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Closing the Gap between Credit Access and Risk Management

Clark R. Abrahams, SAS Institute Inc., Cary, NC

ABSTRACT

The financial crisis has raised questions about the way the lending process, indeed the entire loan-value chain, operates. This talk describes a framework (CCAF) that combines judgmental factors with analytical methods to achieve a more complete and accurate credit assessment. CCAF ensures that all relevant considerations and business contexts are brought into play early on in the process so that lenders can quickly evaluate risk and render sound decisions. There are several categories of shortcomings in current practices that are referred to collectively as the underwriting “gap.” CCAF effectively narrows the gap, which enables users to qualify more creditworthy consumers (especially the underserved), while anticipating incremental risk exposures in advance of loan performance declines. Had this system been in place, the magnitude of the financial crisis would have been greatly lessened, or it might have been averted altogether. Implications for improved institutional credit risk assessment and balance sheet management (as well as market, country, and systemic early warning) will be highlighted.

INTRODUCTION

The time has arrived for lenders to address shortcomings in their current lending process. In fact, they need to re-engineer how their entire loan value chain operates. Over my 35-year career I have been directly involved with all aspects of lending and I have seen a great deal of change, both in terms of economic cycles, business practices, regulation, and, of course, technology. During the past ten years I have focused on community development, lending compliance, and the deeper connections between credit access and credit risk management. Those connections will become increasingly more apparent with the continued emergence of governance, risk, and compliance (GRC) solutions, which address the convergence of enterprise risk management (ERM) and compliance, while integrating business strategy and corporate governance. In this paper, I share perspectives from multiple views—and I speak one who has not only built credit underwriting models, but also has dealt first hand with customers facing foreclosure of their personal and business properties. In other words, I see faces on the numbers.

SAS has pioneered a technological breakthrough that will transform the way loan underwriting is performed today. This new lending system offers greater transparency, effectiveness, efficiency, flexibility, and responsiveness when compared with today’s best practices. It is described in mathematical detail in the last half of my first book, which is more technically-oriented¹. It is the entire subject of my second, business-oriented, book, published last year.² This paper is oriented towards the Latin and South American Region, which includes many countries, each different and unique, and yet sharing many common goals and linkages. It is a fact, however, that very similar concerns and challenges are faced by lenders, regulators, borrowers, and investors globally. Indeed, innovations, such as the one I am about to describe, are the product of a very large number of conversations over a number of years between myself, my co-author, Mingyuan Zhang, and hundreds of people who graciously exchanged their ideas and perspectives with us. Those discussions spanned the full spectrum of stakeholders, namely business professionals, such as yourselves, the academic community, technologists, senior regulators and policy advisors, both defense and prosecuting attorneys, legislators, government officials, community activists, and, of course, banking customers.

This paper describes a framework that combines judgmental factors with analytical methods to achieve a more complete and accurate credit assessment. It ensures that all relevant considerations and business contexts are brought into play early on in the process so that lenders can quickly evaluate risk and render sound decisions. CCAF (pronounced See-Caf) is short for Comprehensive Credit Assessment Framework, and it represents a new lending system that benefits borrowers, lenders, and investors. CCAF seeks to comprehensively, systematically, and transparently handle the loan underwriting process, which today has evolved into quite a complicated decision making process. CCAF allows for judgmental factors to be “instilled” into the core model so that a significant foundation of the model rests on solid business expertise. In this way, there is less risk of relying too much on the models where common sense would dictate otherwise. The CCAF philosophy is “judgment first; then apply models for fine tuning” to avoid the tail wagging the dog syndrome and also over-emphasis of correlations present in the data that might not persist in circumstances not historically present in the data, such as economic downturns, bursting market bubbles, and so on.

THE NEED FOR GREATER CREDIT ACCESS

There appears to be overall agreement that access to financial services bears a direct relationship to economic growth and prosperity. Over ten years ago Ross Levine alluded to this when he stated that “No shortage of evidence exists to suggest

that the level of financial development is a good indicator of economic growth, capital accumulation and of the technological change of the future economy."³ In his ground-breaking book *The Mystery of Capital*, Hernando de Soto points to many factors surrounding the barriers to achieving economic prosperity in a capitalist society, including the importance of formal property law and the importance of the associated processes for making assets more fungible in order to create capital. Certainly, if consumer savings can be mobilized to more productive uses that either facilitate consumption or develop capacity, then the economy will benefit. More recently, the World Bank has conducted many studies in this region that provide empirical evidence to substantiate the fact that access to credit, and financial services in a broader context, will spur sustainable economic development.

In addition to the economic considerations, there is also a social side that relates to inclusion of all segments of society in the pursuit of a better life. Simply put, the underserved are not undeserved. Banked consumers obtain lower fees on transactions, higher returns on savings, and lower rates on loans. The unbanked, who do not have an account with a regulated deposit-taking institution, make up anywhere from forty to as much as eighty-five percent of consumers in Central and South American countries. One study indicated that the percentage is seventy-five in Mexico City, contrasted with a little over half that much in urban Brazil. There are many factors for the wide variation, which I will highlight momentarily. The unbanked span the full spectrum of the population, but tend more predominantly to be in the lower income tiers and also tend to have less formal education. Estimates are that their collective undocumented savings amount to as much as \$1.0 billion US of dead capital in Mexico City alone, maintained in cookie jars and hidden under mattresses.⁴ In addition, the unbanked pay what amounts to a poverty tax for the higher costs they bear both to make and receive payments and to finance their needs. In some instances, the poverty tax can amount to 15%, or nearly 2 months of wages. In the conclusion of his book, which I referred to earlier, de Soto lays out six points that governments must be willing to accept, including the fact that the poor are not the problem but the solution. The technology I will describe to you today can help quantify and/or capture the first two of those points, namely "The situation and potential of the poor need to be better documented," and "All people are capable of saving."⁵ Later on I attempt to dispel the common notion that poor people are risky when it comes to lending money by way of a compelling real-life story.

