MIAC Perspectives

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www.MIAC*Analytics*.com
521 Fifth Avenue, Suite 900
New York, NY 10175

MIAC CORE™: Non-Agency Loss Model

Introduction

The **MIAC CORE™** is the name of MIAC's new class of behavioral models for all asset classes including residential non-agency whole loans/MSRs, residential agency whole loans/MSRs, commercial whole loans, auto loans, credit cards, unsecured consumer loans, etc. Each of these models has two components – a Voluntary Prepayment Model and a Loss Model. Each of these model components has been built to measure their **CO**nditional **RE**sponse to at least five macro factors required for bank stress testing. Each of these model components is the CORE of MIAC's cash flow behavior for asset valuation, balance sheet, capital requirements and net interest income simulations.

The MIAC CORE - Non-agency Loss Model ("NALM") was developed to address the growing needs of market participants to understand the dynamics of the credit behavioral response to changes in important macro economic factors. With the arrival of CCAR and DFAST, not only will financial institutions need asset and enterprise-specific behavioral models, that have been calibrated to respond to requisite macro factors, but asset pricing methods adequately robust to incorporate these macro factors in their underlying pricing model and, by extension, into their forecasted cash flows.

The very significant contribution of "NALM" is the granularity of the cash flow simulation process within MIAC's software suite, **Vision™**. This unparalleled level of specification is possible because the dataset, being so large, allows for granular transition roll rates to be measured with statistical confidence. Thus granular delinquency, foreclosure, curing, and REO simulation processes will improve the modeling of delinquent payment advances costs for mortgage servicers and will also improve the near-term forecasts for expected REO liquidations. Additionally, allowance for Loan and Lease Loss (ALLL) and SOP 03-3 accounting challenges can be addressed with a new level of accuracy.

The MIAC Non-agency Loss Model was built with two very large datasets. The first dataset is the entire population of loans that were used as collateral for residential MBS private-label (non-GSE) bonds. This population included over 23 million loans, nearly one billion loan monthly transactions, and starts in the middle of the 1990s. The second dataset is culled from five of the largest Puerto Rican banks. This dataset starts in the early 2000s and includes nearly 1 million unique loans. Puerto Rican borrowers display unique payment behaviors and the MIAC NALM is able to measure this behavior accurately. Utilizing this large dataset, MIAC can measure the asset specific, geographic specific, and institution specific behavioral response to the requisite macro factors – HPI, CPI, GDP, unemployment, and interest rates. In addition, the borrower behavior while in foreclosure, including the cure rates, REO entry rates, the timing of REO entry and the timing for Cure from FCL, are all precisely measured.

New Approach to Modeling Mortgage Losses

The primary goal of a mortgage loss model is to forecast, as precisely and consistently, the frequency, timing and severity of mortgage loss behavior. Historically, when modelers approached this problem, they utilized historical regression behavior thereby needing large datasets to build and calibrate their regression models. However, the availability and numerical size of actual REO data was difficult to obtain and much smaller than

foreclosure entry data. So rather than regress loan attributes to REO completion rates, the modeler regressed loan attributes to FCL Entry rates, which was a larger data set than REO completion rates. A separate model was built to measure the time from foreclose entry to REO entry and ultimately REO completion or liquidation. The sample size of foreclosure entry was larger and thus enabled the models to have better statistical significance than if the process where REO completion was directly regressed. Wall Street dealers, rating agencies, bank research departments, and independent vendors shared this approach. And once a loan entered foreclosure, there was a high probability that the loan would ultimately enter and complete REO. Typically, only a modest percent would cure from foreclosure, so measuring and regressing FCL Entry was seen as a more defensible approach.

However, when MIAC approached this problem with a very large dataset and re-examines the trade-offs, MIAC choose a newer method that is more robust. D30 Entry events are far more frequent than FCL Entry events. FCL Entry events are far more frequent than REO Completion events. If one regresses the key loan attributes against foreclosure entry, the results of the statistical correlations are unimpressive (R-squares in the 0.2s). The statistical correlations improve dramatically, however, when the D30 Entry status of a loan is included in the independent parameters. The statistical correlations improve approximately four times (high 0.8's) when delinquency status is included. Moreover, the delinquency status dominates the regression outcome - to the tune of six times. This has dramatic consequences for mortgage loss modeling.

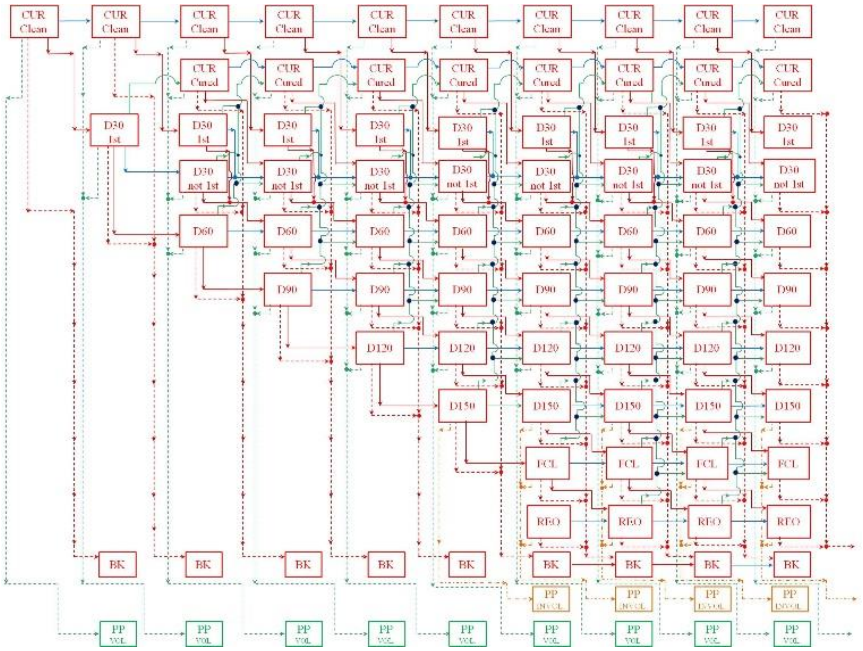
Therefore, in building a regression model to forecast the frequency and timing of delinquency 30 days (D30 entry), using the key loan attributes and the macro factors, the correlations are statistically significant and dramatically better than foreclosure entry. And very importantly, the transition roll rates have a surprising level of stability provided that key loan level attributes are included. The transition roll rates do have a dependency on some of the loan attributes, but these are identified. This new approach to modeling D30 entry and then modeling "loan sector"-specific delinquency transition roll rates can improve the loss model frequency forecasting accuracy by more than four times over the traditional methods. This is a game changer for mortgage market participants.

