Minimize Risk and Optimize Profitability with Empirical Credit Risk Management Analytics

Self-learning, Dynamic Analytics Deliver Greater Transparency and Control

WHITE PAPER

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Regain Confidence with a Dynamic and Sophisticated Approach to Minimizing Credit Risk

When it comes to lending and managing tens of millions of dollars, making business decisions based on assumptions, theory or incomplete information can be catastrophic. That fact has been painfully clear to retail lenders during the recent credit crisis.

With their confidence rocked to the very core, today's financial lenders are under incredible pressure to find ways to drive profitability while also minimizing their credit risk. They must walk a fine line between attracting and retaining customers with tempting offers, while also understanding and identifying those customers and prospects that pose a potential threat. For these companies to be successful, it is crucial that they are able to identify risk factors with great precision.

But how can they tell which loans are sound and which loans are risky? How can lenders accurately value assets or assess their existing, rapidly expanding and changing loan books without this information? And how can they price risk so that they can resume profitable lending?

If the recent economic downturn taught retail lenders anything, it is that the traditional estimations of credit risk—whether for managing new business, collections or profitability—are subjective, static and hopelessly optimistic. Today's highly dynamic and competitive world demands a far more sophisticated and intuitive approach to identifying both risk and opportunity. Unreliable, traditional methods of estimation need to be replaced with a new empirical approach that is self-learning, intuitive and able to respond to dynamic, ever-changing conditions.

Confidence is vital to the economic recovery. If financial lenders are confident that they have the best information possible to distinguish opportunity from risk, they will grow their business and drive revenue. This level of insight and accuracy requires a credit risk model that leverages analytics. By taking numerous factors into consideration—information from a credit application, customer behavior, local economic data, corporate profit and loss data, etc.—lenders are given the empirically-derived information they need to make objective and informed decisions. With greater control over the risk management process, lenders will regain the confidence they need to build a stronger business.

Empirical Credit Risk Management Analytics: A Breakthrough in the Management of Retail Credit Risk.

Fueled by powerful analytics, Empirical Credit Risk Management (ECM) Analytics offers an objective, dynamic, approach to credit risk management. Designed for banks and other retail lenders, ECM Analytics is a patented, self-learning solution that facilitates the measurement and management of credit risk in retail lending.

Mathematically constructed and actuarially informed, ECM Analytics analyzes credit risk, first at the portfolio level—calculating loss forecasts and provisions, and then at the account level for loan pricing and debt management. Calculations of credit risk are based solely on the lender's most recent credit risk experience—not on assumptions or third-party advice. And unlike other solutions that undertake forecasting using data imported from spreadsheets or outside experiences, ECM Analytics uses your own data.

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Built to support today's demanding environment for anytime, anywhere access to current information, ECM Analytics is a dynamic system that leverages timely information versus traditional models that are locked in statistical regression.

In addition to these features, ECM Analytics:

- > Provide macro level loss forecasting
- > Is an empirical system that tracks both the national and local economies
- > Automates and calculates loss provisions
- > Exposes critical trends in credit risk
- > Is able to distinguish provisions from loss forecasts
- > Enables analysis by loan type, credit score band, etc.
- > Evaluates performance of dealers, underwriters, product types, etc.
- > Allows for account-level loss forecasting
- > Calculates credit risk in the well-performing portfolio
- > Can prioritize collections based on account level loss forecasts, not on outstanding balances
- > New Business Loan Pricing—no cross subsidization
- > Is Basel II and IAS compliant
- > Enables substantial tax breaks through risk specification
- > Has been back-tested and reviewed by bank auditors since 2006 including KPMG, PwC and Revenue (Irish Revenue Authorities)

With ECM Analytics, Credit lenders have access to the comprehensive information they need—when they need it—to make the informed and accurate decisions required to drive revenue and eliminate risk.

A Top-down Approach to Risk Management

ECM Analytics represents a new standard in the measurement and management of credit risk. The solution uses a comprehensive, top-down view of credit risk, on a rolling basis, to meet consistent, financial reporting and operating requirements. With a drill down-capability, ECM Analytics is able to locate risk in Characteristics and in Characteristic combinations.