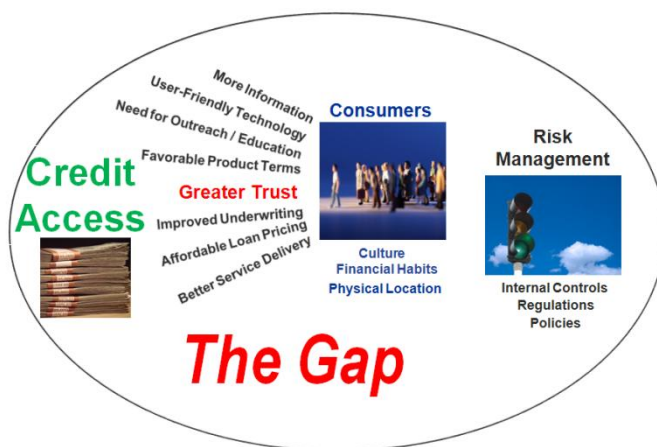


Figure 1. Visualizing the Gap between Credit Access and Risk Management

The pressing question is "How can greater credit access be achieved?" The answer has been explored by many, and some recent studies point to areas of focus (Figure 1). One of those areas is the physical banking presence in communities. We must be information-led and seek to quantify not only demand for credit, but also to gather intelligence on the informal economy.⁶ Some proven techniques can be used to compute useful metrics, such as household income or spending per acre. Essentially, to make the business case for community development and investment, you need to develop indicators of potential demand. In the US, and more recently abroad, we have seen much progress made in this area. Social Compact, a Washington, DC-based non-profit that pioneered the DrillDown analysis, has completed studies for dozens of cities over the past several years and has successfully illustrated stronger population levels and spending power in underserved communities across the country. John Talmage, their CEO, shared at a board meeting in late October 2009 that Manny Diaz, the outgoing mayor of Miami, credited the DrillDown as possibly the most significant project of his administration (the DrillDown of 14 Miami neighborhoods showed that the city has 137,000 more people than the Census projected, as well as a 29% higher income level). At present, Social Compact is also in partnership with the World Bank and local officials to test the potential of DrillDown methodologies in emerging markets in Bogota, Columbia and Johannesburg, South Africa.

I recall a study done several years ago by Social Compact of an area not far from San Francisco, California, where I grew up. On the surface it was a neighborhood of need. Both the poverty rate and unemployment rate were two times the national average, and the overcrowding was four times the national average, with an aging housing stock. Social Compact came in

and performed a study, and they found that there was significant aggregate household income and aggregate retail spending in the neighborhood. Furthermore, the median home values were above the national average and owner occupancy by building was seventy-five percent. Indeed, this was a neighborhood of opportunity! By one view the glass was half empty, another it was half full. Technology can collect, integrate and organize information into a form that is amenable for analysis. It can help us to look deeper, below the surface statistics and typical impressions. To borrow from de Soto's terminology, technology can help to make capital more *mind-friendly*. Past research that I have conducted with others in the US has demonstrated that technology can locate lending opportunities where homeownership is deficient, yet qualified borrowers exist and housing stock is in good supply at the metropolitan level of aggregation.⁷ For those interested, there is a framework specified at the neighborhood, rather than borrower level, complete with primary categories, segment-defining variables, and key measures for lending to the unbanked in my first book.⁸

Borrower trust in the financial system is critical. Technology can play a role here, in combination with sound business judgment. It must be recognized that inclusion of input from all stakeholders is required for success on these critical fronts. The new lending system I will describe shortly will go a long way towards connecting all participants in the lending process, providing disclosure on the loan qualification process (and specifically how borrowers are classified and risk rated) and fostering a complete understanding of the reasons and the ways that the lending process is carried out and the responsibilities that rest on both borrowers and lenders to ensure that successful outcomes are achieved.

In a nutshell, trust will be deepened by loan underwriting systems that:

- exhibit greater transparency and disclosure—no secret recipes
- foster understanding, whereby the borrower view is identical to the lender view
- have greater accuracy—yet are simpler;
- are thorough – yet more concise
- consider the full context and specifics of the lending transaction, as opposed to a one-size-fits-all approach
- are grounded in common sense so that all parties will have confidence the loan is in everyone's best interest, both borrower and lender

Related areas of focus are the need for loan products geared more towards the underserved borrowers and for automated underwriting systems supporting those products. First, better customer segmentation is needed that integrates well with the loan underwriting function. Products need to have terms and conditions that match with the needs and capabilities of low to moderate income consumers. Some have questioned the economic and practical feasibility of performing automated underwriting of loans for the lower income consumer market. In particular, one source writes:

"Second, computerized credit histories for consumers and automated credit risk assessments are highly developed in the U.S. and cover nearly all working adults. In Mexico, such institutions are far less comprehensive and sufficiently less developed that there can be little meaningfully predictive automated credit risk assessments for most lower-income Mexican households. Third, labor costs are significantly less in Mexico compared to the U.S. This means that labor-displacing financial service technologies employed in the U.S. may not be appropriate in the Mexican context."⁹

I believe that some progress is actually possible in this area. The new underwriting system described in this paper can be deployed in either a manual or automated mode. Missing or incomplete data, and the absence of a credit bureau record, are recoverable, given alternatives of self-reporting, and other means of documentation and or verification of the information.

Another critical area is pricing, which should be market-driven on both the lending and deposit side. Creative approaches need to be explored on ways that cost can be lowered and risk diversified, or shared, in ways that will bring millions of dollars of dead capital to life. There is power in numbers that needs to be tapped effectively and efficiently.

Next, we explore in greater depth the areas that can be improved on the risk management side of the gap that may hinder creditworthy consumers from gaining access to credit.

The Underwriting Gap

There is an underwriting component that contributes to the gap between credit access and risk management. It is a blind spot in many loan underwriting systems that over-rely on quantitative models and automated underwriting systems. Technology has a vital role to play to boost efficiency and help measure and monitor credit risk. However, we need to control the models instead of the other way around. Loans need first to be properly classified and then risk rated. Many systems implement that process backwards. Second, credit scoring has not done an adequate job of assessing risk in the US subprime mortgage market. Lenders who depended on these credit scoring systems were measuring credit risk inaccurately and incompletely. Improper use of credit scoring and automated underwriting created incomplete risk analyses and weakened underwriting

standards and policies, and the end result was a drop in loan quality. Those who do not heed these lessons will expose themselves to a similar fate.

