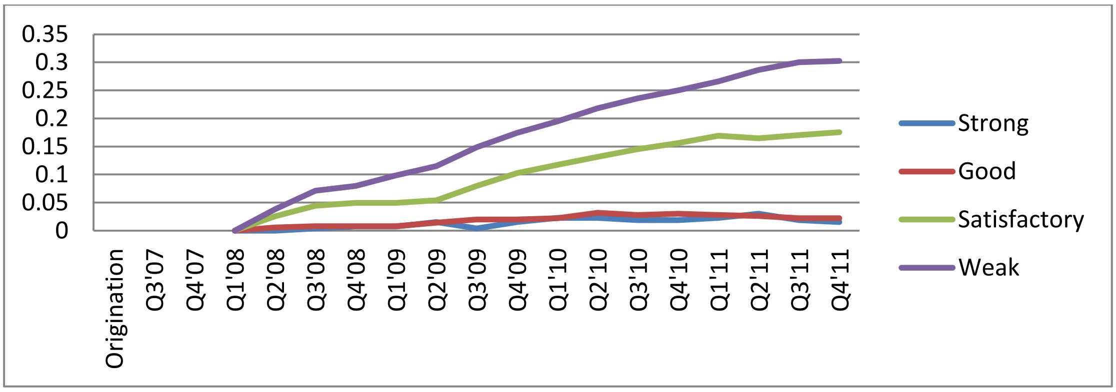
The peak DSCR distress for our hypothetical IPD criteria loans initially qualifying for the Strong slot shows a different pattern than our ICR breaches in this slot. The peak occurs in Q2 2011 at 3.0% (8 loans) but by Q4 2011 four of the eight loans again have a DSCR over 1.00.

The peak stress for the initial Good slot occurs earlier – in Q2 2010 - with 3.2% (16 loans) having a DSCR lower than 1.00. But by the end of the simulation only 11 loans (2.2%) have debt service cover of less than 1.00.

In the Satisfactory and Weak slots, distress continues to increase throughout the simulation period ending with 17.5% (145 Satisfactory loans) and 30.2% (560 Weak loans) unable to generate income greater than interest plus amortisation in Q4 2011.

The above DSCR defaults in the IPD simulation remain broadly similar to those seen in the FSA former draft guidance part-amortising simulation. The combined Strong and Good DSCR defaults are slightly higher using the IPD lease criteria (24 IPD peak defaults versus 17 FSA peak defaults) while the combined Satisfactory and Weak peak defaults are slightly lower (705 IPD peak defaults versus 734 FSA peak defaults).

Chart 23: Proportion of hypothetical IPD criteria loans where DSCR<1.0 and LTV>100%



The resulting equity shortfall for IPD peak DSCR defaults is £919 million while the equity shortfall using the FSA former draft guidance is £948 million.

Write downs

To estimate losses on our hypothetical IPD criteria loans, we again calculate the gap between asset value and loan amount as a proportion of original loan amounts. We add to this an impairment charge of 10% of asset value to simulate the impact of selling into a Weak market.

Table 25: Simulated write downs as at Q2 2009 by slotting category, IPD criteria compared with FSA part-amortising, LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where loan value > collateral value	FSA 0.0% IPD 0.1%	FSA 1.6% IPD 2.1%	FSA 15.0% IPD 15.5%	FSA 16.3% IPD 19.5%
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

In the table above we have compared the hypothetical write downs in Q2 2009 from the IPD and FSA simulations at the bottom of the cycle on the assumption that an LTV greater than 100% triggers possession and sale. Again, it is immediately noticeable that even at the trough of the cycle, the risk weighted capital that would be required for Strong and Good exposures under the slotting criteria is well in excess of the downturn LGD for our hypothetical loans.

In contrast, the risk weight for Satisfactory is less than adequate to provide for downturn LGD if possession and sale is triggered by LTV being in excess of 100% at the cyclical low point. However, the risk weight for Weak slot exposures in our IPD simulation would appear to be approximately in keeping with downturn LGD.

If forbearance is allowed at the bottom of the cycle, then write downs decline as asset values start to recover.

Table 26: Simulated write downs as at Q4 2011 by slotting category, IPD criteria and FSA part-amortising compared, LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where loan value > collateral value	**FSA 0.0%** **IPD 0.0%**	**FSA 0.3%** **IPD 0.7%**	**FSA 4.5%** **IPD 7.9%**	**FSA 9.9%** **IPD 13.1%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

Again we see that the risk weighted capital dictated by slotting greatly exceeds write downs in the Strong and Good slots. Moreover the Weak slot now shows a very large excess of capital and even the Satisfactory slot has a substantial capital cushion.

If we confine possession and sale to loans where LTV is higher than 100% and the ICR is less than 1.0, we find that the risk weighted capital dictated by the slotting method becomes greatly in excess of that required to cover write downs. By the end of our simulation period write downs are greatly reduced in all slots using both former FSA draft guidance and IPD criteria if paying interest is deemed sufficient to exercise forbearance.

Table 27: Simulated write downs as at Q4 2011 by slotting category, IPD criteria and FSA amortising compared, ICR<1.00 and LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where interest > asset income	**FSA 0.0%** **IPD 0.0%**	**FSA 0.1%** **IPD 0.1%**	**FSA 0.7%** **IPD 1.1%**	**FSA 2.1%** **IPD 3.3%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

If forbearance is confined to loans where the DSCR is at least 1.00, write downs increase relative to the ICR example but still remain a very small percentage of the risk weighted capital allocated at origination.

Table 28: Simulated write down as at Q4 2011 by slotting category, IPD criteria and FSA part-amortising compared, DSCR<1.00 and LTV>100% (% original loan value)

% original loan amount	Strong	Good	Satisfactory	Weak
Simulated write downs where debt service > asset income	**FSA 0.0%** **IPD 0.0%**	**FSA 0.2%** **IPD 0.1%**	**FSA 1.6%** **IPD 3.7%**	**FSA 5.1%** **IPD 6.9%**
Risk weighted capital, % of exposure amount	6.3%	8.1%	10.4%	22.5%