What about the Roll Rate Transitions?

With very large datasets, modelers can measure the components of the roll rate transitions with more precision and with statistical significance. Because MIAC *Analytics™* software is used to model more residential whole loans than any other analytical solution in the industry, we choose to increase the granularity of the cash flow simulation process to include every measurable transition roll rate that could be measured with statistical significance. A challenging modeling and model validation quest that we have achieved.

Figure 1 charts transition roll rates that can be measured with statistical significance and are included in the MIAC *Analytics*™ cash flow process.

Figure 1: Transition Roll Rates



Source: Mortgage Industry Advisory Corporation

What about the timing?

The model contains several timing curves. The first curve shows the timing of when a loan will enter D30. Specifically, MIAC segregates the population of current and performing loans into two categories – Clean Current and Dirty Current. Clean Current loans are loans that have a "current" delinquency status (e.g. not delinquent) and have never been delinquent. Dirty Current are loans that presently have a "current" delinquency status but have, at one point in their history, been delinquent. The Dirty Current loans have a distinctly different D30 entry frequency model and a distinctly different timing curve from the Clean Current loans. The propensity for a loan to enter D30 is dramatically higher for a loan that has previously been delinquent. Not surprisingly, the timing of their D30 is distinct from the Clean Current loans.

For those populations of loans that MIAC has collected and normalized the loan performance data, MIAC segregates discrete databases of loans that have been 'EverDelinquent', 'EverBankrupt', or 'EverFCL'. Because of the statistical significance of having this data, MIAC refers to this segregation as our 'Data Enrichment Process'.

The other timing curves are loan sector, geographic and servicer specific. These three curves are "Time_To_Enter_REO", "Time_To_Cure_Exit_FCL", and "Time_IN_REO". The "Time_To_Enter_REO" curves are of course unique for loan sector, state and servicer. After a loan enters foreclosure, some percentage will ultimately exit foreclosure and enter REO. Likewise, another percentage will ultimately exit foreclosure and cure. There are many possible delinquency states that the cured loans will enter, including bankruptcy. And those remaining loans will continue in foreclosure. The timing of when the loans leave FCL to enter REO is governed by the "Time_To_Enter_REO" curves. The timing of when the loans leave foreclosure to cure or enter bankruptcy is governed by the "Time_To_Cure_Exit_FCL" curves. For each sector, state and servicer there is a Time_To_Enter_REO. The software uses the appropriate curve. Because foreclosure timelines are distinct by sector, state and servicer, MIAC constructed these "Time_To_Cure_Exit_FCL" curves to also be unique by each loan sector, state and servicer combination.

Model Validation

How is a MIAC client assured that the specifics of model functionality and the MIAC *Analytics*™ software is operating in a manner consistent with the underlying statistical model? MIAC has built model validation tools to enable both software licensing clients as well as asset valuation clients to engage MIAC analysts in the details and defense of the model behavior. Over the past several years, the users of financial models have been required to demonstrate that they understand not only the implications of the models but also the mechanics and methods of their financial models. MIAC embraces this approach and has a long-standing practice of working with clients to open up the underlying black-box pricing models and work collaboratively toward comprehensive model comprehension.

Conclusion

The MIAC CORE - Non-agency Loss Model has several innovations and improvements from prior mortgage industry tools. In this article we have focused only on the high-level summary of the key innovations and improvements. The major innovations are: migrating the frequency simulation of D30 to dramatically improve the predictive ability of the model; increasing the granularity of the transition roll rates; and increasing the granularity and specification of timing in the foreclosure process. The details of the model behavior will be shared collaboratively with our clients as we mutually address mortgage valuation and balance sheet management challenges.

***By: Dr. Glenn Mandigo**, SVP, Borrower Analytics*
***Joseph Furlong**, SVP, Borrower Analytics*

Mortgage Servicing Rights Market Update

Market Overview

The Mortgage Servicing Market experienced a significant drop in the number of discrete bulk transactions for the first half of 2015 versus the first half of 2014. However, due to several large portfolio sales by Non-Banks and other Regional Institutions, the actual UPB that changed hands was larger than the first half of 2014. Much of the decline in volume of completed transactions was due to the overall price weakness in the market for both conventional and government portfolios. Prepayment volatility and regulatory uncertainty regarding new capital rules continued to wreak havoc during the entire first quarter where the spread between the sellers' cost basis and market clearing levels was at its widest point in over two years. This weakness affected both large and small portfolios alike. Further complicating matters was the decline in prices which led to MSR impairments taken by several of the large buyers of MSRs during January and February. Fortunately for market participants, cash flows from new originations continued to be strong, allowing sellers to hold off on executing deals.

The second quarter showed some price improvement but numerous offerings were not completed due to the prices bid vs. the seller's expectations. Prepayment volatility was still a factor along with a fair amount of market uncertainty as to when or if the Fed would increase rates. With the bulk market temporarily stalled-out, the sell side looked to the flow market to meet MSR liquidity needs. Prices remained firm for co-issuance flow transactions, especially the larger volume conventional offerings, where several new buyers entered the market.

Supply

MSR Sellers in Q1 and Q2 2015 were a very diverse group with varying degrees of needs. Top of the list from an MSR transaction size perspective, were those firms with strategic corporate initiatives and those with Basel III capital constraints. In addition, several middle-tier banks sold large (over $20 billion) bulk MSR portfolios which were comprised of both Agency and GNMA collateral. There was an abundance of mortgage bankers that were hoping to reduce their MSR exposure or servicing operational burdens while others were sellers for cash flow needs.

