

# CREDIT EXPO LTD

## **Using Empirical Analysis to Derive Loss Forecasts and to Manage Arrears**

White Paper



*Patrick Shallow  
Managing Director*

If you would like further information about ECM Software please contact our offices at:

Credit Expo Ltd  
114 Pembroke Rd  
Ballsbridge  
Dublin 4

T: +353 1 667 1822  
F: +353 1 667 1823  
[www.creditexpo.ie](http://www.creditexpo.ie)

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## **Using Empirical Analysis to Derive Loss Forecasts and to Manage Arrears**

### White Paper

#### **Executive Summary**

This white paper discusses the topic of loan portfolio analysis, using the data available to the lender from the existing loan book to estimate the likely future performance of the loans, based on the analysis of recent experience. By analyzing the loan book using a number of slicing and dicing methodologies it is possible to identify various loan characteristics which can isolate those risk cohorts whose combination indicates an unacceptable likelihood of impairment. Analysis of recovery rates and of the LGD (Loss Given Default) allows lenders to correctly estimate loss provisions.

Banks are in the business of managing, rather than simply avoiding, risk. The profitability of any loan book is, put simply, the difference between the cost of funds and interest earned, less the loan write offs. While much of the blame for current economic woes has been laid at the feet of the US sub-prime mortgage securitization, it is clear that the recent period of sustained economic growth has led to a credit boom; rapidly rising levels of default have created uncertainties about the quality of assets on bank books even within their core domestic instalment lending portfolios.

This paper discusses strategies for calculating the quality of the instalment loan book and ways to manage it for maximum profitability, introducing the ECM methodology.

## **Risk Management in Today's Environment**

In good times banks develop an appetite for risk. Those banks which are most admired are those which can react quickly and beat their competitors to a deal. Loans backed by assets whose value could only increase were seen as “sure things”. The recent growth in consumer credit, off the back of former high employment and low interest rates, looks like turning sour in a recession as job losses mount. In this environment how can we tell which loans are sound and which are going to turn bad? Without this certainty how can banks accurately value assets and how can wholesale lenders trust counterparties? This cycle of over lending, a tendency towards denial, and the freezing of the wholesale markets now characterises the current crisis. The inevitable solution must involve a correction in the statement of asset values, credible write downs and the rebuilding of trust. While property backed assets are the obvious focus of concern, the recession means that consumer loans are also heavily suspect. How can banks accurately assess their existing, rapidly expanding and changing, loan books? How can they price risk so that they can resume profitable lending?

## **Instalment Finance**

Instalment lending refers here to those loans which are repayable by monthly, or other periodic, payments. The popular types of instalment loan are Leasing, Hire Purchase and Consumer Finance. While mortgage loans and credit cards are also types of consumer loans, they have special features which distinguish them and they are not considered here. The main division of instalment loans is into *secured/asset backed* and *unsecured*.

The measurement of credit risk in any portfolio of instalment loans is made more difficult by the following features:

- No two loans are alike, being differentiated by asset types and the calibre of borrower, typically expressed by credit scores
- Some of the loans in the portfolio will have commenced 4 years ago and mature shortly; others will have commenced recently and mature in, say, 6 years.
- The growth rate of any portfolio can keep the portfolio young and immature making it difficult to get the full measure of its credit risk
- The performance of instalment loans tends to be volatile, rising and falling with the economy and frustrating the identification of stable risk guidelines

Over recent years banking attention has been focused on mortgages and other property lending and the approach to the risk management of instalment loans has been relatively neglected, unscientific and intuitive, largely driven by tax and compliance rather than by business issues or empirical evidence.

## **The Traditional Approach to Instalment Loan Risk Management – A Case Study**

**Empirical Credit Risk Management (ECM)** had its genesis when its designer was appointed Deputy MD of a UK Finance house then operating in Ireland. In the course of reading himself in, he noted a provision calculation of 3.75% against one month loan arrears. Impressed by the apparent preciseness, and low level, of this *Probability of Default (PD)* he queried its origin. ‘It’s from head office’ was the innocent reply.

Some rudimentary regression analysis over loans incepted two years earlier established a loss rate of 11% on earlier one month arrears. By applying this observation to the bank’s then provision level a shortfall of some £5M was immediately apparent. This was noted by auditors KPMG and was reported up the line to the parent bank. In consequence, both the finance house and its sister bank were withdrawn from Ireland, never to return!

### **An Early Application of ECM**

The writer shared relevant observations, and an early statistical model, with colleagues in PwC who invited him to partner on an examination of a leading Bank’s Instalment loan Portfolio. The results of that examination challenged the Bank’s own calculations and turned on the level of projected net recoveries. Sample testing of these, across asset types and also referenced against the earlier finance house benchmark rates, identified a provisioning shortfall here, while also differentiating across asset types. The Bank’s provision was increased appropriately.