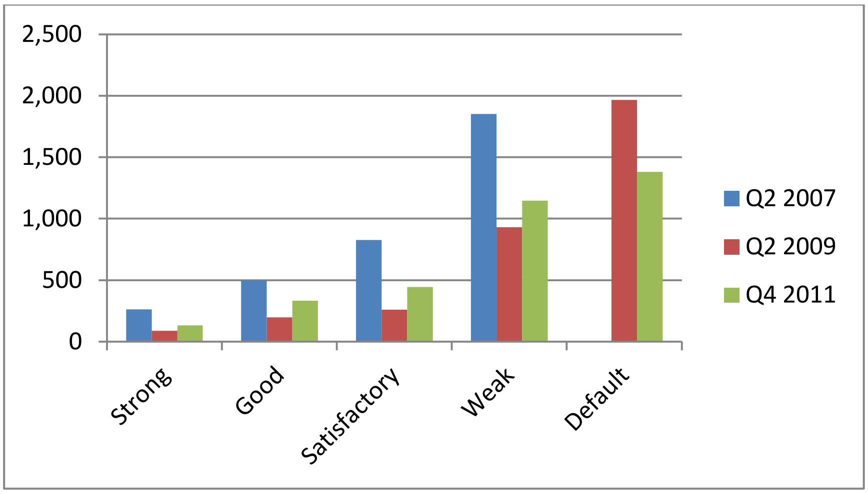
Of course, we cannot lose sight of the need to refinance our part-amortising IPD loans by Q2 2014. However, amortisation will reduce the outstanding value of the loans that have not been declared in default by a further 0.5% per quarter, reducing the refinancing requirement. Nevertheless, a non-negligible equity injection will be needed to refinance the loans in the Satisfactory and Weak slots at their original LTVs in 2014 if asset values do not rise substantially in the interim.

Slot migration

We now change from a 'through the cycle' (TTC) view of risk weighted assets to a 'point in time' (PIT) view where we move the loans in breach of their original criteria to lower slots and increase risk weighted assets. As asset values and net incomes fall over the simulation period, the slotting category for each loan that no longer meets the criteria for its original slot changes.

Change in slotting category by number of IPD criteria loans:

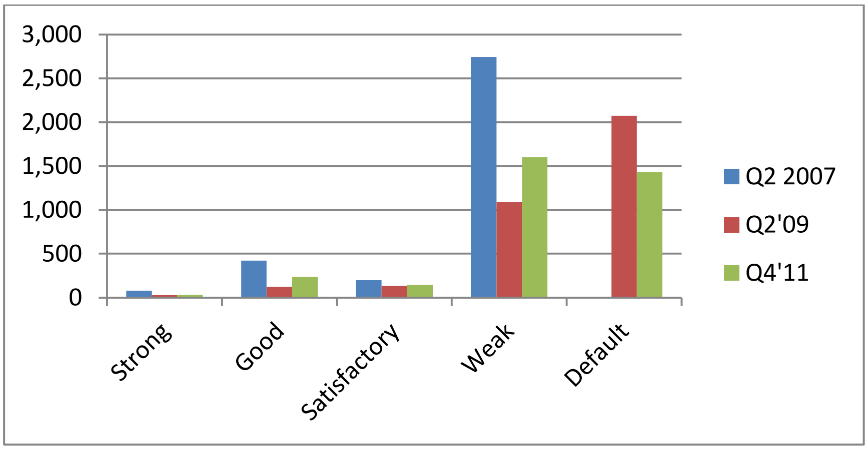
Chart 24: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011, IPD Criteria by number of loans with default when LTV>100%



The IPD slot distribution over time is much changed from the FSA draft guidance simulation equivalent for part-amortising loans (shown again below).

Change in slotting category by number of FSA former draft guidance simulation part-amortising loans:

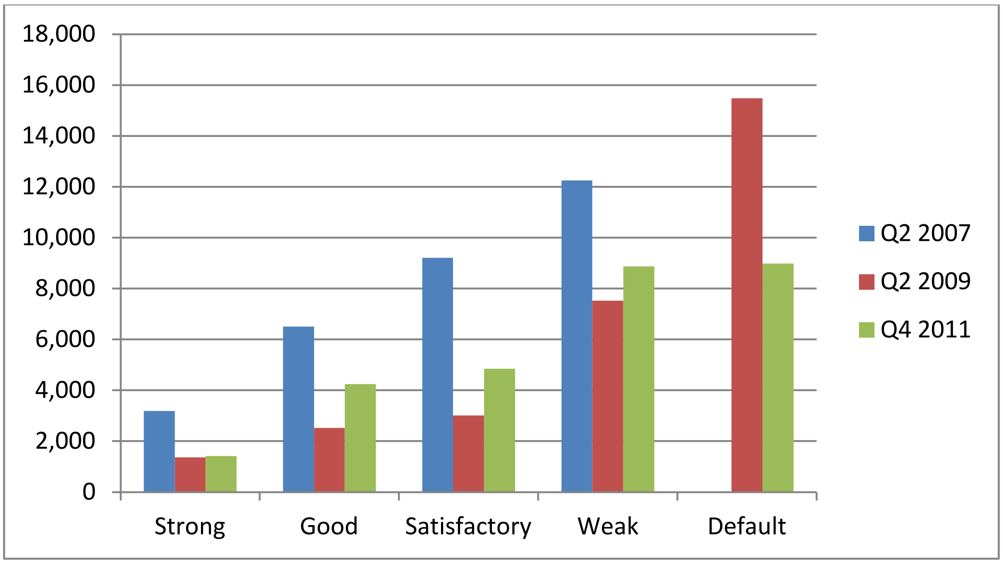
Chart 25: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011, FSA part-amortising by number of loans with default when LTV>100%



If we examine the migration between slots by loan value, we now see a fairly 'well behaved' distribution on the IPD lease criteria as compared with the FSA lease criteria.

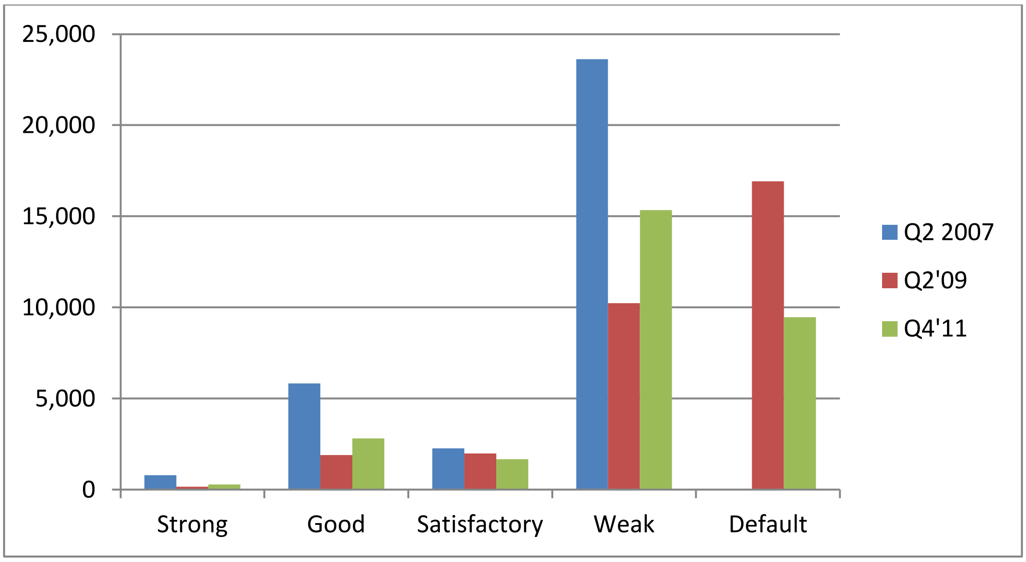
Change in slotting category by value of IPD loans:

Chart 26: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011, IPD criteria by value of loans, with default when LTV> 100%



Change in slotting category by value of part-amortising loans, lease lengths based on FSA former draft guidance:

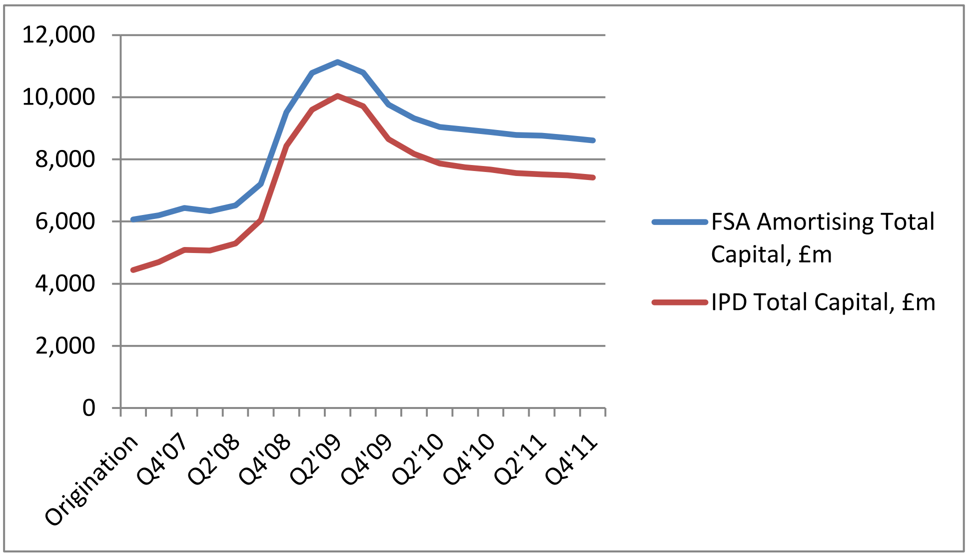
Chart 27: Slot at 'origination' versus simulated slot at Q2 2009 and Q4 2011, FSA former draft guidance by value of loans, with default when LTV> 100%



Using a PIT approach, the overall capital plus provisions (risk weighted capital + EL of 50% for the default slot) required for our hypothetical loan book of IPD criteria loans rises from £4.44 billion in Q2 2007 to a peak of £10.04 billion in Q4 2009 and then declines to £7.24 billion in Q4 2011.

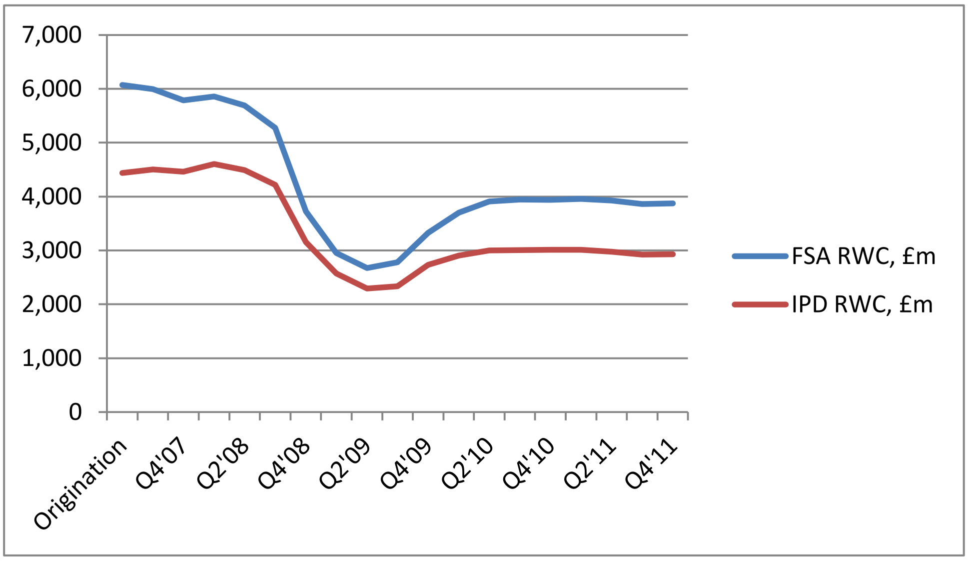
Recall that the equivalent figures for the FSA part-amortising simulation were £6.07 billion in Q2 2007, £11.13 billion in Q2 2009 and £8.6 billion at the end of the simulation.

Chart 28: Simulation Comparison of RWC + EL totals, FSA Part-Amortising Versus IPD Criteria



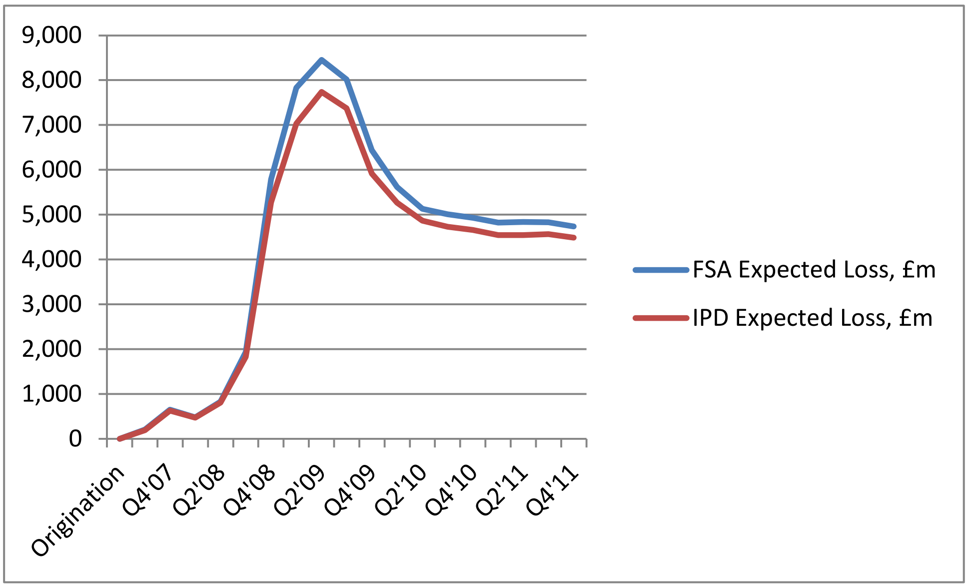
The charts below disaggregate the above data to compare risk weighted capital and expected loss for the FSA amortising and IPD simulations.