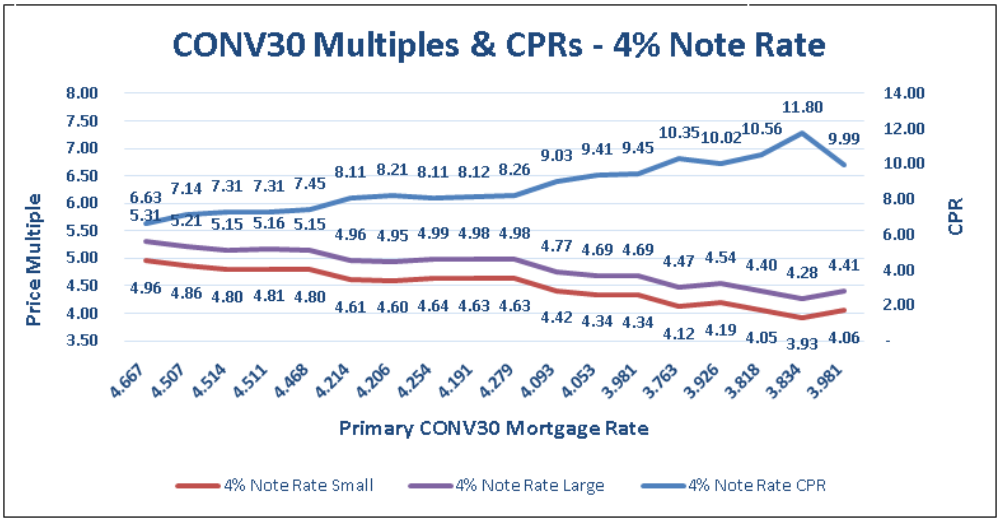
Demand

Prevailing market and regulatory conditions in the first half of 2015 shifted the market from a "Sellers" market to more of a "Buyers" market. Strong MSR liquidity in 2014 was led by numerous Non-Bank servicers whose strong demand led to higher execution prices for both the MSR bulk and flow markets. In 2015, these same firms have been unnerved by the prepayment volatility and the poor overall ROI performance of the MSR asset. They want to grow their portfolios but were much more conservative in their pricing in the first half of 2015. Demand was strongest for very sizable portfolios that were strategic acquisitions that then moved the needle in the buyer's current servicing operations. Demand was strongest for the large, low coupon FNMA/FHLMC portfolios over $1 billion in size, but there was a significant drop in the number of bidders for most offerings. Fewer buyers, which MIAC attributes to prevailing market conditions, resulted in an overall reluctance to get into bidding wars, which was not the case in 2014. Large portfolios of newer vintage GNMA have had some modest, patchy demand. Smaller portfolios of $50 - $400 million continue to have a very spotty buyer interest, where most of the bid prices were below a sellers' book basis. There was weakness for servicing portfolios with large concentrations of VA IRRLS, Manufactured housing loans, Reverse loans, FHA Streamlines, USDA, FHA 203k, and low FICO loans.

Values

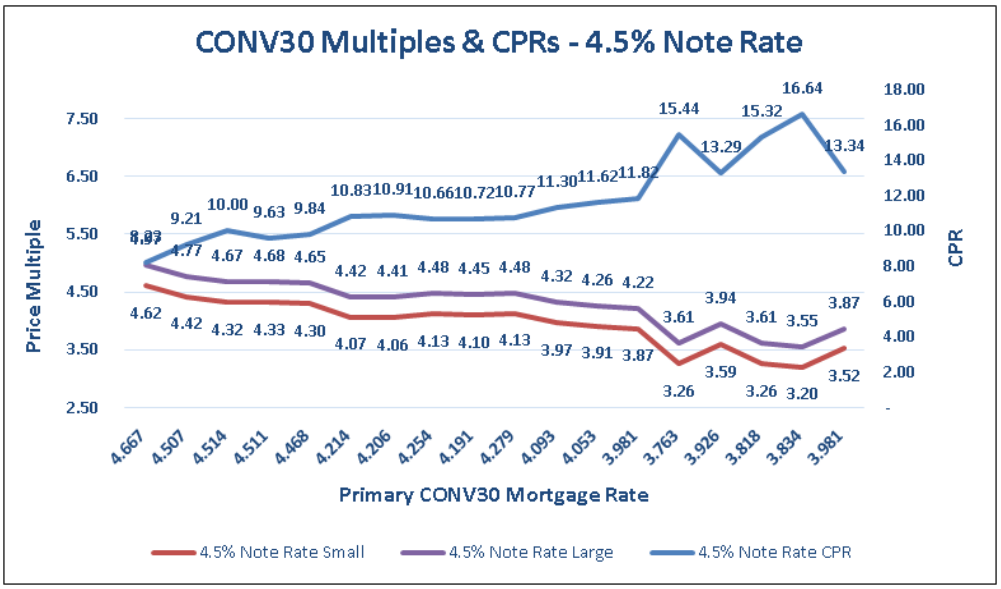
In the most recent period, numerous factors align to affect market demand including Basel III, the FHA MIP adjustment, and to a lesser extent the Ginnie Mae Prepay Interest impact. However, very little will impact the demand for legacy MSR's more than a steady decline in mortgage rates. As illustrated in the following tables which depict MIAC's nGSAs (New Generic Servicing Assets), the 1Q decline in benchmark mortgage rates heavily influence "Newly Originated" Conventional 30 MSR values due to a steady increase in modeled CPR's.

Figure 1: Conventional 30yr Multiples & CPRs – 4% Note Rate



Source: Mortgage Industry Advisory Corporation

Figure 2: Conventional 30yr Multiples & CPRs – 4.5% Note Rate



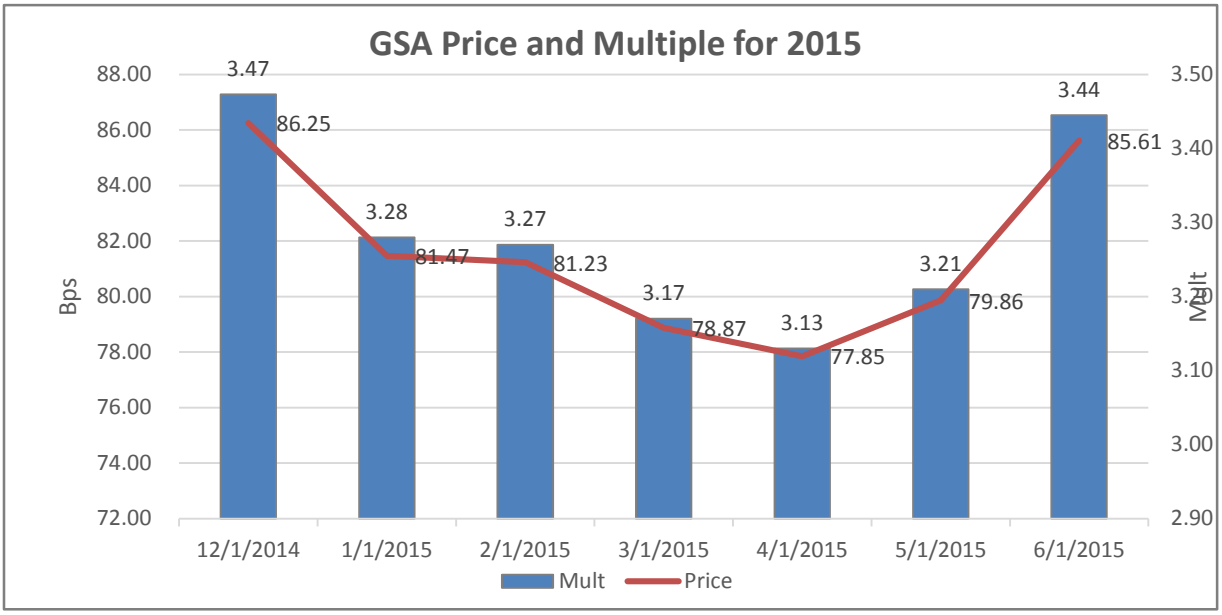
Source: Mortgage Industry Advisory Corporation

As illustrated in Figure 1 and 2, value is still heavily influenced by the size of the portfolio being transacted and the Net Worth of the Seller. This is effected by numerous Buyers increasingly demanding higher Seller Net Worth sufficient to support contractual "Reps and Warrants".