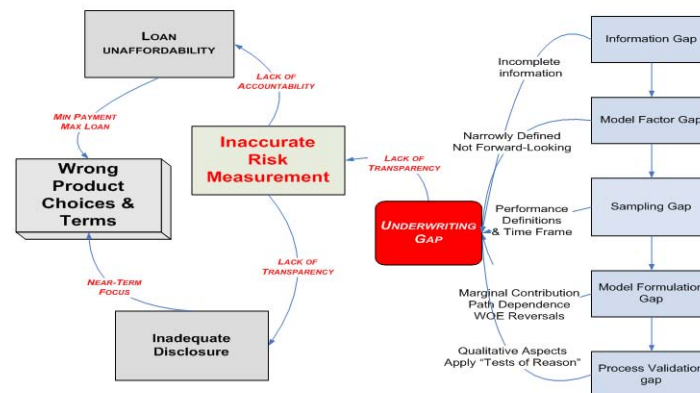


Figure 2. Visualizing the Underwriting Gap

There are several categories of shortcomings in current practices that are referred to collectively as the underwriting “gap” (Figure 2). The new lending system effectively narrows the gap, which enables users to qualify more creditworthy consumers, while anticipating incremental risk exposures in advance of loan performance declines. Rather than letting the models decide what factors are of primary importance, this system specifies five categories of factors that require coverage by one or more metrics. Before describing the new approach in detail, I want to return to the discussion of the underwriting gap, highlight one gap area in particular, and point to a few others.

There is an information component of the gap that relates to the breadth of information included. A colleague of mine, Dr. Michael Turner of the Political & Economic Research Council, headquartered in Chapel Hill, North Carolina, has conducted many studies over the past several years, and he has empirically established the value of full (both positive and negative) reporting of trade line information to credit bureaus. In Latin America, for example, there is a wide variation in the collection of this data. Countries where three quarters or more of the credit bureau files contain positive information include Colombia, Dominican Republic, Guatemala, Honduras, Mexico, and Uruguay.

Benefits of reporting positive payment data are threefold. For consumers, the probability of over-extension is reduced, they obtain greater and fairer access to credit, and credit offers can reflect not only credit risk, but also credit capacity. Lenders will experience improved loan portfolio performance, reduced provisioning and capital requirements, and achieve more sustainable and affordable growth in new and emerging markets. Lastly, the economy will benefit due to better financial services efficiencies and affordable growth in domestic consumption. Dr. Turner has also pointed to the catch-22 of having to be in debt to prove one is worthy of debt. Hence, it would be beneficial to capture non-credit payments made by consumers to establish a track record of meeting financial obligations. These would include, but not be limited to rent, utilities, and cell phone. There are many whose financial activities in the day-to-day existence are largely cash-based and therefore not captured by credit bureaus. Currently, seriously delinquent data—usually above 90 days late—is reported to the three national repositories. Few utilities fully report to one or more national credit bureaus. Using data from those that do, PERC was able to measure impacts on credit access, default rate, Type 1 and 2 error rates, KS statistic, Gini coefficient and other indicators of the predictive value and credit impacts of having this information included in a consumer’s credit file. The net take away is that there are dramatic increases in credit access for any given default rate. And KS increases significantly for the entire sample—between 2 and 10 percent. Amazingly, when one considers only the thin-file and no-file sample, that increase is an order of magnitude greater (over 300 percent)!

I would like to see the credit bureaus take information collection a step further to encompass the borrower’s income and capital. This would afford a 360 degree view of the borrower’s financial picture. The income information, coupled with their inventory of obligations, would enable the calculation of debt ratios for both credit and total obligations, and that would effectively capture borrower capacity. Relative to capital, any savings account, checking account, and investment account balances would be included in pooling liquid assets. Liquid assets, in combination with information about borrower income, can enable calculation of months of reserves—in other words, the number of months that the borrower could continue to meet obligations in the event there was an interruption in income. Real property ownership, and the associated estimated value, could also be included as a means to establishing other assets and borrower net worth, which might be considered as compensating factors in loan underwriting. In my view, the best loan underwriting system is one that enjoys the closest fit to the business, borrower, and market realities. In his book *The Mystery of Capital*, Hernando de Soto describes a capitalization process for moving dead capital to live capital. The simple fact is that physical assets acquired through extralegal property arrangements, and where there has been absolutely no dispute for a given period of time (perhaps one to five to ten to

however many years, depending upon the type of asset) are for all intentions and purposes owned by the party that holds possession of it. I hope that progress can be made in sorting out the legalities in light of the realities for establishing property ownership so that the possessor of the property is empowered to subdivide it, grant a share of ownership in it, use it for collateral, transfer ownership of it, sell it, and perhaps have greater incentive to develop it.

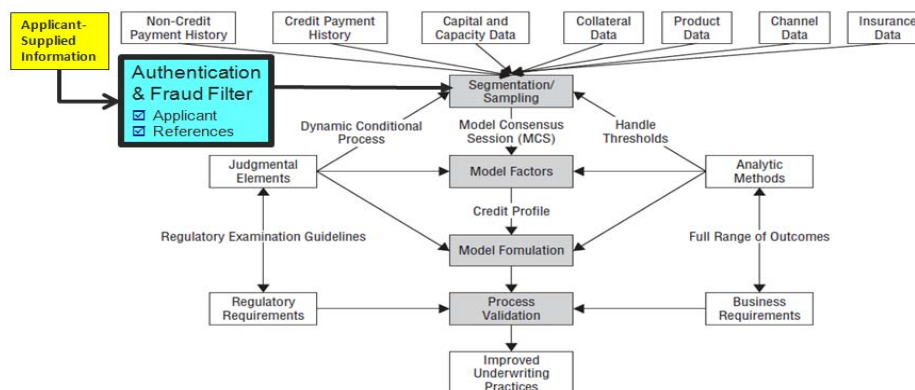
I understand that my suggestions for collecting sufficient additional information at a credit bureau to cover the determination of borrower capacity and capital are probably pie in the sky at this time. Certainly there are concerns around the individual privacy that might cause resistance to these suggestions. I believe these concerns can be addressed, however, through effective technology and proper safeguards.

My ultimate vision is that someday, instead of a hard to interpret score, the credit bureaus would be able to provide consumers with a single classification number, called a handle, that would provide them with the power to know their personal credit rating, and also the primary factors and associated sub-ratings that make it up. They would be able to have this information “on demand” and it would also appear every month on their bank statements for all loan and deposit accounts. Furthermore, the criteria that define their rating would also be shared, so that they would understand that if the threshold is four percent between low and moderate savings, and they are currently saving three percent, then they can improve their credit standing if they can put away just one more percent per month of their income.

In other words consumers would have knowledge of the impact of the choices they make and the actions they take on their ability to obtain credit. This sharing of information would inspire greater trust in a system that is transparent; a system that does not have one set of rules for some borrowers and not for others; a system that does not hold secret from the borrower the methodology that is used to determine their credit worthiness and calculate the probability that they will fail to make good on their promise to repay their debt.