Chart 29: Risk Weighted Capital Comparison, FSA Part-Amortising versus IPD criteria



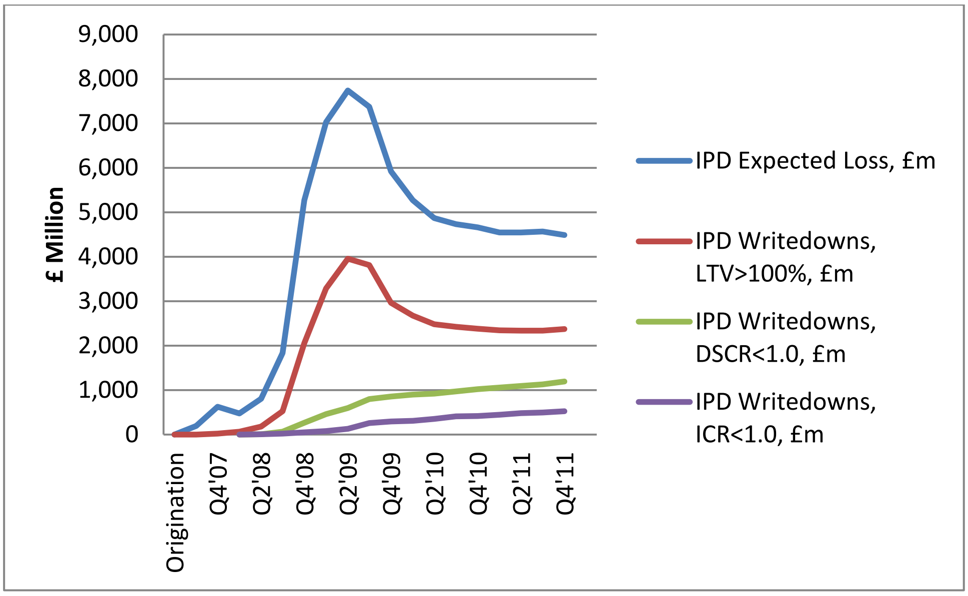
The IPD lease criteria enable more loans to be eligible for the top three slots. This reduces risk weighted capital relative to the FSA criteria. However, if LTV>100% immediately triggers default, then the IPD lease criteria only slightly reduces the mandated 50% EL attached to the Default slot.

Chart 30: Expected Loss Comparison - FSA Part-Amortising versus IPD criteria



The mandatory 50% EL in the default slot which is illustrated in the chart below is greatly in excess of the write downs actually required in our IPD simulation. This excess provisioning is evident even at the worst extreme where all loans with an LTV>100% are subject to possession and sale at the nadir of asset values in Q2 2009.

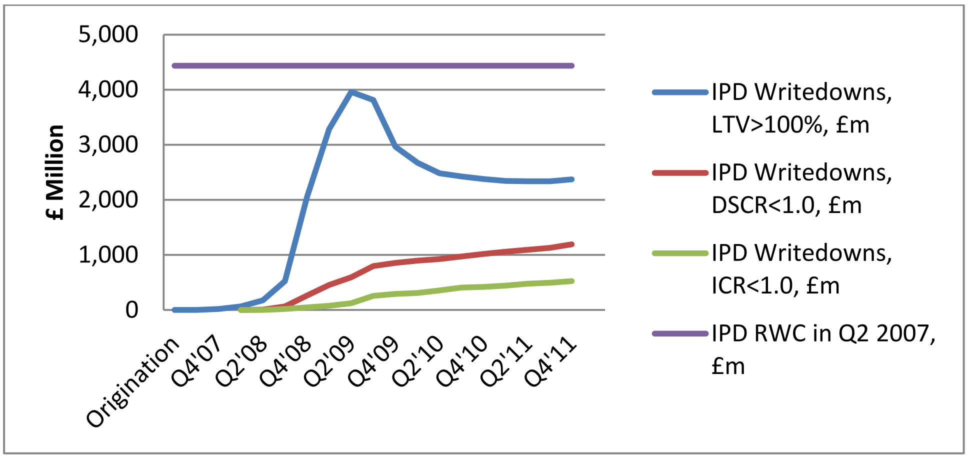
Chart 31: IPD Criteria Simulated Expected Loss Provisions as compared with Write downs



Below we see that the initial risk weighted capital allocated at origination in Q2 2007 is comfortably in excess of write downs, even on the very restrictive basis of possession and sale when LTV is greater than 100% at the nadir of the cycle.

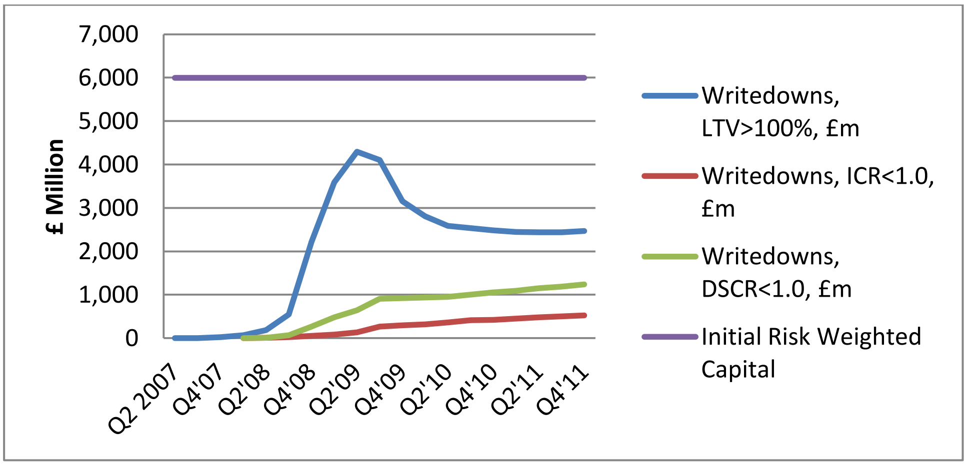
If a more pragmatic approach is taken and forbearance is exercised until the DSCR is less than 1.00, then the amount of risk-weighted capital is considerably in excess of that needed to ride out this leg of the cycle in our IPD criteria loan simulation. This is despite the fact that 40% of the loans by value were placed in the combined Strong and Good slots in the IPD simulation while only 27% were eligible for these slots in the FSA simulation.

Chart 32: Initial Risk Weighted Capital in IPD simulation Compared with Write downs



In the chart below we again show the high excess of risk weighted capital allocated at origination based on the FSA former draft guidance lease criteria compared with write downs. The IPD lease criteria result in aggregate risk weighted capital which is closer to the value of simulated write downs, albeit still excessive.