MIAC's Monthly GSA Data Set

As presented in Figure 3, the chart displays results that were derived from MIAC's Generic Servicing Asset data set. The GSAs™ are representative of MSR assets whose characteristics such as pass-through rate, issue year, etc. are consistent with the cohorts utilized by MIAC in preparing its Mortgage Industry Medians (MIMs) data set of dealer consensus prepayment projections. Ultimately, MIAC analyzes a broad group of Generic Servicing Assets that collectively simulate the agency market cohorts as a whole. Utilizing data from recent MSR transactions, ongoing client dialogue, advanced MIAC behavioral models and industry surveys, GSA values are designed to reflect what a fair buyer would pay for a similar asset separated into dealer consensus-like product cohorts of no less than $1bln if offered in the marketplace today. As depicted in the following charts and despite other market influencing variables, interest rate volatility and the resulting CPR speeds remains the largest drivers of MSR values. Only now that rates have begun to increase are we observing values in excess of the levels set in March and April of this year.

Figure 3: GSA Price and Multiple for 2015



Source: Mortgage Industry Advisory Corporation

Figure 4: GSA Pricing by Product

MIAC GSA's

MIAC Analytical Solutions for the Financial Industry

GSA Pricing by Product (MS Access Backend)

Analyst Notes: Period Over Period Price Change

	Pricing Dates	CMS 2Y	CMS 5Y	CMS 10Y	2Y/10Y	FN15 PMR	FN15 CCY	FN30 PMR	FN30 CCY	FN30/10Y	GN30 PMR	GN30 CCY	HY51 PMR	1x10 Swaption
Current Date	6/30/2015	0.8930	1.7660	2.4435	1.5505	3.3875	2.2760	4.2044	3.0690	0.6255	4.0694	2.9020	3.1571	31.83
Previous Date	1/2/2015	0.8960	1.7460	2.2400	1.3440	3.3062	2.0200	3.9792	2.7700	0.5300	3.7973	2.6470	3.4036	31.76
	Change (bps)	(0.30)	2.00	20.35	20.65	8.13	25.60	22.52	29.90	9.55	27.22	25.50	(24.65)	0.07

GSA's

ProductID	Total UPB	Number of Loans	Avg Loan Size	WAC	Net Serv Fee(bps)	Price Prev (bps)	Price Current (bps)	Price Change (bps)	Serv Multiple Previous	Serv Multiple Current	Multiple Change	% Price Change
CONV_10/1	1,000,000,000	5,000	200,000	3.375	25.00	77.42	77.78	0.36	3.10	3.11	0.01	0.47%
CONV_3/1	1,000,000,000	4,651	215,008	3.000	25.00	59.24	60.62	1.38	2.37	2.42	0.06	2.34%
CONV_5/1	1,000,000,000	4,082	244,978	3.125	25.00	68.22	69.20	0.98	2.73	2.77	0.04	1.44%
CONV_7/1	1,000,000,000	3,636	275,028	3.250	25.00	74.91	75.91	1.00	3.00	3.04	0.04	1.34%
CONV15	175,224,000,000	1,591,210	110,120	3.500	25.00	71.20	69.85	-1.35	2.85	2.79	-0.05	-1.90%
CONV30	1,223,831,000,000	6,706,787	182,476	4.688	25.00	95.26	94.17	-1.09	3.81	3.77	-0.04	-1.15%
GNMA_3/1	1,000,000,000	4,348	229,991	3.125	19.00	49.80	48.43	-1.37	2.62	2.55	-0.07	-2.76%
GNMA_5/1	1,000,000,000	3,846	260,010	3.125	19.00	52.14	53.02	0.88	2.74	2.79	0.05	1.70%
GNMA15	5,387,800,000	35,333	152,486	3.317	19.00	54.47	54.35	-0.12	2.87	2.86	-0.01	-0.23%
GNMA30	922,427,000,000	5,560,562	165,887	4.335	26.37	77.47	72.39	-5.08	3.14	2.94	-0.21	-6.56%
JUMBO30	4,000,000,000	5,756	694,927	4.142	25.00	90.31	90.79	0.48	3.61	3.63	0.02	0.54%
GSA Total	**2,336,869,800,000**	**13,925,211**	**167,816**	**4.175**	**25.18**	**86.25**	**83.57**	**-2.68**	**3.47**	**3.36**	**-0.11**	**-3.11%**

Portfolio Name: MIAC GSA's Application Name:

Source: Mortgage Industry Advisory Corporation

Mortgage Delinquencies

The delinquency rate for mortgage loans on one-to-four-unit residential properties has been steadily improving and, according to the MBA, now sits at a seasonally adjusted rate of 5.54%. As illustrated in the following chart, the percentage of loans that are 30, 60, or 90 days delinquent has been steadily improving since hitting the high mark of 10.06% set in March 2010. The delinquency rate includes loans that are 30 or more days past due, but does not incorporate loans in foreclosure.

A significant caveat to conclusions drawn from Figures 5 through 7, without specific cohorts and well defined attribution, these graphs are only appropriate for a big-picture view of delinquencies.