This study was responsible for adding the dimensions of *net recoveries and the differentiation of asset types* to the ECM calculus.

### **Development of the *Vintage Analysis* Capability**

A further study in partnership with PwC was undertaken for another bank’s telephone subsidiary bank, where serious concerns had arisen about acceleration in the rate of emerging arrears and, in consequence, even about the bank’s telephone business model. An ECM review of the portfolio, however, located the source of the burgeoning arrears in a lending vintage some 9 months earlier, associated with a particular marketing initiative and some over-enthusiastic underwriters.

This loan vintage was given close attention thereafter, the telephone banking model was vindicated and the overall portfolio returned to full health!

A spin-off development of this exercise was the capability to differentiate, and to interrogate and compare, the quality of sub-portfolios underwritten over *particular periods* (critical later for loan securitization by another bank).

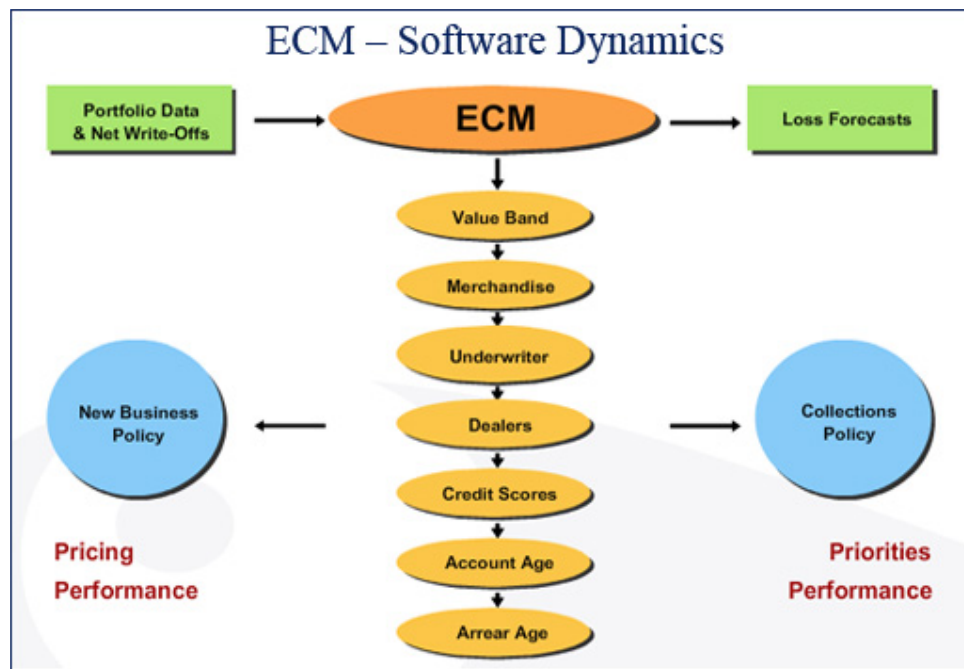
### **Loan Characteristic Analysis and the Development of the *Risk Coefficients***

At the invitation of another PwC client bank, a series of reviews were undertaken... The brief there was to provide, in addition to developing a rolling loss forecast and provision calculations, a *characteristic analysis* of the location of credit risk.

That portfolio was sufficiently large to permit segmentation into several sub-portfolios for specific analysis to identify high and low risk areas, via characteristic *risk coefficients*, which were immediately valuable in identifying risk ‘hotspots’.

## Weighting the Risk Coefficients

When ECM completed measuring and tracking the Risk Coefficients it was apparent that not all coefficients were of equal importance e.g. *Credit Scores*, which focussed on the borrower and which also contained elements of other characteristics, would clearly weigh more heavily than, say, the Referral Source ( a characteristic of, perhaps, surprising importance) or Asset Type. Through University College Dublin (UCD) Statistics' Department an analysis was undertaken to identify relative weightings.



Results were compared with a similar review for another Bank some six months later, but with significantly different findings.

An *SPSS* study was additionally commissioned and, again, findings were not fully consistent with the two earlier studies. The explanations suggested included: divergent underwriting policies of the banks, the passage of time with changing economic conditions, the effect of coefficient *overlapping* and of course coefficient *interactions*.

An important, additional, valuable but complicating, finding of UCD was the high contribution to credit risk of Lifecycle Risk and of the *account age*.

The solution finally developed for identifying credit risk for each bank was to provide the capability within the ECM software to measure the *composite risk coefficient* for any three selected characteristics, then varying the combination selected. (This feature again lent itself to software patenting)

## Identification of Risk 'Hot Spots' and Fraud Rings

The weighting of Risk Coefficients facilitated the identification of risk 'Hot Spots' for closer management and collections and 'Cool Spots' for new business targeting and pricing. Importantly, it also facilitated interrogation for evidence of fraud rings.