Chart 33: Initial Risk Weighted Capital Compared with Write downs, FSA former draft guidance simulation for part-amortising loans

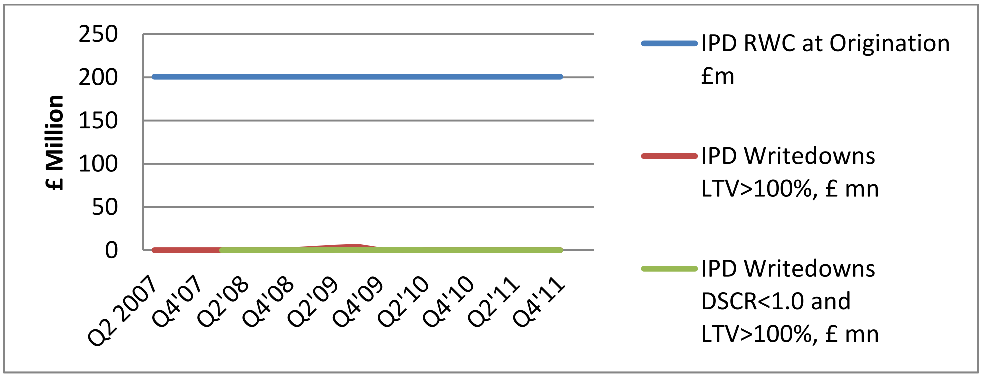


However, even on the IPD lease criteria there is more excess capital in some slots than others as noted previously. In order to more accurately calibrate risk weighted assets, we must first examine each slot.

The strong slot - calibration

As we noted in our analysis earlier, the losses in the Strong slot are negligible in our simulation, regardless of whether we use the IPD lease criteria of >10 years or the FSA former draft guidance of >15 years.

Chart 34: The Excess of RWC on IPD Lease Criterion for the Strong Slot



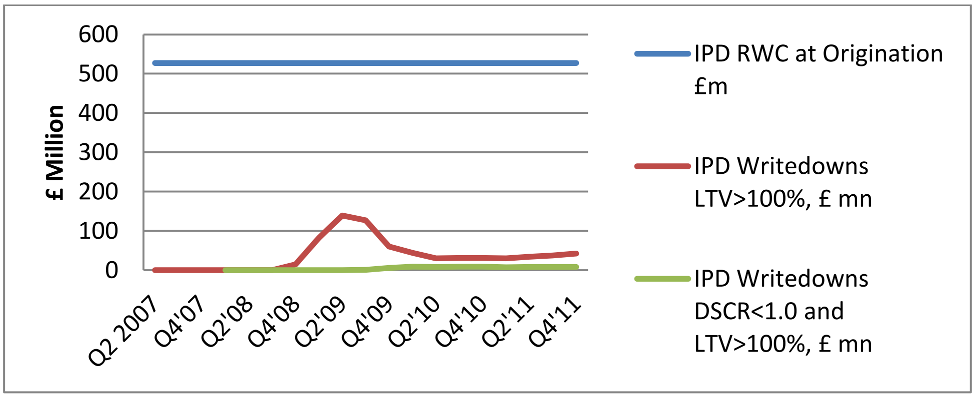
The IPD lease criteria enable more assets to be eligible for the Strong slot than the FSA criteria. Yet the resulting excess RWC for the Strong slot is higher in our IPD simulation than in the FSA simulation. The write downs on loans with the most secure income streams – i.e. greater than 10 years - combined with top quartile asset/location quality do not generate write downs commensurate with the prescribed RWC for this slot.

Since the risk weights for each slot are taken from the original BIS formulation for slotting, the risk weight for the Strong slot cannot be changed. *To get RWC closer to downturn LGD in our simulation, we must clearly loosen the criteria for eligibility to the Strong slot by reducing one or more of the constraints. If we maintain the criteria, the slotting risk weights discourage the underwriting of Strong loans.*

The good slot – calibration

The same issues described above in connection with the Strong slot hold for the Good slot. Although the IPD simulation only requires a lease length of >7.5 years rather than the >10 years in the FSA former draft guidance, RWC is still excessive relative to downturn LGD.

Chart 35: The Excess of RWC on IPD Lease Criterion for the Good Slot



Again, the IPD lease criteria allow more assets to be eligible for the Good slot than the FSA draft criteria, but the resulting excess RWC remains. *Again, in order to get RWC closer to downturn LGD in our simulation we would have to loosen the criteria for eligibility to the Good slot by loosening one or more of the constraints. If we maintain the criteria, the slotting risk weights discourage the underwriting of Good loans.*

The satisfactory slot – calibration

In the Satisfactory slot we are confronted with a different set of issues as regards calibration. In order to determine whether the risk weight is appropriate, we must make a judgement as to whether calibration should be primarily based on a PIT view of the ***value** of the collateral assets* - i.e. the peak negative equity at the nadir of the cycle – or a TTC approach which takes account of the aggregate market tendency toward mean reversion.

If the PIT approach is taken, then the criteria for the Satisfactory slot are too lenient, as evidenced by the results of both the FSA and IPD simulations charted below. However, if a TTC approach is adopted and greater emphasis is placed on debt service capacity than PIT collateral value, then risk weighted capital again appears to be excessive.