Finally, there is another aspect that needs to be considered. The choice of factors that go into a credit bureau score, or a loan underwriting system, will ultimately influence the choices that borrowers make and the consequences of those borrower choices. In other words, the model for evaluating creditworthiness should not reward people who, while not past due on any payments, purposely overextend themselves. This is the danger of developing a credit score based purely on credit payment and usage information and not requiring capacity and capital factors to be included. Modelers may argue that, because of correlations with capital and capacity factors, they can substitute other factors that can effectively separate good and bad credit risks. As Benjamin Franklin said, “There is no substitute for common sense.” Such systems can bring on exactly the kinds of trouble that they were envisioned to prevent!

What about asking consumers to self-report key information? After all, they represent the richest source of data that pertains to their loan request. But can they be trusted to tell the truth? How is this addressed in the US? Allow me to provide a historical perspective on how this was handled in the US. When I joined Fair Isaac and Company in 1976, they had already produced in excess of 650 credit scoring systems worldwide. At that time, it was commonly held that maintaining consistency was paramount, and as a result, lenders should not introduce verification of scored credit application data for some applicants and not for others because it would not be consistent with historical development samples and would also cause inconsistency with future samples. Either every applicant needed to be verified for consistency (viewed as unnecessary and too costly), or none. The widespread practice was to authenticate the borrower but not to verify the actual factors used to qualify them because good versus bad loan performance could effectively be determined purely based on what credit applicants self-reported. The mantra then was “It’s not what they have; it’s what they say they have.” Again, it came down to trust—and during that time it worked in the US on a massive scale.



Credit Risk Assessment: The New Lending System for Borrowers, Lenders & Investors, Clark Abrahams & Mingyuan Zhang, copyright © 2009, SAS Institute, Inc. Reprinted with permission of John Wiley & Sons, Inc. [page 202, Exhibit 4.13]

Figure 3. Fraud Framework and Credit Framework Synergy

Today, verification of income and assets is not a legal requirement—it is up to the discretion of the lender to determine if when, and what they need to verify in that area. However, in light of the recent problem with mortgage fraud and misrepresentation of borrower income, there is regulatory guidance in place that seeks to ensure that lenders perform verifications when the loan amount is significant, as in the case of a mortgage loan. On smaller loans, especially unsecured credit, certainly one option would be random verification audits or to verify only every fifth loan applicant, which would reduce verification costs by 80%. Yet another option would be to have a fraud framework sitting behind the loan underwriting system which would detect any misrepresentations in the credit applicant’s identity, authentication of individuals supplied as character references, and other applicant data (Figure 3). For example, information about median income by the geographic area in proximity to the borrower’s address or the known range of compensation associated with borrower’s stated occupation, and similar data checks can be undertaken using fraud analytics. Indeed, the credit framework and fraud framework work very well together. CFOs will tell you that it is important also not to confuse fraud-related losses with credit quality problems!

There is a sampling gap that addresses the representativeness of the sample of loans and the way the performance of those loans is classified. Depending on who is included in the bad loan group, for example, possibly wealthy individuals who do not pay bills on time, then a statistical analysis might conclude that wealth is not a factor in lending! Another gap area deals with allowing a model to select the factors that can make up a credit underwriting system, instead of requiring that all relevant factors be included. There is also a model validation gap that is addressed by applying qualitative criteria in addition to quantitative analysis—in short, we need to look beyond the formulas to ensure that results make sense at all detailed loan segment levels. Model validation is a critical concern--so much so that, in my first book, the final chapter is devoted entirely to it. Another gap deals with the need for underwriting models to be more forward looking and not rely purely on historical data, but let me now describe how a more comprehensive credit assessment can be made and then how it will help to close the credit access gap.

Framework Construction

At this time, I must admit to the fact that I am experiencing what can only be described as reciprocal déjà vu. A third of a century ago, while at Fair Isaac & Company, I argued that we needed to replace judgmental lending with credit scoring. Today, I am arguing that credit scoring is inadequate and that we need to reconsider the value of judgment! On the face of it this may seem particularly odd, given that I am a mathematician and engineer by training and was a professional model builder for decades, and yet I am advocating a new lending approach that is not strictly by the numbers.

The fact is that this new approach, when contrasted with today’s lending best-practices, is:

- Simpler, yet more accurate
- Thorough, yet more concise
- Is based on a model that gets more predictive over time, not less so
- Is statistical in nature, yet is transparent and satisfies the test of common sense

While these might seem a bit paradoxical, you’ll see shortly how this is possible.

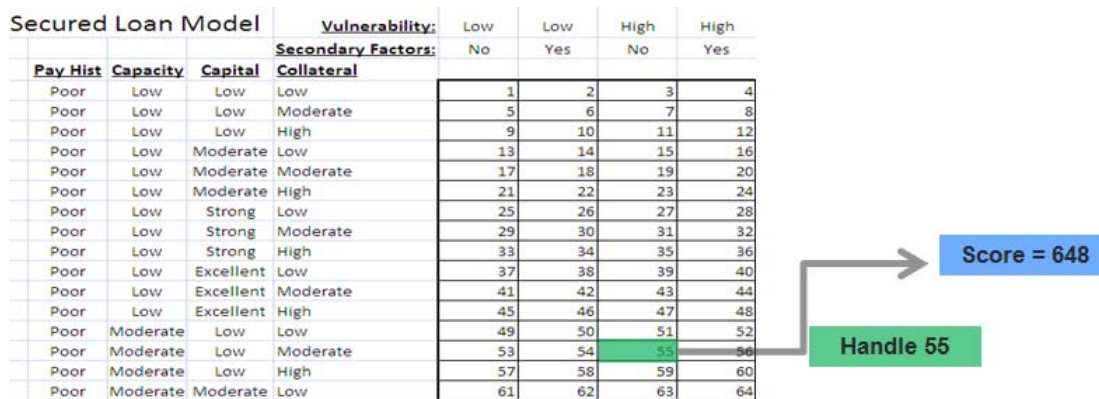


Figure 4. CCAF Handle: Single Segment Identifier with Associated Holistic Score

The new system has a single segment identification number, which we call a CCAF handle (refer to Figure 4), which provides borrowers with full disclosure on how they rate and the basis for their rating—no more secret sauce! Furthermore, borrowers are qualified only for the types of loan products, and in consideration of their collateral, that they can confidently repay. The new framework provides the lender with a single CCAF score associated with every handle that quantifies the risk of loan default based upon all of the relevant factors relating to the borrower and the transaction—no more system cut-off score overrides! Lenders are able to put the right product with the right borrower at the right time. Investors and rating agencies obtain better quantification of risk based on the holistic CCAF score and obtain added structural information about the loan pool backing the investment security based on the CCAF handle. In essence, they all get the same view and get better connected!