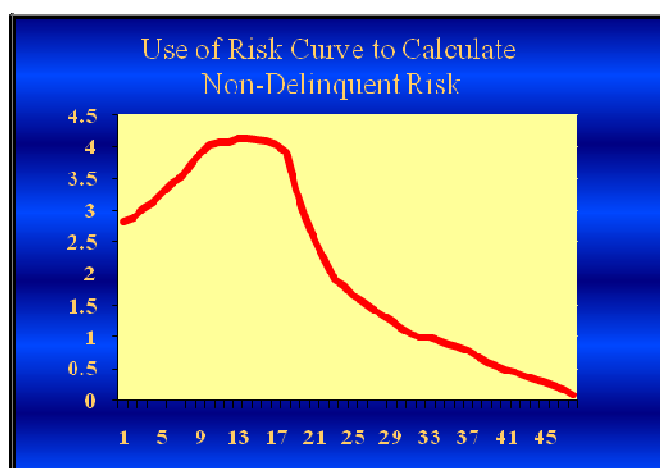
## Credit Risk Calculation for the *Non Delinquent/ Up to Date* Loan Portfolio

When first reporting to a major bank on its credit risk there was a clear need to recognise also 'latent' risk in the non delinquent' portfolio. After all, total arrears represented only some 5% of the total portfolio! Clearly the remaining 95% of the portfolio could, reasonably, be expected to spin off new arrears progressively, as the portfolio moved to maturity!

While *Backward Induction* offered a ready statistical approach to the calculation of Default Probabilities (PDs) in *arrears* calculations, this was less obvious in relation to *Up-To-Date* accounts, especially in the case of a young immature loan portfolio. Here it might be too easy to take comfort from the lower level of arrears emerging and to believe that the quality of the new business was somehow superior to the 'historic' debt (a delusion the UK finance house mentioned above).

The approach adopted here was to undertake a 'mass autopsy' of former 'write-offs' to understand the 'clustering' of risk across the loan lifecycle (these observations were refined and updated by also tracking selected migration rates). This analysis produced the 'Risk Curve' showing the pattern of arrears emergence and the months of greatest credit risk, thereby enabling ECM to establish and to automate the relationship between the *visible* arrears and the *invisible* latent arrears, *IBNR* 'incurred but not reported'(the software containing relevant algorithms was again patented).

Importantly, it became possible thereafter to refresh the Risk Curve over time to recognise altered economic conditions and to differentiate between alternative banks, portfolios and loan maturities.



### **Traditional Reluctance to Recognise Risk in the Non Delinquent Debt**

Note: Understandably, there was, and remains among banks a disinclination to recognise fully the measurable risk in such non-delinquent loans. Especially at this time, with escalating provisions for arrears, banks are unhappy about appearing to bring forward a further charge for non-arrears!

However *it is important* for banks, in their own interests, to be able to measure, *and to price*, for the full risk across the loan portfolio. Otherwise it is easy for a new Lender (or a new portfolio) to believe that the loan portfolio is generating a higher level of profitability than previously (The Irish case of *Cambridge Finance*, now defunct and often recalled, is testimony to the folly of failing to measure provisions accurately and frankly).

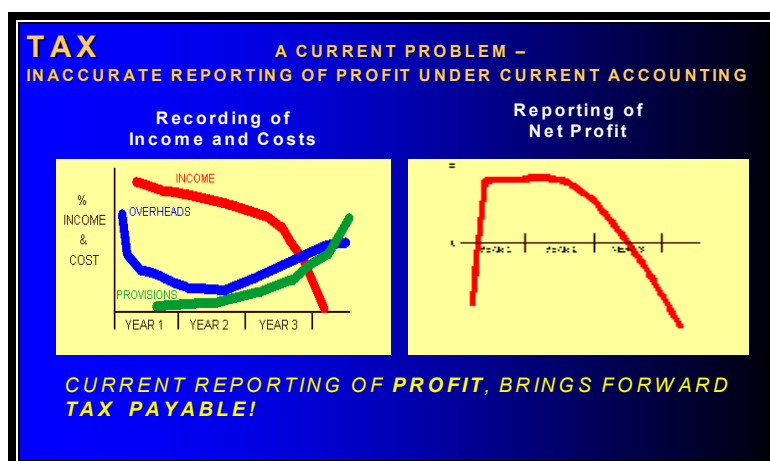
### **Provisioning for Bad Debt**

Bank loss forecasting has been bedevilled over the years by the, arguably, artificial distinction made between ‘specific’ and ‘general’ provisions, ( a reasonable distinction, perhaps, for tax purposes , to prevent Lender ‘management’ of the P&L results)

‘Specific Provisions’ were reserved for identified and relatively imminent bad debts

‘General Provisions’ represented the charge which the bank, in its wisdom and experience, wished to make for bad debts which could not be immediately identified, but which represented the normal, predictable emergence of new default.