Chart 36: RWC on IPD Lease Criterion for the Satisfactory Slot

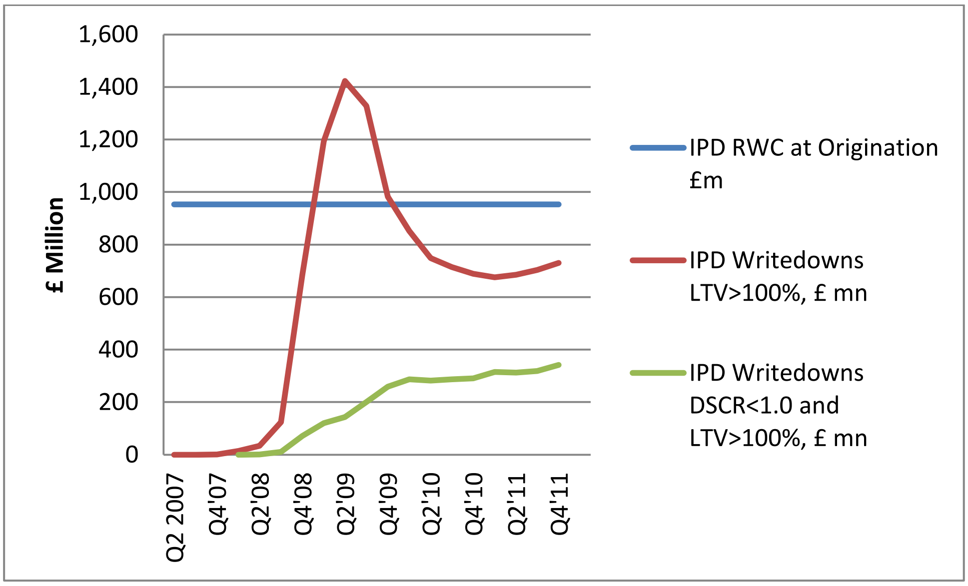
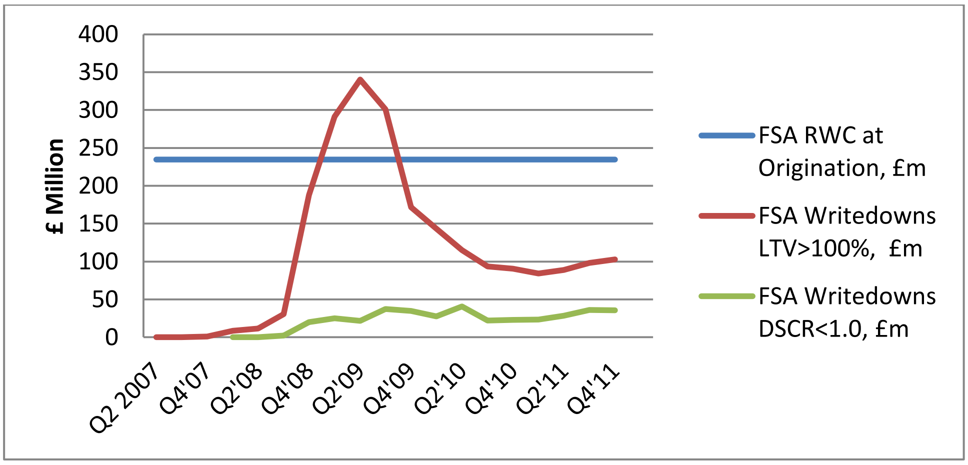


Chart 37: RWC on FSA Former Lease Draft Guidance for the Satisfactory Slot



The dilemmas posed by calibrating the Satisfactory slot highlight the problems inherent in the slotting methodology. The model has the virtue of simplicity but does not have enough methodological content to offer a coherent approach to risk management.

The lower risk weighted capital required per unit of volatility would make lending to the Satisfactory slot the most attractive of the 4 slots if margins were allowed to vary by slot.

The weak slot – calibration

In the Weak slot we see the same issues arising as in the Strong and Good slots with the addition of a further issue – the absence of sufficient slots to differentiate between the wide variety loans which are relegated to this 'lowest bucket'. Some loans are Weak because the collateral assets have a 4th quartile asset/location quality. However, these may have a long lease with a good covenant (e.g. the government). Other loans in this slot may have a top quartile asset/location quality but an unexpired lease term of less than 5 years. These leases may actually have a high probability of renewal or re-letting, albeit on a new lease of less than 10 years if current leasing market norms persist. The very basic nature of slotting affords little flexibility for developing a methodology that would result in calculation of the appropriate risk weighted capital for each asset.

Chart 38: RWC on IPD Lease Criterion for the Weak Slot

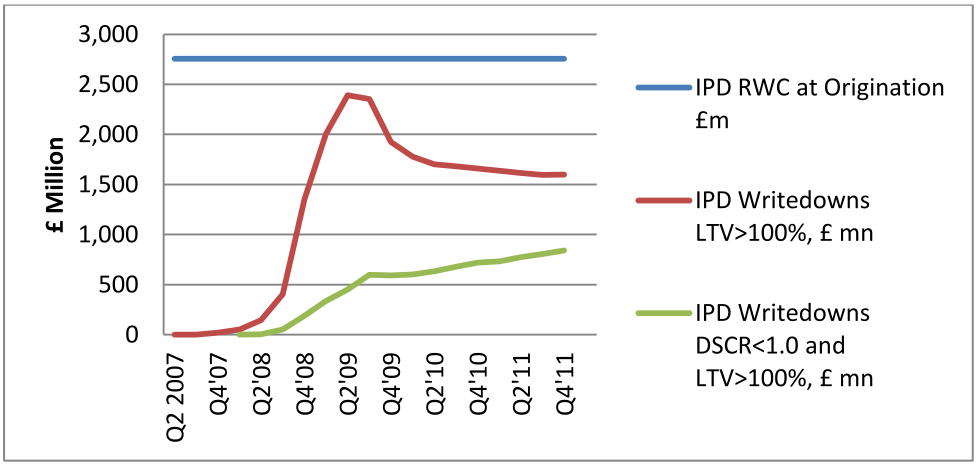
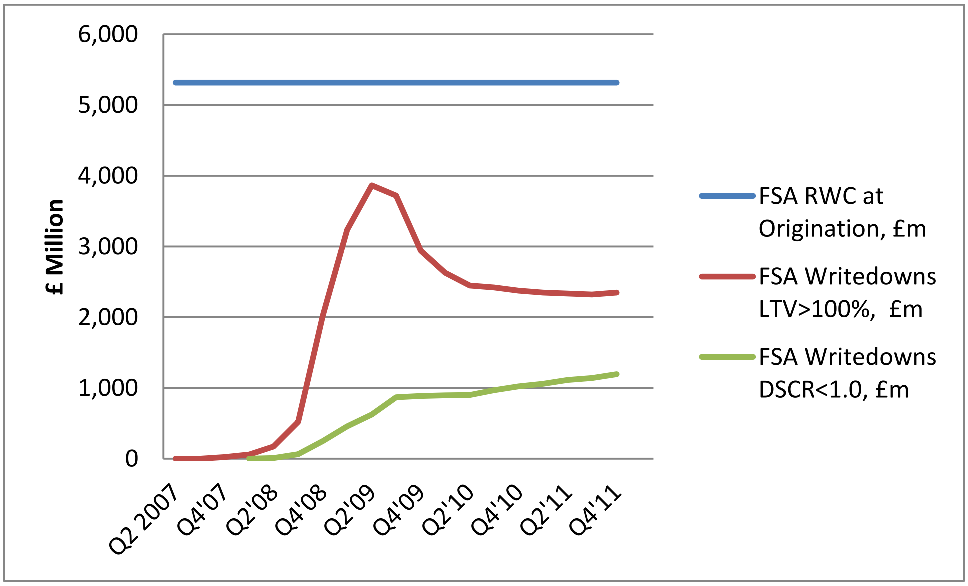


Chart 39: RWC on FSA Former Lease Draft Guidance for the Weak Slot



Conclusions

The former FSA draft guidance for slotting attempted to clarify eligibility for each slot and focus lenders on the factors relating to some of the most important dimensions in IPRE risk. Guidance was given in relation to market risk, asset and location risk, leasing (income security) risk and underwriting risk (LTV, ICR and DSCR). The importance of these risk dimensions has been demonstrated in the above simulations and could be analysed in even greater detail using the IPD data set to further calibrate the results. However, the former draft guidance was not comprehensive. In particular, there was little mention of tenant credit quality and the likelihood of tenant default. Yet tenants are the source of the very cash flows that service IPRE loans. The FSA was previously very keen to see lenders monitor and understand tenant risk so this is a surprising omission.