With the new underwriting system, loan applications are processed and first classified and associated with the handle. Credit underwriting policies based on credit bureau scores and ratios such as DTI and LTV tend to over or under penalize borrowers when viewed individually. They must be viewed jointly with all other relevant factors. FICO Credit bureau scores, so prevalent in the US, are incomplete measures of risk, and the notion that they represent the probability of loan default is basically flawed. The new Borrower Contour replaces the FICO Bureau Score to provide a 360 degree view – not just what is typically in the credit bureau file. The Transaction Contour replaces the entire loan underwriting model, including scores, judgmental overlays, credit policy directives (caps on ratios), and so on. Each handle cell represents a unique combination of primary factors and thresholds, and borrowers in the same handle cell have similar degree of credit risk. Since the financial crisis I have had calls from CEO's of banks. Some say we should have had more emphasis on the second C of credit (capacity), while others think the problem was the fourth C (collateral) because potential depreciation based on more recent price run-ups was not considered, and so on. I agree and think there was insufficient emphasis on all of the C's of Credit and all combinations of them!

The process of constructing a loan underwriting framework consists of first specifying scope and objectives, that is, the kinds of loans that are the focus, how we define performance relative to those loans, and over what time period. Next, domain knowledge is tapped to categorize the necessary types of factors that come into play to produce the desired result, that is, categories of factors that have the greatest causality on the final outcome based on established expert judgment. The default would be the 5 C's of credit: character, capacity, capital, collateral, and conditions. Character usually is assessed based on current and past payment of financial obligations, as sourced from credit bureaus, directly from merchants or service providers, or self-reported and possibly verified.

At this juncture, I digress a bit to consider some of the harder to quantify aspects of borrower character, namely persistence, will, determination, dependability, work ethic, and faith. What would be helpful indicators in these areas? I would offer that there are many possible sources of information from which character indicators could be derived, either mathematically or perhaps judgmentally. These include, but would not be restricted to, a history of demonstrated willingness to work multiple, different, and/or part-time jobs when needed, a solid work history with current job stability, on-the-job training, specialized experience, formal education, marketable and transferable skills, letters of reference, establishment in the community, service to country, community, and religious organizations, social network of family, friends, and neighbors, responsible behavior, and reasonably good physical health. This is very important information, particularly for individuals who do not have a history of credit usage and are in the low income tier.

I want to do some myth-busting around the notions that you have to be in debt to be worthy of a loan and that poor people are risky. To make it real, I want to share a story about a woman who is small in stature and had very meager beginnings, but who is a giant in terms of faith and determination. Her name is Estella, and I actually dedicated both of my books to her. Her story is as follows. She was raised in poverty in rural Tennessee, and her parents were share croppers. I first met her in 1959, when my parents employed her to help out in the home. In 1961, at age 47, Estella decided to take a big risk and buy a home. Everyone advised her against it, saying it was not a good idea and that in those days an unmarried woman, especially black and older, had too many forces working against her. But they did not know Estella and how much she wanted that home, which she saw as her security in old age and a chance to own a piece of the community in which she had decided to live. Estella had no record in the credit bureau, no formal education, no permanent job, but steady domestic work for several families and no debt. Her wage was a dollar an hour, and she had to pay her own way to get to and from work. Her life savings of \$4,700 made up the 20% down payment on a \$21,000 duplex home in San Francisco, leaving no financial cushion. She applied for a 15-year fixed rate loan. She rented out the lower flat. Here's how she rated at loan closing: her persistence, strength and faith were all very strong! Her other ratings were: credit history—none, capacity—poor, capital—poor, collateral—good, conditions—good. This transaction had a very good outcome for the lender and the borrower. In 1974, Estella paid her mortgage loan off in full (two years early, at age 60). In 2005, Estella sold her home for \$1.4 million, with zero debt. Today, at age 95, she is a millionaire.

Returning to the discussion of the 5 Cs of Credit, and character in particular, it should be noted that in place of classifying past credit performance by how established the borrower is, whether they have ever defaulted on an obligation, and their late payment behavior, one could simply come up with a rating based on different ranges of a credit bureau score. By doing so,

however, there would be a loss of transparency, due to the black box nature of credit scores. Concerning the remaining four of the 5 Cs of Credit, capacity deals with income, monthly obligations, debt-to-income ratio, and payment shock. Capital addresses net worth, liquid assets, months of reserves, and down payment/loan-to-value ratio. Collateral would cover properties (location, age, physical attributes) of the item being financed, any pledged assets, the valuation of those assets, and price volatility/liquidity over time. Conditions refers to the product terms (loan amount, maturity, pricing, payment options) and market/economic forces. Finally, a sixth factor is introduced that would cover any additional compensating considerations with a simple yes or no, signifying whether any of the required criteria were satisfied. This sixth factor is all-encompassing and might include formulas, if-then-else logic, scores, results from social network analysis, and so on. This approach is also appropriate for SME lending, where primary factors would encompass such things as the business owner's personal information, business information, financial performance/cash flow data, industry data, management strength, payment track record (traditional and alternative), economic and capital growth scenarios, market location and demographics, and relationship breadth and depth.

The following uses capacity as an illustration of how key metrics can "cover" each category of the 5 C's of Credit. Continuous metrics are made discrete by specifying threshold values to indicate major groupings. For capacity, two such factors might be: the savings ratio [none, low (less than 3%), moderate (3 to 7%), and high (8% or more)], and debt ratio [low (for values 30% and under), moderate (for values 31 to 45%), and high (for values greater than 46%)]. Next, generic risk ratings are used to label the individual metric groupings, all metrics relating to a specific category are combined, and all possible combinations of ratings are consolidated to one of a few category ratings (for example, low, moderate, and strong).