Figure 5: MBA Mortgage Delinquencies

	Curr Value	Curr Date	Prev Value	Prev Date	% Change
MBA Mortgage Delinquent	5.54	03/15	5.68	12/14	(2.46)
MBA Mortgage Foreclosure	2.22	03/15	2.27	12/14	(2.20)
MBA Mortgage Prime	3.18	03/15	3.25	12/14	(2.15)
MBA Mortgage Prime FRM	2.94	03/15	2.97	12/14	(1.01)
MBA Mortgage Prime ARM	4.61	03/15	4.77	12/14	(3.35)
MBA Mortgage Subprime	17.60	03/15	18.50	12/14	(4.86)
MBA MortgageSubprime30	7.14	03/15	7.37	12/14	(3.12)
MBA Mortgage Subprime60	3.18	03/15	3.24	12/14	(1.85)
MBA Mortgage Subprime90	7.28	03/15	7.89	12/14	(7.73)
MBA Mortgage SubprimeFC	8.96	03/15	9.63	12/14	(6.96)
MBA Mortgage Subprime FRM	17.29	03/15	17.60	12/14	(1.76)
MBA Mortgage Subprime ARM	18.23	03/15	19.63	12/14	(7.13)

Figure 6: 30/60/90 Delinquencies as Percent of Total Loans

Source: Mortgage Bankers Association

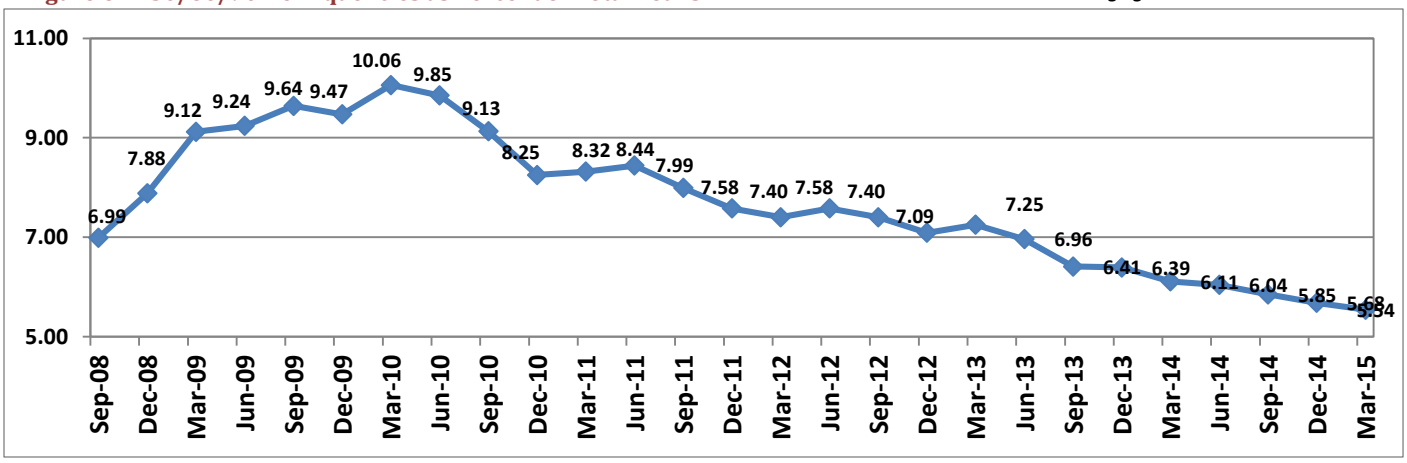
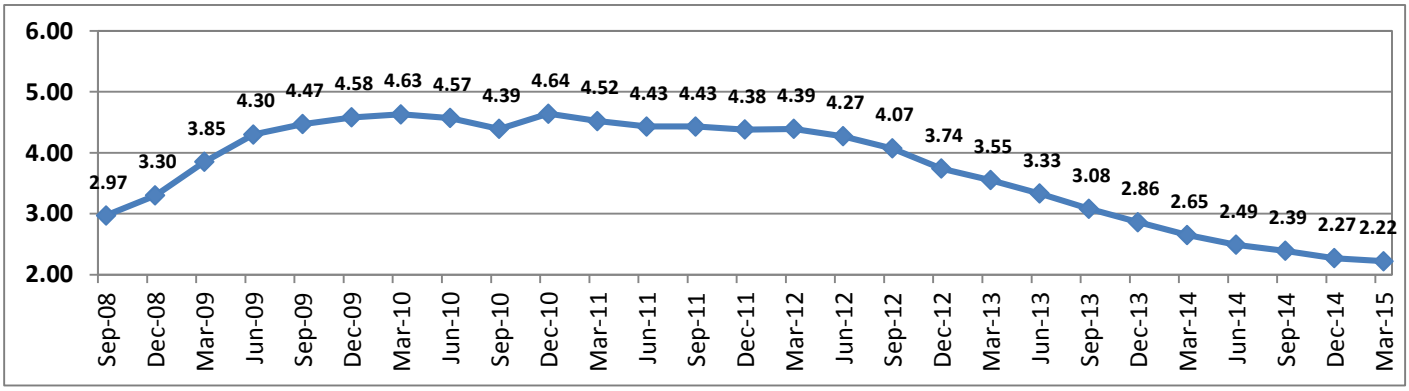


Figure 7: Foreclosure as Percent of Total Loans

Source: Bloomberg

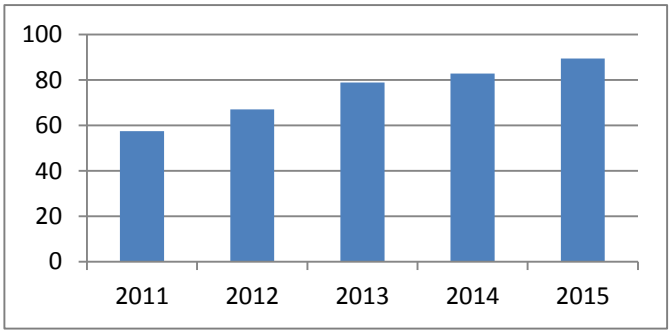


Source: Bloomberg

As you can see in Figure 7, foreclosures as a percentage of total loans outstanding continue to improve. This has resulted in steady improvement in portfolio performance and improved servicing economics. It has also resulted in downsizing at numerous financial institutions who have increased staffing to accommodate record levels of foreclosure activity.

As the ever changing regulatory environment continues to effect servicing cost, one method originators "may" use to boost profitability is to increase rates and/or upfront originations costs. While the competitive nature of this business may prevent such an occurrence from happening overnight, one thing is certain and that is buyers need a financial incentive to service assets no matter the regulatory environment. According to the MBA, between 2008 and 2013 the cost to service a performing loan increased from $59 to $156 per year. Simply analyzing the mean primary/secondary spread (see caption) would suggest that, as an industry, primary-secondary spreads are being artificially widened at least partly in an effort to offset higher costs to service while still achieving targeted ROI's.