Rules similar to the former draft guidance on LTV and DSCR could in principle provide the basis for a very useful countercyclical mechanism if adopted as a general guideline provided the issue of financial engineering through use of the swap curve and other derivatives/options can be dealt with. We have demonstrated that the LTV & DSCR are separate mechanisms that independently moderate capital and income risk respectively if financial engineering is not employed to enable increased leverage.

The impact of the DSCR on the maximum LTV would have been a powerful countercyclical force in the recent cycle, enforcing a sharp fall in the average maximum loan-to-value for loans as yields declined during the run up to the market's peak. The use of combined LTV and ICR guidelines alongside an appropriate mechanism to prevent increased leverage through the use of mismatched long maturity swaps and derivatives, could moderate cyclical extremes and prevent repetition of some of the worst excesses in lending.

However, there are number of anomalies in slotting which have surfaced in the three simulations that run contrary to the precepts of modern financial risk management generally and Basel II/III in particular. Principle among them is that the risk weights attached to each slot are not consistent with the simulated loss behaviour of the assets which qualify for those slots. Moreover, the 50% EL required in the default slot is penal relative to write downs if the slotting regime is adopted as described in our simulations.

It is also apparent that the DSCR criteria are not consistent with the ICR criteria in the former FSA draft guidance and imply that stricter underwriting is required for amortising loans than bullet loans. This provides a disincentive to conservative underwriting which in most circumstances would include amortization. At minimum, a level playing field is needed between the loan types and given the risk-reducing attributes of amortisation a robust argument can be made for higher ICR requirements to be required for bullet loans.

As shown in the body of this paper, the former FSA draft guidance was not consistent with leasing norms in the UK and we have demonstrated that lease lengths need not be so restrictive. The IPD lease length simulation provided evidence that more realistic lease lengths can be used without a material increase in write downs.

A fundamental methodological weakness in slotting is that LTV, unexpired lease term, asset quality and ICR/DSCR are given apparent equal weighting. Our simulations show that the LTV at any point in time is dominated by market conditions (systematic risk). This leads to indiscriminate changes in asset values when the market rises or falls rapidly and causes frequent slot migration if a PIT approach to risk weights is required.

The other measures are based on idiosyncratic (specific) risks which are far more indicative of loan servicing capacity on a through the cycle (TTC) basis. These income security factors are crucial in calibrating the specific credit risk of each exposure.

In its present construction, the slotting method does not provide a comprehensive methodology for improved risk management. Instead it may act to discourage IPRE lending altogether and it is likely to discourage low risk lending in particular. Our simulations indicate that slotting as currently construed provides disincentives for underwriting Strong and Good IPRE loans due to high capital requirements relative to downturn LGDs. A retreat from the market is a possible consequence for many lenders if the capital required to underwrite loans is not consistent with risk-adjusted prospective returns.

Further, the incentives embedded in slotting could skew the remaining bank lending toward future exposure concentrations in the higher risk slots. The use of a few crude ‘risk buckets’ has previously lead banks to maximise exposure to the riskiest (highest margin) loans they can financially engineer into each bucket. This was the manner in which Basel I market risk rules were gamed by banks. Moreover, the same perverse incentives may lead the already blurred line between corporate loans and IPRE loans to shift as lenders and their borrowers seek to redefine loans that were once deemed IPRE into the lower RWA designation of ‘corporate loan’. This would rob property risk managers and regulators of valuable information needed to pre-empt a future property crisis.

It has been widely observed that alternative loan sources (insurers, senior debt funds and the shadow banking system) are increasingly willing to take on IPRE exposures. While a diversification in the sources of real estate finance is to be welcomed in many respects, it should also be noted that a number of these new lenders will be unregulated entities and the long term consequences of an expansion in ‘shadow real estate banking’ are unknown.

However, in the near term the aforementioned new entrants' lending capacity is limited. Thus the knock-on consequences from a further reduction in available bank finance for IPRE assets could undermine the values of existing bank exposures and engender negative feedback effects both for other IPRE investors (including pension funds, insurers and REITs) and in the wider economy. This tendency will be accentuated as banks move to Basel III levels of capital. In this study we have used the current EBA required capital level of 9%, but as that level climbs to 10.5% and above, risk weighted capital must rise commensurately in each slot leading to a greater disconnect between specific risk attributes and risk weighted capital.

It is our view that the limited number of slots in the structure of slotting and the absence weightings for each risk factor does not encourage a sufficiently detailed analysis of IPRE risks. As such, the use of slotting as outlined originally by the BIS is a retrograde step in risk management and a potential threat to UK financial stability. It must also be noted that a PIT approach to slotting in which lenders are required to hold more risk weighted capital when real estate markets fall and loans migrate down to weaker slots is inherently pro-cyclical and likely to engender destabilising secondary effects.

However, we do see ample potential for a more a more risk sensitive UK slotting regime that would provide capital cost incentives to lend in a stabilising manner. Such a slotting regime would involve the use of more slots, and each slot would have a risk weight that is more finely calibrated to align with the downturn LGD for exposures with that slot's associated risk profile. Such a regime could operate on a TTC basis and thus avoid pro-cyclicality.

A slotting methodology with appropriately calibrated risk weights would involve some slots with much lower risk weights than the BIS 'Strong' slot and others with much higher risk weights than the BIS 'Weak' slot. There would also be more slots in between Strong and Weak so that the increase in risk weights between slots is not so large as to encourage gaming by lenders. Such a system would be more likely to encourage careful underwriting and reduce the write downs that have characterised real estate cycles historically in the UK and elsewhere.

We hope to provide evidence to underpin this alternative slotting methodology in a second paper. In this paper we would employ further simulations using IPD data in which we would examine the sensitivity of defaults for variations in the LTV, ICR, DSCR, Tenant PD and Unexpired Average Lease Length to quantify the relative influence of each of these dimensions. We will then use these simulations to provide insights into the weightings that should be attached to each risk factor in order to place each exposure in the appropriate slot.