However, since these latter were not tax allowable, their importance was downplayed and this area of risk became progressively neglected. The entire area of Non-Delinquent debt was afforded scant attention, with only token provisions, and the profitability of Banks was, in consequence, seriously overstated. This contributed quite substantially to the current credit crisis in Instalment lending, as banks now continue to discover their ‘Unexpected’ Losses.



Note: In Instalment lending interest income is recognised on an actuarial basis, in line with reducing balances. It is, accordingly, entirely reasonable and appropriate (and in line with the principles of accrual accounting) that risk should, as far as possible, also be recognised on an actuarial basis.

## ECM Calculation of Provisions and Corporation Tax

The ECM software is programmed to calculate and report provisions on a (qualified) actuarial basis. Because of the important (highly positive) tax implications of this approach, the Revenue Authorities were invited to evaluate and to certify the ECM calculation for their purposes. Their written *imprimatur* was obtained. Accordingly, a bank which is in a position to measure and further to ‘specify’ its Non Delinquent loans can now have these recognised for corporation tax purposes, in line with IFRS requirements for *IBNR* accounts.

This represents an immediate and major benefit from ECM

Note: While ECM calculates provisions on the *Non Delinquent Debt* on an actuarial basis, in line with income recognition, it also provides *less than fully* against its Loss Forecast calculations, mitigating by reference to lifecycle expiry rates on the ‘front-end’ arrears.

## **ECM and Strategising For Collections**

ECM is capable of differentiating and distributing credit risk at the account level. It does this by *characteristic analysis*, discussed above, using the *composite risk coefficients*. It also has full reference, both to the aged analysis of arrears and, via the Risk Curve, to identified *lifecycle risk*.

In a study for a major US bank, the key risk ‘hotspots’ were identified, by reference to individual account level provisions, thereby focussing the collections effort on the more cash-generative arrears and facilitating performance management of the entire collections effort and team.

Individual account provisions distinguished those accounts which, though only one month in arrears were recognized to be at *high risk* and in need of proactive management. Through the application of other bank benchmarks it was additionally possible to inform the strategic decisions e.g. as to whether to *pursue* certain loans, having regard to legal and other costs, or to *sell off* to debt collection agencies, subject to achieving certain identified minimum prices

## **ECM and Strategising For New Business**

In due course, hopefully in 2010, the credit crisis may begin to ‘bottom out’ and lenders can progressively resume new business, albeit cautiously. Again, ECM with its ability to identify the risk ‘Cool Spots,’ by reference to the lenders own experience, with indicative pricing, provides a strategic basis for risk targeting.

It’s the identification of ‘Hot Spots’, by reference to its own immediate experience, will enable the lender to avoid unacceptable combinations of risk, or to indicate appropriate remedial management, e.g. by shortening the maturity of the loan applied for, or reducing the Loan to Value Ratio, thereafter pricing appropriately for risk (Pricing, here, includes the credit risk measured in the Non Delinquent Portfolio).

While all such decisions are, of course, important on ‘Day One’ it is, arguably, more important, however, that the quality of such decisions be monitored continuously thereafter.

## **Trend Analysis and Longer Term Forecasting**

The ECM software has been constructed to measure risk, using alternative moving averages, e.g. 12, 6 and 3 months, (or any desired number). Accordingly, the lender may, for accounting purposes, wish to measure Loss Forecasts using a 12 month rolling average. Alternatively, to note changes in the recent past (and there have been many!), he may wish to note developments over the last 6 months. Finally, he may wish to note the impact of the most recent downturn, by referencing the *3 month* rolling average. ( In March ‘09 the 3 month rolling average view of one client bank’s loss forecast identified a €5m higher loss forecast than the relatively more benign 6 month rolling forecast!)

While these alternative views can provide somewhat different forecasts, they will also, in the process, provide a trend curve which can then be extrapolated to a future point, e.g. to the financial year-end (complete with predicted fall-out from the Non Delinquent Portfolio).

## **Compliance: Can be A Double- Edged Sword!**

Importantly, ECM is fully compliant for Basel 11 purposes (incidentally, Basel 11 has been badly bruised by the bank failures of recent days; its measurement of the capital requirements for banks has been shown to be poorly calculated and seriously inadequate) Importantly, ECM calculations are also fully compliant for IFRS and IAS 39 purposes.

It is argued here that Banks throughout Europe have been preoccupied and, arguably, seriously distracted by the need for Basel and other compliance, often to the neglect of somewhat more urgent business issues such as identifying the precise location of risk and accurate risk measurement, Loss Forecasting and responsible provisioning. For its part ECM is focused primarily *on the business issues*, while also providing all the information required for compliance reporting.