Figure 8: MEAN 5-YR Spread Freddie Mac 30 YR Primary vs. Freddie Gold Secondary



Source: Bloomberg

Mortgage Market Volatility

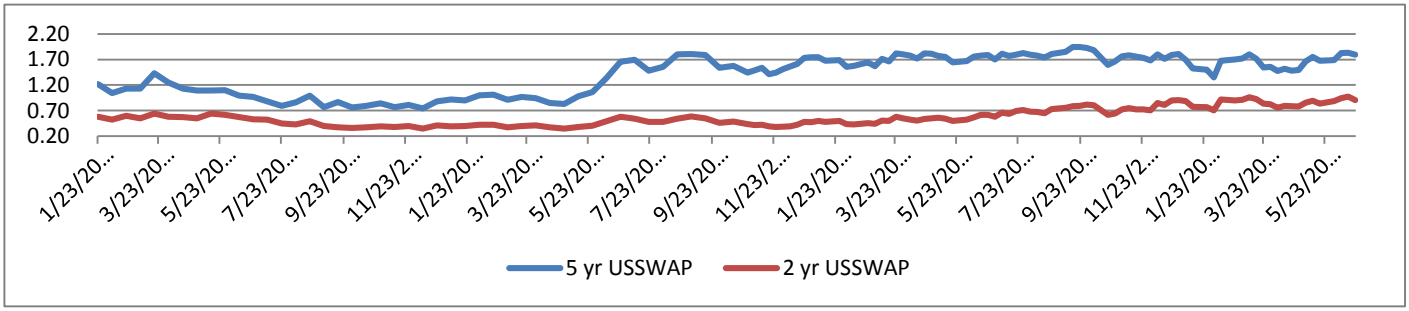
The 2-Year through the 5-Year Swap rate is an often used as a benchmark for earnings projections on float: lower swap rates lead to lower float income and thus lower MSR values. As rates rise, firms need to think about the impact that higher rates will have in calculating the best execution spread between a scheduled/scheduled remittance (where P&I and Prepay float is a positive possibility) and an actual/actual remittance structure (where float income is not possible). Float income can create a valuation spread between the various remittance types.

However, lower float revenue coupled with the cost of capital needed to fund the advances can level the playing field. For example: in case where the cost of funds exceeds the earnings potential, MSR's with an actual/actual remittance type can result in a higher MSR value than a scheduled/scheduled remittance structure. The reason is that the derived float income may not be enough to offset the negative impact due to the higher cost of advances. Under normal circumstances, when short-term earnings rates rise, so will the valuation difference between the various remittance structures. As of June 22nd the 5-Year Swap rate was at 1.80% which, due to the recent back up in rates, is nearing its 6 month high.

MIAC Modeling Corner

1) As part of a firm's overall risk planning, we encourage that all owners of MSR's be aware of prevailing Fair Market Values as well as the true cost of owning Mortgage Servicing Assets. For instance, firms should be aware of the following trends:

Figure 9: US 2 Year and 5 Year Swap Rates



Source: Bloomberg

a. Risk sensitivity levels due to changing interest rates
b. Rising cost to service
c. Changes in default rates
d. Overall shift in market liquidity

2) We expect that the January adjustment to FHA MIP should exhibit signs of burnout in the next 6-12 months even if mortgage rates stay the same or go lower.

3) 1Q MSR valuations were down but, more than anything, the decline in value over the preceding 5 quarters was due to declining interest rates. Now that rates are rising we should not only experience higher values but also an increase in the supply and demand of MSR transactions. For example, sellers may hold off selling until they are able to sell their portfolios at a price that is equal to or higher than their existing book basis. Likewise, buyers anticipating higher rates and/or fewer concerns about increased prepay risk are more likely to pay higher prices once those portfolios are no longer at risk for higher prepayments.

4) The impact of the new capital rules will certainly raise the cost of capital. How much, if any, will the increase in capital slow the pace at which Non-Banking firms have been acquiring large portfolios depends on each firm's business model and their availability to capital. When buying and selling MSR's, contractual terms have largely stayed the same. What has changed is the minimum net worth requirements of the sellers from whom buyers are willing to purchase the MSRs. This ensures their ability to effectively back their contractual "Reps & Warrants". Many buyers now seek minimum network of at least $10 million before they will consider acquiring new MSR's.

5) In order for the mortgage servicing market to continue operating in a diversified and efficient manner, look for and support harmonized regulatory standards across all governing bodies. This will help to maintain uniformity while also reducing the cost of compliance oversight.

***By: Mike Carnes**, SVP, Capital Markets Group*

Is the UK Buy-To-Let Sector Resilient to Interest Rate Rise?

The following article was first published in the Mortgage Finance Gazette in January 2015 and has been brought up to date for *MIAC Perspectives*.

Introduction

The Buy-To-Let (BTL) sector has demonstrated material growth as a sub-market of the mortgage industry in the UK. For potential home owners, buying homes has become a serious challenge from an affordability perspective, contributed to by Mortgage Market Review rules. With house price inflation continuing to outstrip wage inflation a significant proportion of lending activity has been to BTL investors seeking to take advantage of the buoyant private rental sector.

As a result of this growth there is extra focus on the importance of robust stress testing methods for purpose. Many lenders have increased exposure to the product and, therefore, a reliance on the resilience of the BTL market generally.