July 31st 2012

Appendix – Data Set

Collateral by broad type & region, June 2007

	No of Properties	Capital Value June 2007	Capital Value Dec 2011
Standard Retail – South East	341	2,944	1,720
Standard Retail – Rest of UK	479	4,016	2,414
Shopping Centres	103	9,953	5,915
Retail Warehouses	454	12,439	6,324
Offices: City	60	1,318	673
Offices: West End	156	5,039	2,547
Offices: Rest of South east	388	4,912	3,368
Offices: Rest of UK	270	3,443	2,343
Industrials: South east	533	6,451	4,381
Industrials: Rest of UK	546	4,134	2,963
Other	112	1,968	1,169
All Property	**3,442**	**56,619**	**33,818**

Collateral lot size distribution, June 2007

	<£1 m	£1m to £2.5m	£2.5m to £5m	£5m to £10m	£10m to £20m	>£20m
Standard Retail – South East	7	53	107	88	62	24
Standard Retail – Rest of UK	12	91	129	127	79	41
Shopping Centres	0	0	2	6	15	80
Retail Warehouses	0	4	36	112	133	169
Offices: City	0	2	3	12	21	22
Offices: West End	0	4	13	23	40	76
Offices: Rest of South east	3	22	75	123	104	61
Offices: Rest of UK	3	14	50	89	70	44
Industrials: South east	2	28	125	168	145	65
Industrials: Rest of UK	10	87	167	170	76	37
Other	3	10	23	17	21	38
All Property	**40**	**315**	**730**	**935**	**766**	**656**

Collateral average unexpired lease term, June 2007

	Top quartile	Median	Lower quartile
Standard Retail – South East	10.7	6.3	3.5
Standard Retail – Rest of UK	10.6	6.6	3.8
Shopping Centres	11.4	8.2	6.4
Retail Warehouses	13.8	11.3	8.4
Offices: City	5.3	3.6	2.2
Offices: West End	6.6	4.7	2.8
Offices: Rest of South east	6.7	4.1	2.8
Offices: Rest of UK	7.2	4.8	2.9
Industrials: South east	6.9	4.7	3.1
Industrials: Rest of UK	8.6	4.4	2.8
Other	18.4	15.9	14.0
All Property	**10.4**	**5.8**	**3.4**

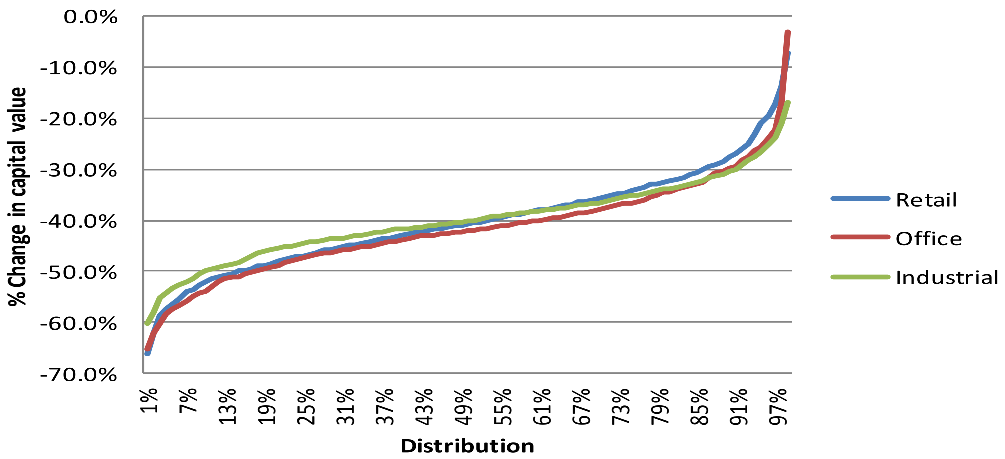
Distribution of change in capital value, June 2007 to June 2009, %

	Top quartile	Median	Lower quartile
Standard Retail – South East	-29.3	-35.4	-40.5
Standard Retail – Rest of UK	-32.6	-38.0	-44.0
Shopping Centres	-37.8	-43.5	-50.5
Retail Warehouses	-41.7	-45.8	-50.3
Offices: City	-40.5	-47.1	-52.1
Offices: West End	-36.9	-43.2	-49.1
Offices: Rest of South east	-37.0	-42.0	-46.8
Offices: Rest of UK	-35.0	-40.9	-45.2
Industrials: South east	-35.8	-40.4	-44.9
Industrials: Rest of UK	-34.9	-39.9	-44.2
Other	-27.9	-36.2	-40.9
All Property	**-35.0**	**-40.7**	**-46.0**

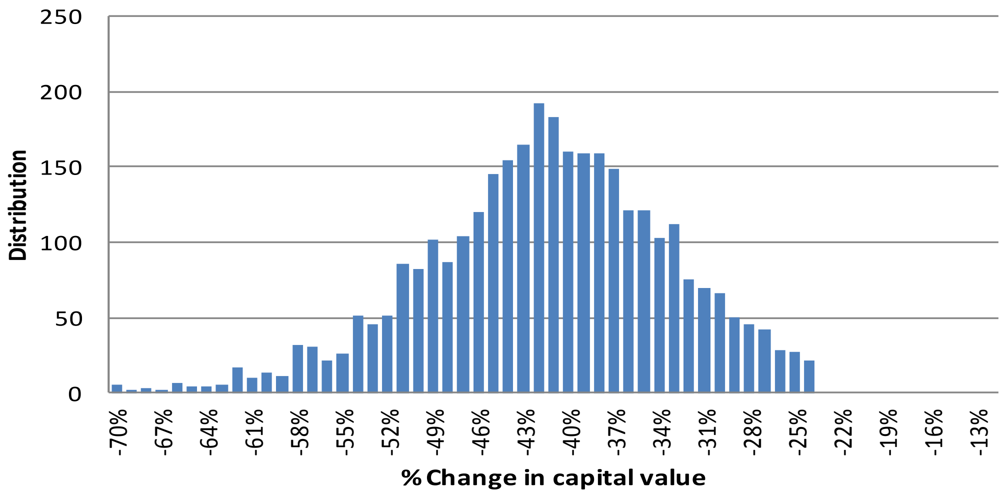
Distribution of change in income, June 2007 to December 2011, %

	Top quartile	Median	Lower quartile
Standard Retail – South East	16.5	0.8	-6.9
Standard Retail – Rest of UK	6.6	0.0	-16.0
Shopping Centres	4.3	-3.2	-12.8
Retail Warehouses	11.8	0.9	-3.7
Offices: City	36.5	1.2	-23.9
Offices: West End	22.8	1.7	-16.3
Offices: Rest of South east	1.1	0.0	-37.7
Offices: Rest of UK	4.0	0.0	-28.8
Industrials: South east	6.8	0.0	-17.7
Industrials: Rest of UK	7.5	0.0	-17.0
Other	15.1	8.2	0.0
All Property	**9.3**	**0.0**	**-15.5**

Distribution of change in capital value, June 2007 to December 2011



Distribution of change in capital value, June 2007 to December 2011, %



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