The solution allows the lender to view each loan as an amalgam of risk based on its characteristics, for example, credit scores, merchandise, referral sources, loan maturities, lifecycle risk, etc. Risk Coefficients are calculated for combinations of characteristics which are then deployed in calculating individual loan

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loss forecasts. Using this process, ECM Analytics first calculates the Macro Level forecast (for accounting and tax purposes), then, using powerful analytics, it calculates credit risk at the sub-portfolio level and then at the characteristic level risk . By characteristic correlation, LGD measurement and migration monitoring, it is able to calculate account level risk.

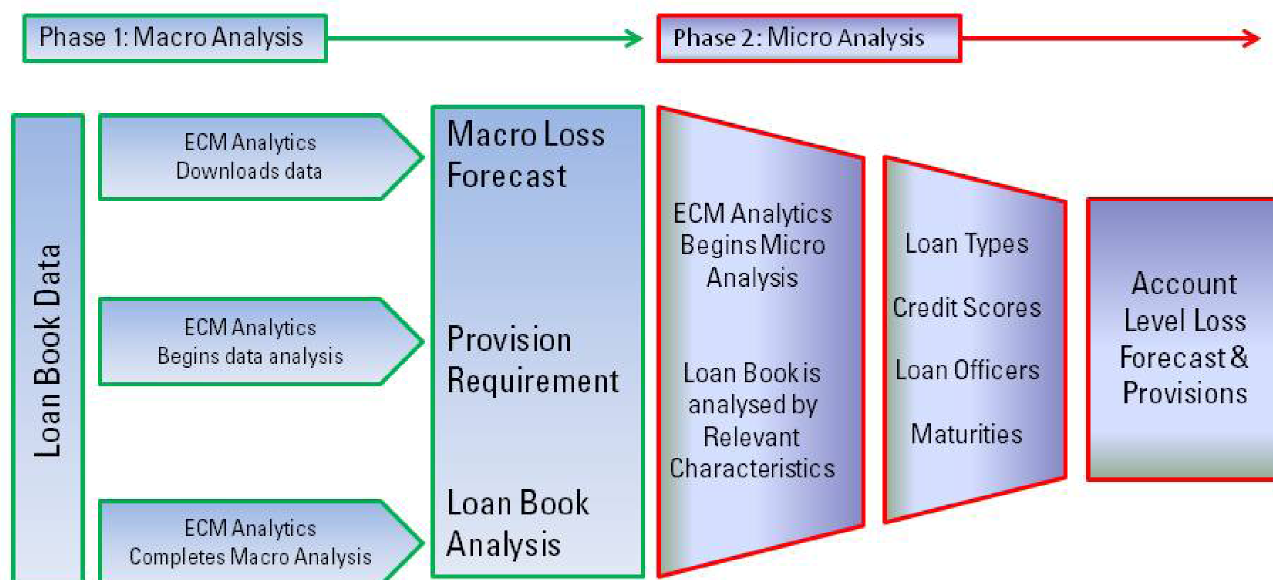

Figure: ECM Analytic's Top-down approach to risk

Flexible System Enables Anytime, Anywhere Access through the Cloud

As a state-of-the-art, web-based system accessible via a secure cloud, users can log into the ECM Analytics system from any location across the globe. And unlike on-premises solutions that require a significant investment in hardware, software, upgrades and maintenance, ECM Analytics is fully web-based, offering a lower total cost of ownership than competitive products. Because every business is unique, ECM Analytics is easily customizable to meet the specific needs of your business, and it is compatible with all IT platforms.

Initially developed in 2006 at University College Dublin's Technology Transfer Centre, ECM Analytics is the product of some years of research into the lending portfolios and best practices of leading Banks and Credit Unions. Most recent additions to the product have included: loan loss forecasting, loan provisioning and the development and web-enabling of Version 3, specifically for Credit Unions.

Benefits of ECM Analytics

Increase New Business Profitability

ECM Analytics increases profitability by focusing management on net margins rather than on volume, and by providing strategic pricing for both high and lower risk loans. The close analysis of account behavior and individual write offs distinguishes the risk (and probability of default) by asset type (e.g. Mercedes versus Hyundai), by maturities (e.g. three-year versus five-year), etc. and thereby facilitates risk pricing for greater profitability. ECM Analytics is also self-learning, with the ability to identify important changing

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patterns, for example, the resale price of cars or other assets. And ECM Analytics assists in the strategic targeting and pricing of new business and in the avoidance or re-pricing of higher risk loan sectors.