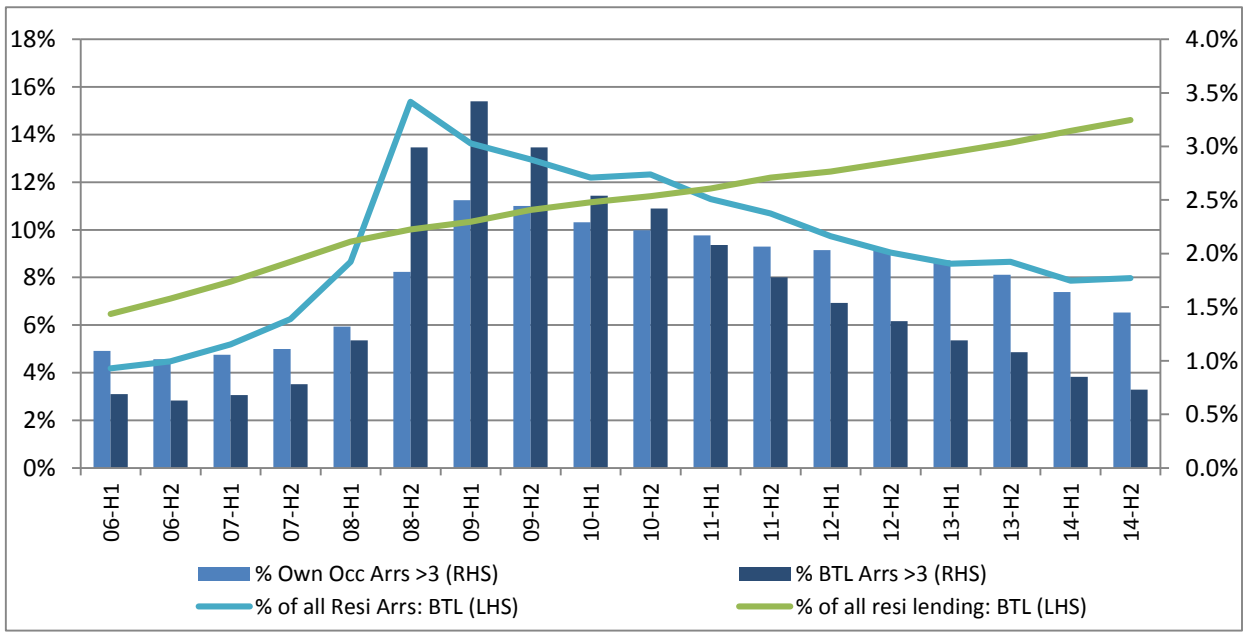
Interest rate rises are a specific risk to this sector as it will put the squeeze on tenant's affordability (debt service costs) as well as the borrower's. The argument that there is extra insulation against mortgage default risk when compared to owner occupied lending - due to the rent being the primary source of paying the mortgage and the borrower's resources as a backup - is partly substantiated by recent arrears statistics.

However, the criticality of understanding the specific risk drivers and behaviours within the sector are essential in modelling BTL portfolios for future defaults. This enables measurement of the resilience of these assets to perform within risk appetite under stressed macroeconomic conditions.

Market Insight

The proportion of the first charge mortgage market taken up by BTL versus owner-occupied has been growing consistently since 2006. These statistics, represented in Figure 1 and compiled by the CML, are a strong proxy for the market as a whole. At last count these figures make up over 90% of the mortgage market. In June 2006 BTL lending took up only 6% of first charge mortgages and now that figure has risen to 14.4% as at Q3 2014 (green line).

Figure 1: UK Residential Lending & Arrears: BTL versus Owner Occupied



Source: Council of Mortgage Lenders (CML)

The ratio of arrears numbers allocated between owner occupied and BTL from the same dataset is superimposed in Figure 1 (blue line). This clearly demonstrates an inverse relationship with the overall BTL growth since the economic crash. As BTL has become a higher proportion of the lending, the arrears proportion has reduced. Whilst this has an element of arithmetic influence (rising denominator), and lag effect from higher volumes of new lending (including the time it takes for arrears to emerge), there are undoubtedly wider underlying explanations. The relatively high arrears at the start of the time series can be attributable to weaker lending criteria. During the pre-crisis lending boom many higher LTV products and self cert BTL options were available. Since the crash LTV criteria and borrower credit quality has been materially tightened and this is reflected in current arrears trends.

With many potential home owners unable to afford to buy, market forces dictate that demand will be high in the rental market. Many investors seeking returns on their available wealth have been understandably choosing BTL as a route for their investment with the returns in other options low due to the interest rate environment.

In terms of underlying price trends within the wider rental market; our analysis demonstrates that London and the South East, in particular, have seen the highest rental inflation. Much like the house purchase and general economic trends, there is a divide between North and South here. (Refer to Figure 2).

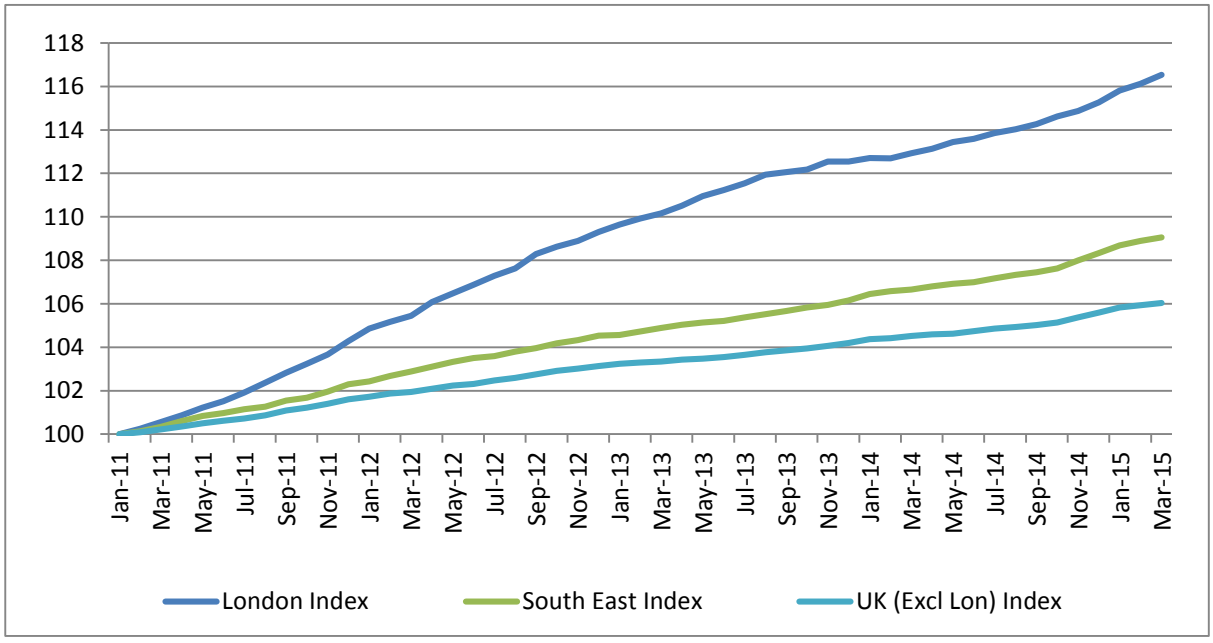
Stress Test

Portfolio

To produce some meaningful analysis on the subject at hand it was important to process a relatively typical BTL portfolio through a stress test scenario with specific focus on a material interest rate rise.

The portfolio tested is £0.6bn of loans (c.3,900) originated between 2006 to 2014. The average original LTV is 73% and the average current LTV is 64%. The percentage of accounts in default, defined as 3 months in arrears to align with CML stats, is at 0.75% as at the projection point of our analysis. This is a strong proxy for the industry as it is near to the industry arrears rate detailed in CML statistics (0.78%).