As previously noted, there is a sixth category that follows the 5 C's of Credit categories that we term secondary factors. It consists of business rules and various additional metrics that can come into play in the event that there is some weakness in one or more of the 5 C's of credit so that the chances of being approved for the loan are improved, but not guaranteed. Some examples of secondary factors are similar housing expense, years in profession, strong liquid assets, history of handling higher debt, level of discretionary income, and breadth and depth of banking relationship. Finally, all category groupings are combined to form the CCAF handle, which holistically and uniquely classifies every borrower. A decision table completely enumerates all handles and the associated loan approval decision. Each handle is associated with a degree of risk and also a frequency of occurrence. In instances where a decline decision is made, another table in the system (Figure 5) lists the four most important primary factors that could improve the borrower's chances of being approved.

SEG	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	SEG	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
REF	NET GAIN	NET GAIN	NET GAIN	NET GAIN	REF	NET GAIN	NET GAIN	NET GAIN	NET GAIN
NBR	RESULT	RESULT	RESULT	RESULT	NBR	RESULT	RESULT	RESULT	RESULT
102	PYMTHIST	CAPITAL	COLLATRL	SECONDRY	131	PYMTHIST	VLNABTY	CAPITAL	SECONDRY
	76	56	40	0		57	32	20	16
	APPROVE	APPROVE	APPROVE	DECLINE		APPROVE	APPROVE	APPROVE	APPROVE
103	PYMTHIST	VLNABTY	COLLATRL	CAPITAL	133	PYMTHIST	COLLATRL	SECONDRY	VLNABTY
	118	32	32	32		80	60	12	0
	APPROVE	DECLINE	DECLINE	DECLINE		APPROVE	APPROVE	DECLINE	DECLINE
104	PYMTHIST	CAPITAL	VLNABTY	COLLATRL	134	PYMTHIST	COLLATRL	SECONDRY	VLNABTY
	118	52	40	40		74	66	0	0
	APPROVE	DECLINE	DECLINE	DECLINE		APPROVE	APPROVE	DECLINE	DECLINE
107	PYMTHIST	VLNABTY	CAPITAL	SECONDRY	135	PYMTHIST	COLLATRL	VLNABTY	SECONDRY
	100	52	40	20		122	60	40	20
	APPROVE	APPROVE	APPROVE	DECLINE		APPROVE	APPROVE	DECLINE	DECLINE

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Figure 5. CCAF Handle Decline Reasons Ranked by Incremental Holistic Score Contributions

For example, handle number 131 corresponds to borrowers who have a poor credit history rating, yet high capacity, strong capital, high collateral, high vulnerability and no secondary factors. For this group, the greatest improvement in order of importance would be achieved by improvement in payment history (for 57 additional points), vulnerability (for 32 additional points), capital (for 20 additional points), and secondary factors (for 16 additional points). In this case, any of these improvements would result in loan approval. In general, the approve/decline decision associated with any specific handle varies as a function of the desired acceptance rate or target default rate, but handle-specific strategies can occur based on business objectives or secondary market guidelines. When adjusting the numerical holistic score cut-off, the system user can immediately see which handles, or borrower segments, are being included, in the case of lowering the cut-off, or excluded, in the case of raising the cutoff. As economic cycles progress, business objectives change, and market forces play out, lenders must respond by altering their lending policies. Today, adjustments can be made to a multitude of conditions based on various factors. Moreover, rules differ by loan product and sub-product, geographic location, channel, program, customer profitability

tier, legal entity, and so on. Implementing adjustments to credit policy is greatly simplified by the system, and it avoids the common pitfalls of today's process, whereby:

- **Restricting credit access**, referred to as tightening, is complicated (lots of levers to pull), time consuming, imprecise, and tends to over-correct, which results in the loss of profitable business
- **Giving greater access to credit**, referred to as loosening, is also complicated, time consuming, imprecise and tends to under-estimate the riskiness of certain segments of borrowers, which results in higher delinquencies and losses.

The framework affords sufficient flexibility to address these concerns and can also accommodate manual underwriting procedures and "unusual" circumstances that might arise in practice. Unlike scorecards, CCAF is adaptive. It gets more, not less, predictive over time and never requires replacement, which lifts a huge cost burden and loss exposure. It does this by continuously refreshing information as processing and performance data become available. Over time, the degree of risk associated with a handle can change, and the percentage of applicants associated with the handle can shift. These are easily measured, and the system is updated to maintain desired acceptance rates and to limit losses.

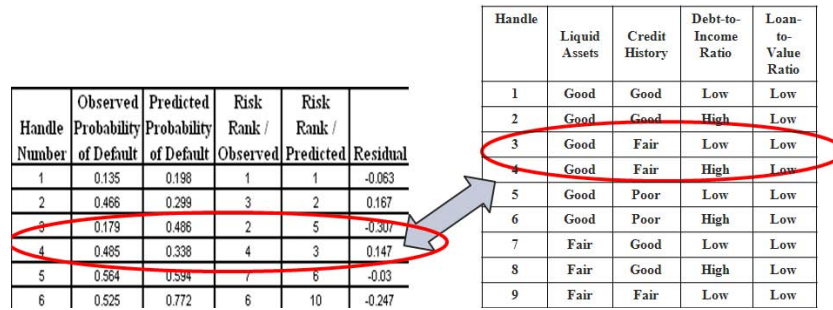


Figure 6. Common Sense Model Validation

In addition, it is possible to perform logical analysis to validate the risk ranking of handles. This is because of the natural ordering of the handles. In the example shown in Figure 6, handles 4 and 3 are identical except that handle 4 has a higher debt ratio and therefore should logically be riskier. Indeed, the observed probability bears this out—but the model had it the other way around. This can be detected at model development time, affording an added degree of transparency. Even if the separation is adequate overall, you will still want to know if there is internal consistency among the handles.

Summarizing, Figure 7 provides a side-by-side comparison of the new lending system with the typical score-based underwriting system. The contrast is stark, and the advantages are obvious over a number of factors, such as safely affording greater credit access, lower cost to maintain, greater reliability, less ambiguity, and greater clarity, credibility and comprehensiveness.