Reduce Defaults

Bad debts currently account for the largest cost in lending. Through greater transparency of potential credit risk, both before the underwriting (new business) process and after (collections), lenders can be confident in the decisions they make. The ultimate objective of debt management is the reduction of defaults and an increase in loan profitability. Recognizing that "one cannot manage what one cannot see," ECM Analytics ensures full transparency of risk. By monitoring key changes in the composition of the portfolio, in the debt and arrears progression/migration experience, and by projecting accurate write-offs via empirical observations, collections energies are focused on the higher risk areas. The result is better deployment of resources for maximum profitability and improved performance management.

Optimize Performance Management

Through more accurate measurement of risk and profitability, it is possible to measure and incentivize the performance of new business lending officers of collections management and of dealer network arrangements.

Improve Collections

Specific analysis of the most recent account write-off experiences (the Loss Given Default/LGD) refines and drives the ranking/prioritization of the lender's debt accounts. This process sharpens the focus on the management of collections and of dealer performance.

Increase Confidence

With access to transparent and verifiable results, mangers across both new business and collections functions have greater confidence and control over the lending process.

Real-world Application of ECM Analytics: Customer Snapshots and First-hand Testimonials

ECM Analytics has a proven pedigree with both large banks and smaller lenders. Customers, including Bank of Ireland, GE Money, Irish Permanent TSB, and Friends First Finance (Eureko), rely on ECM Analytics to manage their credit risk. The following sections profile snapshots and personal accounts of how our customers are realizing significant business benefits with ECM Analytics.

Customer Snapshots

Reduced Loan Losses

Using ECM Analytics, one bank client uncovered that it was operating on overly optimistic estimations of early Loss Probabilities and of Loss Given Default and was neglecting front-end arrear collections. By demonstrating true credit risk, the Bank was able to initiate earlier intervention and reduce its write off experience. Identifying that bank's Hot Spots' also improved collections management and reduced its bad debts.

Bank Cross Subsidization of Loan Losses

After implementing ECM Analytics, a bank client found that while the overall calculation of the loss forecast was broadly accurate, the distribution of risk across different regions and branches was skewed—resulting

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in misleading perceptions of risk, of individual performances and of local profitability. By retuning relevant (formerly undifferentiated) calculations to reflect local experiences, local management and local performance was additionally focused, improving the bank's bottom line.

Improved Accuracy of Loss Probability Calculations

A bank was applying Loss Probability figures 'imported' from another Irish bank. However, the two banks operated in different market segments, and empirical analysis showed that the (rigid) loss probabilities then being applied understated the risk, especially for 'early' arrears. This encouraged the neglect of such front-end arrears and delayed collections activity until the arrears had progressed to a later, more intractable, stage. With ECM Analytics, the bank was able to adjust the loss probability calculations—which were allowed to respond empirically to actual experiences—and redistribute the collections work pragmatically, delivering focus and performance management to collections.

Securing Additional Relief from Corporation Tax

An ECM Analytics review of one client bank's provisioning calculations demonstrated that certain bank calculations understated credit risk and the tax allowable provision requirement. By recasting the calculations empirically, it was possible to make an adjustment in the bank's financial statements and to secure significant additional tax relief.

Revising Loss Given Default Calculations (LGD)

One bank client was operating on the basis of an assumed, universal LGD / write off rate of 72%. Using ECM Analytics, it proved possible to complete a net present value (npv) calculation of net recoveries over more recent months and to differentiate the bank's LGDs across asset types, loan maturities and at the account level, thereby refining account level credit risk for greater profitability.

First-hand Customer Testimonials

Credit Union Reduces Risk and Gains Transparency with ECM Analytics

When an Irish credit union experienced escalating debt problems, it turned to CreditExpo's professional services team to perform a risk review and diagnosis using ECM Analytics. The review identified that the organization's poor credit risk reporting system, Resolution 49, had masked the true risk exposures which contributed significantly to poor lending and to the underestimation of the relevant provision requirement. The credit union then replaced its existing system with a customized web-based version of the ECM Analytics banking model for portfolio level compliance reporting, loan reviews, trend analyses, identifying risk 'hot spots for pricing and collections.

Since the implementation, the credit union has realized significant business benefits. The following are direct end-user quotes detailing some of those benefits and the specifics of how ECM Analytics has impacted the business.