Figure 2: UK Rental Market Trends



Source: Office for National Statistics (ONS)

Scenario

In order to try to isolate how sensitive default rates are to interest rates within the BTL market we have designed a macroeconomic scenario that performs broadly to expectation on all other measures but with a constantly rising Bank of England Base Rate from its current state of 0.5% up to 5% by 2019, rising in quarterly increments of 0.25%.

In reality, there are macroeconomic indicators that will need to adjust in order for the MPC to raise interest rates, with additional focus being placed on wage inflation in relation to price inflation.

Modelling Focus

In our experience it is still relatively commonplace that BTL mortgages are modelled in the same way as owner occupied residential mortgages in respect of default and loss. At the same time, it is widely acknowledged that the credit risk drivers are different between these two product types.

This article seeks to explain how to overcome some of the main challenges in BTL mortgage modelling and discuss how the sector may perform from a default perspective under a rising interest rate environment.

The 'double' default risk insulation referred to in the introduction is the fact that many BTL loans are underwritten on the basis of rental income covering the monthly payment with the borrowers own financial circumstances acting as a backstop to any tenancy voids or arrears.

As with all product types, there is a spectrum of different lending criteria in the marketplace and lenders will always try to differentiate in order to gain what they see as a competitive advantage. This could be in terms of getting the highest quality portfolio or, alternatively, in tinkering with the traditional criteria in order to obtain a higher margin.

The key unknowns when modelling future portfolio performance are the value of the underlying collateral, the anticipated rental income, the default drivers at the loan level and the influence the macro economy has on default.

Collateral

When forecasting it is vital that the starting point for the collateral value is accurate as differing house price paths will be applied against that valuation.

MIAC Acadametrics Collateral Revaluation tool updates property values based on their property type and geographical location. The geographical layer drills down to a granular level; County or Local Authority across England, Wales and Scotland and London Borough within the Capital.

Rental

An important element of modelling a back book of BTL loans is understanding the likely rental income the borrower is receiving under today's market and how that might change as the economic environment changes. This becomes more important the more seasoned the loan becomes as any rental information obtained from origination loses its value.

In the case study presented here rental income has been estimated using the MIAC Acadametrics Rental AVM product. This utilises a database of comparables to optimise a rental valuation based on the postcode, number of beds and property type of the collateral.

In order to understand how rental values might change under differing scenarios a model was built to understand the correlation between rental income over various regions and wider economic indicators. A statistically significant relationship was evident using change in price inflation and house price inflation to predict the changes in rents. This enables us to forecast the evolution of rental incomes and understand how rental coverage ratios change at the loan level in the projections.

Macro Modelling

The macro default model inputs are House prices, Unemployment, CPI, GDP and Bank Base Rate. When changes in these variables are compared to BTL arrears trends this creates a default risk credit cycle which is used to predict the systematic component of future default rates, i.e. the amount of default that is attributable to the state of the economy.

Default modelling

Building PD models for the BTL sector usually results in some typical loan characteristics that are correlated to default. In addition, ensuring that some of those characteristics are dynamic as you forecast forward is vital in the PD being reflective of the changing market dynamics.

In many respects the macro model component of the framework covers the changing environment but with BTL, where the Rental income is a vital influence on the borrower maintaining their obligations, it is sensible to reflect the idiosyncratic risks that are unique to each loan and borrower. This can be done by including the changing rental coverage ratio as a characteristic within the PD model. It then follows that, as the rental coverage is eroded by interest rate rises, because there is no commensurate rise in rental income, the risk of default rises.

Results

As illustrated in Figure 3, the expected path of default rates over time (blue line) using the sample portfolio discussed. The distribution around that expectation is signified by the shades of blue. This distribution charts the different probabilities of a diversion from expectation. This can be interpreted as model error, or another interpretation is that forecasting is not an exact science and thus it is informative to understand the likelihood of outcomes other than our modelled expectation. As the distribution demonstrates, there is more tail risk above expectation than below.

This analysis has focused on the influence interest rate rises will have on default rates within the BTL mortgage sector. The level of actual crystallised credit loss those defaults will generate will be highly dependent on the portfolio, and the management of that portfolio, but the almost universal LTV ceiling of 75% certainly adds a layer of loss insulation and should keep loss provisions down. However, with a material portion of the BTL collateral being on the lower end of the market, where collateral values are below average prices, the forced sale discounts are often high, anecdotally between 35-45%. Whereas, on properties that are nearer the average property, and thus in most demand, the forced sale discounts tend to average nearer 30%.

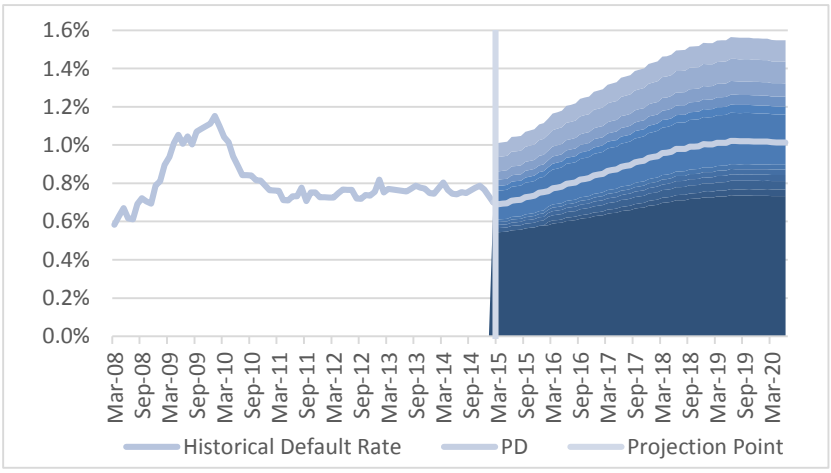
Conclusion

As with all future defaults they are heavily dependent on the economic environment and the credit quality of the portfolio. However, dig a little deeper into these areas in the BTL context and it is difficult to conclude that the sector is more exposed to default risk than other mortgage sub sectors. The buoyant rental market coupled with the borrower's resources as a backup mean that there is built in default resilience.

Whilst lending criteria stays as prudent as it is today, and challenges remain with getting on the bottom rung of the housing ladder, the BTL market will continue to prosper. Conversely, if the market is opened up around the edges in terms of credit quality and LTV once more then the sector will become more exposed to default and losses as historical trends suggest.

***Joe Macklin**, Senior Manager, Risk & Analytics*
MIAC Acadametrics Ltd.

Figure 3: MIAC Modelled Distribution of Projected Default Rates



Source: MIAC Acadametrics