Pain	Credit Bureau Score	CCAF
Greater Credit Access	Too Blunt and Too Harsh an Instrument	Locates Pockets of Opportunity & Approves Qualified Borrowers Declined by Scoring
Reliability	Assumes Past Determines the Future Less Relevant Going Forward; <u>Loses</u> Power Over Time	Incorporates Future Scenarios; Factors in Economy & Markets; <u>Gains</u> Power Over Time
Clarity	Black Box	Full Disclosure
Ambiguity	Identical Scores for Borrowers Having <u>Different</u> Qualifications	Identical Handles for Borrowers With <u>Same</u> Qualifications
Credibility	Not Intuitive, Cannot Tell by Inspection	Makes Sense, Can Be Logically Validated
Comprehensiveness	<ul style="list-style-type: none"> • Narrow ⇒ Resulting in Over-emphasis of Credit Bureau Information / Inclusion of Irrelevant Factors (Relates to Lack of Coherence) • One-Size Fits All 	<ul style="list-style-type: none"> • Covers All 5 C's of Credit • Considers full context of borrower, collateral, loan product, and economic/market factors
Costly Model Re-Development	<ul style="list-style-type: none"> • Static Scorecard Becomes Less Predictive Over Time. • Changes In Economy/Markets/Borrowing Population Accelerate Loss of Power. • Worsening Performance Looms More Heavily as Model Replacement Approaches 	<ul style="list-style-type: none"> • Adaptive System Becomes More Predictive Over Time. • Relies on Proven Lending Principles and Reason, Not Purely on Statistical Correlations • Continuously Updates Data and Loan Performance.

Figure 7. CCAF Better Addresses Generic Loan Underwriting Issues

Transaction View—Impact on Borrowers

CCAF applies both to consumers that are out of the mainstream financial systems, whose data might be scarce, and to established consumers, where certain data might be over-emphasized while other data is ignored. In the latter case, risk might be overstated using typical lending approaches, which increase the number of undeserved credit denials and instances where the borrower is overcharged. Conversely, risk might be understated, which increases the likelihood of loan default and loss for the consumer, lender, and any purchaser of the loan, including investors and other capital market participants. Had this system been in place, the magnitude of the financial crisis might have been greatly lessened, or it might have been averted altogether.

The system achieves greater accuracy due to the fact that it closes the underwriting gap to better align with the business, borrower, and market realities, as previously discussed. It also has the advantage that it can locate pockets of opportunity among loan applicant populations traditionally considered to be higher risk and that are missed because of adherence to individual policy factors and traditional credit score cut-offs.

For some borrowers, there is risk due to weaknesses in other factors, despite having a good credit history. For other borrowers who have low credit bureau scores, or no history of credit, there may be strengths in other areas that can enable them to handle credit safely. There are many combinations to consider, and the new lending system does so explicitly, as shown in Figure 8 for nine borrowers.

No.	Borrower	Occupation	CCAF HANDLE	1 st C	2 nd C	3 rd C	4 th C	5 th C	Sec. Factors
1	Nate	Salesman	289	G	L	L	L	H	Y/N
2	Beth	Programmer	293	G	L	L	M	H	Y/N
3	Bob	Paralegal	301	G	L	M	L	H	Y/N
4	Jill	Exec Admin	337	G	M	L	L	H	Y/N
5	Joe	Plumber	247	F	H	L	M	L	Y/N
6	Carl	Construction	200	F	M	L	M	L	Y
7	Salina	Nurse	211	F	M	M	M	L	Y/N
8	Xavier	Accountant	223	F	M	ST	M	L	Y/N
9	Julie	Teacher	167	F	L	M	H	L	Y/N

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Figure 8. Classifying Borrowers Using CCAF

We now consider a couple of examples of how two individuals (Beth and Carl from Figure 8) would be evaluated using the new system, versus a system that heavily relied on the credit bureau score.

- “Beth is a programmer who works in the IT department of a large financial institution. Beth has only herself to support, but has trouble controlling her urges to take expensive vacations and wear the latest fashions. Beth drives a late model BMW that has proven expensive to maintain and which she financed at the dealer on the installment plan. She owes a lot of money, but always pays all of her obligations on time, even though they are the minimum payment she can get away with. Beth’s FICO score is 761. She has virtually no savings, and her capacity is low. Beth currently lives in an apartment, and she wants to have her own place and has spotted a townhouse that appears to be a great deal. She can make a 20% down payment with the help of her parents. So her collateral rating is moderate.

Result: With no additional factors in her favor, Beth would be classified into handle 293, with a CCAF score of 678. The greatest improvements in score would result from improvement in Beth’s capacity and capital, which would net her additional 119 and 52 points, respectively. The lowest qualifying score is currently 713, which is the lender’s CCAF cutoff score to maintain an 80% acceptance rate. If Beth could increase her savings and cut spending, she would be able to qualify for the loan in time. At present, however, CCAF would deny her request.¹

¹ Abrahams and Zhang (2009) op.cit. 1, p.196

- “Carl is a construction worker. He has a fair credit history due to the seasonality of his work. Although he comes up short from time to time, Carl is hardworking and proud of his trade. Carl’s FICO score does not take into consideration the circumstances, it just sees the tardiness, and his score of 645 is a stinging reminder of that fact. Carl has a moderate capacity. He seldom borrows, but helps his invalid mother with private nursing care. This is a big drain on his finances, but Carl is not about to let his mother down during her time of need. This has eaten up all of Carl’s savings, with the exception of the down payment of 20% he will make on the purchase of a modest ranch home in an older middle-class neighborhood in Cleveland. Carl is applying for a 15-year fixed rate mortgage. The value of the home he is looking at has seen no price change in the past ten years.

Result: CCAF would classify Carl according to his payment history (fair), capacity (moderate), capital (low), collateral (moderate), and vulnerability (low). As a result, he would be assigned a CCAF handle number of 200, and would be approved for the loan with associated risk score of 750. Carl qualifies for preferred pricing under CCAF. His 645 credit bureau score over penalizes him for his payment history and his lack of credit usage and does not see his sizable down payment using hard-earned savings over the years. As a result Carl will pay a subprime premium under today’s system, which punishes those borrowers who least can afford it. To raise his FICO score, Carl could stop paying for his mother’s sitters and run up a tab on his credit card and go out and buy a new car on the installment plan. Fortunately, Carl’s love for his mother and his financial discipline prevent that from happening.”²

No.	Borrower	Occupation	Bureau Score		CCAF Spanning 5 C's		
			Credit Score	Sub-prime?	Sub-prime?	CCAF Score	Loan Decision
1	Nate	Salesman	752	No	Yes	670	DECLINE
2	Beth	Programmer	761	No	Yes	678	DECLINE
3	Bob	Paralegal	756	No	Yes	674	DECLINE
4	Jill	Exec Admin	747	No	Yes	667	DECLINE
5	Joe	Plumber	658	Yes	No	737	APPROVE
6	Carl	Construction	645	Yes	No	750	APPROVE
7	Salina	Nurse	653	Yes	No	759	APPROVE
8	Xavier	Accountant	640	Yes	No	742	APPROVE
9	Julie	Teacher	658	Yes	No	762	APPROVE

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Figure 9. CCAF Compared with the Credit Bureau Score

In my book I provide some additional examples that illustrate the differences between the CCAF score and the credit bureau score (Figure 9). To summarize, there is a big difference between the way borrowers are classified, and their ability to obtain credit (in addition to how much they will pay for that credit) is significant. It is worth mentioning that being alert is important in risk management. In advance of performance downgrades, there are non-delinquent patterns that can emerge. Here I am referring to migration patterns in the handles and also to growing concentrations in some of the more high risk combinations of factors, or groups of handles.