Objective Calculation of Portfolio Loss Forecast and Trends

"The beauty of having ECM Analytics operating in our credit union is that it **removes the guesswork** from many of our former estimations. On a monthly basis we can now see the Loss Forecast and the Provision requirement for the full portfolio, measured objectively, and see if this is up or down on the previous month. We can thereby **measure and track our profitability**. We now have monthly figures and trends, which are

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verifiable and acceptable to the Regulator. Equally important, calculations are verifiable by our own board, which is committed to growth and best management and is also sensitive to its own responsibilities." (Managing Director Credit Union A)

Well-performing Loan Risk

"An important benefit of ECM Analytics has been risk calculation for our Well Performing Loan book (includes approximately 90% of our loans)—an area to which we had previously paid only optimistic lip service! We learned from ECM Analytics that our risk was higher in that area than we had thought. We are now able to adjust our general pricing to ensure that—assuming that the current financial recession continues and our loan portfolio runs to maturity—we will not need to draw on our Reserves. By now, knowing what the overall level of our credit risk is, **we can be confident that our overall pricing strategy is sufficient to ensure competitiveness and profitability**."(Manager Credit Union B)

Drilling Down Performance of Loan Types

"Now that we have confidence in the accuracy of the 'Big Picture', we are able to **drill down to see what is happening at ground level**! Our first level of enquiry was into the relative performance of our 15 different loan types, (including our rescheduled loans), also our loan maturities. We can now see, for example, how our loans for car purchases are performing, risk-wise, with, say, our home improvement loans and student loans. We can also see which combinations of characteristics to avoid altogether! " (Credit Union, Manager)

Loan Risk Pricing—Equity of Pricing rather than Equality of Pricing

"Credit risk pricing of loan types and maturities, as delivered by ECM Analytics, has **provided enormous insight** for us. For example, previously, we believed five-year loans were performing better than three-year loans. But with ECM Analytics we discovered that our five-year loans had a 50% higher risk than three-year loans! On our evidence we are pricing up the longer term loans. We believe in equity of pricing, rather than simply in equality of pricing. Where one loan type is clearly higher risk than another, we believe it should carry a higher risk premium; that is fairest to our members."

Use of Proprietary Data

"**ECM Analytics is entirely based on our own loan data**, downloaded from our provider's loan database. Loan data characteristics captured by credit unions are almost universal and the data format required for ECM Analytics was given to our software provider, who was then able to transfer the data for ECM Analytics. The aspects of Confidentiality and ongoing security were identified and thereby ensured at the outset of our installation. From a security standpoint, ECM Analytics was helpful in allowing for three levels of administration so that not all members of management see all reports; we define the appropriate access levels to the various reports. Also, **operating on a privately-owned cloud**, all the ECM Analytics analyses are available to us within hours of when our core provider uploads the data."

Objective, User Friendly, and Acceptable at all Levels of Management and to Auditors

"Because **ECM Analytics is verifiable, intuitively confirmed and objective**, it removes the arguments which were common when we used traditional and imported, static spreadsheets for estimating risk. All ECM Analytics screens are additionally clear, accessible and immediately available, and the drill-down facility gives full comfort to New Business and to Collections management. **Our own auditors have**

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checked and validated the main ECM Analytics numbers for audit purposes, for example, the Loss Forecast and Provisions."

ECM Analytics is "Transforming" for Bank of Ireland and Irish Permanent Tsb

Inevitably, credit unions and banks have some significant differences when it comes to managing credit risk. Banks tend to have very large databases and a larger pool of rich statistics for analysis. The following are collected observations from banking customers—Bank of Ireland, Irish Permanent Tsb and GE Money—about the value they derive from ECM Analytics.

Evaluating Loan Referral Sources

"One critical area which our loan officers have been able to investigate has been our Referral Sources, including a large range of motor dealers. Here we have found some surprising differences in the risk experiences of both individual motor dealers and of office equipment suppliers. When the loan underwriters analyzed the experiences of their sources, they were able to identify specific problems in the loans being referred—for example some 'hyping' of second hand values, resulting in too high loan-to-valuation ratios and too-long loan maturities. They were then able to discuss these with their sources and agree corrective actions. **Loan underwriters found this new intelligence very empowering and, based on the new facts were able to improve their own performances** in the underwriter league table!

Collections

''An additional area of breakthrough has been that of Collections. In the past, and like all other lenders, we gave priority to the bigger loan balances outstanding and to the broad 'severity' (i.e. advanced age) of the debt. Now, with ECM Analytics, additional risk contributors are identified and evaluated, for example, young account age (honeymoon arrears), certain credit scores, Loan-to-Valuation (LTV) ratios, and the recent performance of individual loans (the 'run rate'). This **analysis distinguishes the high risk loans at a very early stage and triggers early intervention** at a time also when there is still positive equity in the arrear loans. In this way, **ECM Analytics enables us to now give our collections team arrear case loads which are objectively and equitably distributed** and which avoid the 'low-hanging' versus 'high-hanging' fruit debate—common within all collections department and which can obstruct effective performance management of the team. By removing former arguments about loan quality, **clearly objective analysis of risk has brought our New Business department and Collections department closer together**, especially where the New Business department had previously tended to pursue volume targets."

Asset Values are now 'Marked to Market'

"Importantly, we find loans for asset purchase are all 'marked to market'. What this did for us was to establish (sometimes contrary to our own perceptions) that we had higher risk in loans given for the purchase of 'better'/more expensive cars, than for the 'cheaper' cars. When we examined the reasons we found that we were experiencing bigger losses on loans made for the more expensive cars because borrowers who got into difficulty could simply not sell their BMWs, Lexus and Mercedes. We also found that we had given too high LTV ratios in the case of these loans (being over-influenced initially, perhaps, by relatively high borrower credit scores!). **By distinguishing these loans as high risk, we were able to intervene at a very early stage to support those borrowers.**"

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"Using ECM Analytics we discovered that the software not only updated all market prices, but **it also distinguished the actual net recovery and loss experiences, after allowing for legal and other collections costs.**"

ECM Analytics and Dynamic Analysis

"A particular value of ECM Analytics is that, unlike other systems viewed, it does not use long-dated/ time-locked regression analysis on which to base its forecasts. The software has the a**bility to look at most recent trends**, for example, over the last two years, **right down to the last three months**, and to compare these to one another. It can then examine very recent trends and **calculate a small range of Loss Forecasts for management to consider by reference to current economic conditions**."

ECM Analytics Reflects the Reality of the Market

"Like all other banks, until we installed ECM Analytics we had been relying on our own well worn, internally-developed spreadsheets to estimate our ongoing risk. Where that approach let us down (to an unrecognized and damaging extent) was that it failed to reflect the market realities. This bank' former Loss Probability calculations were fixed and, accordingly, did not alert us to the impact of the recession. We also did not have a tool to measure credit risk in then up-to-date loans and, as a result, we underpriced our loans quite seriously. We also did not have a tool to track the most recent repossession values and were complacent about certain large loans. With ECM Analytics, **transparency of credit risk is available for management and it has proven to be transforming as we realize 'One cannot manage what one cannot see!** '"

Evaluation of the Loan Portfolio

This bank developed a new business model, accepting on-line and telephone applications for its car loans. It experienced early defaults and decided, on advice received, to run off its business. However following a full ECM Analytics review, the source of the problem was identified, it related to one specific vintage and to specific underwriting; when these problem loans were isolated the rest of the portfolio was measured objectively and of high quality. The troublesome loans were managed carefully and the Bank continues profitably with its former business model.

Conclusion

As everyone affected by recent economic conditions can attest to, trust is an invaluable commodity. Traditional estimations of credit risk left retail lenders vulnerable because they failed to reflect the dynamic nature of the market. Today's financial lenders can regain that lost trust by employing an empirical approach to risk management that is self-learning, intuitive and able to respond to ever-changing conditions. Tested and reviewed by bank auditors and delivering demonstrable benefits to leading financial lenders, ECM Analytics will empower you to manage your credit risk with precision and achieve the transparency and control you need to drive a more profitable business.

About CreditExpo

ECM Analytics originated from its designer's early professional experience as Finance and Administration Manager of Chartered Trust Ireland where he saw, first hand, the damage caused to business and to staff morale by static and ungrounded estimations of credit risk using spreadsheets. In 2002, he established

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CreditExpo to develop and to patent an alternative empirical methodology—ECM Analytics, simultaneously researching the field and completing a PhD thesis on the methodology.

Following several installations and back testing of results, ECM Analytics is currently being adopted as the new credit risk standard and expert system by Irish credit unions and other lenders, and the solution is now available internationally. For more information visit our website at http://www.creditexpo.ie.

Worldwide Headquarters
Credit Expo Ltd., Nova UCD, Technology Transfer Centre, Belfield, Dublin 4, Ireland
Tel: +353 (01) 716 3671 Fax: +353 (01) 716 3709
On the Web at: www.creditexpo.ie

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