For example, we could examine the size of the borrower population that lives paycheck-to-paycheck, with no savings, that are vulnerable to changes in their monthly loan payments, or to collateral depreciation. With the system, we could limit the percentage of borrowers that fall into that group at the time of loan application (Figure 10). This capability goes beyond early warning in that it can preclude the possibility of creating large concentrations of high risk segments in the loan portfolio.

On the other side of the coin, greater access might be afforded to applicants having acceptable borrower, collateral, and product combinations. One example would apply to my friend Estella, where her capital and collateral were low, but her collateral was rated moderate and she had low vulnerability.

² *ib.id.*, pp.199-200

ACCEPTEE POPULATION VLNRABTY BY CAPITAL BY CAPACITY

CAPACITY	CAPITAL	VLNRABTY	
		HIGH	LOW
LOW	LOW	0.00	1.18
LOW	MODERATE	1.09	3.00
LOW	STRONG	2.03	2.53
LOW	SUPERIOR	3.56	4.44
MODERATE	LOW	1.54	1.72
MODERATE	MODERATE	3.05	3.73
MODERATE	STRONG	4.00	5.58
MODERATE	SUPERIOR	3.99	7.11
HIGH	LOW	3.57	7.38
HIGH	MODERATE	3.08	7.34
HIGH	STRONG	5.72	7.70
HIGH	SUPERIOR	5.47	11.19



Borrowers Living Paycheck-to-Paycheck with No Savings and Vulnerable to Changes in Interest Rates and Collateral Value

Figure 10. CCAF Monitors and Limits High Risk Pockets of Transactions

The next section describes some broader uses and implications of the CCAF technology.

Big Picture View—Product Lines, Channels, Institutions, Countries and Entire Region

This new system has implications for improved institutional credit risk assessment and also balance sheet management, as well as market, country and systemic early warning. The system can aggregate loan origination information across product silos and channels within an institution, across institutions and geographical markets within a country, across countries within a region, and within regions that make up the entire global financial system (Figure 11). There are template frameworks that vary by product. For example, unsecured loans would not have the fourth C of Credit (collateral), whereas secured loans would include it. A particular instance of a template framework can be made to be institution specific according to the lender's internal credit policies and underwriting criteria. Alternatively, it might be maintained in a more industry standard fashion if it processes loans that will be sold in the secondary markets and therefore must conform to loan pooling requirements set forth by the issuer of the asset-backed security. Each instance of the system creates borrower and transaction level contours (collections of handles) that afford rich context supporting the lending process, and for each handle there is a corresponding holistic score that quantifies and conveys the credit risk associated with any loan. The borrower contour, consisting of the first three of the 5 C's of Credit could be captured and maintained at a credit bureau. This would alleviate the need to repeatedly ask the borrower for the same information, and it would have the added advantages of independent sourcing of the data and also keeping the data current. Of course, applicant self-reporting is the fall-back option.

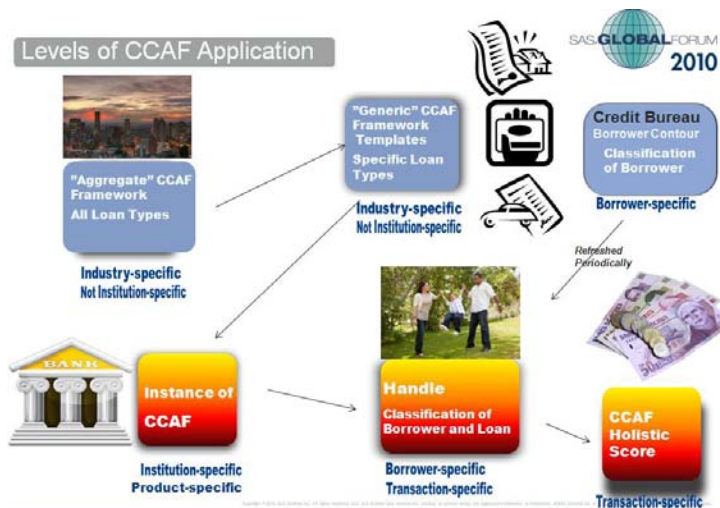


Figure 11. CCAF Framework Templates and Constructs

Certainly, credit access is boosted when secondary markets are opened up and lender balance sheet risk can be managed actively through periodic asset securitization and whole loan sales. This system can enhance the process by affording, with a single number, the means to select loans for pooling, to price them accurately, and also to provide loan level detail in the pool of loans to future investors who might want to better understand the loans and borrowers that are backing their investment. In today's market, there are too many disconnects between the borrower, the lender, the issuer, and the investor, with each party successively possessing less information about the loan transaction. CCAF delivers the same view throughout to all stakeholders along the lending value chain.

Conversely, for loans held in the bank book of business, there is much that can be gained through the mapping of loan handles (grouped by continuous CCAF holistic score bands) into risk rating categories similar to those used by rating agencies for marketable securities in general and corporate debt in particular. In my second book, I provide an example based on eight risk tiers that demonstrates how handle-based risk tiers can be constructed for loan products having different cash flow characteristics and maturities that are designed to align with a desired historical vintage of bond default probabilities.¹⁰ By grouping loans into more risk-homogenous buckets, financial analysts can more accurately forecast revenue, prepayments, and losses for the balance sheet as a whole. This also has implications for stress testing. Stress testing an entire portfolio by varying macro-economic and internal portfolio assumptions is more of a blunt instrument when compared to the approach where the handle structure is leveraged. By stress testing at the handle level, it puts greater context around the exercise. For example, a higher unemployment rate will disproportionately affect borrowers living paycheck-to-paycheck, with no savings, than those having sufficient capital reserves to see them through to the next employment opportunity. CCAF can immediately determine how much exposure there is to loans in the former group of borrowers, and the stress test should associate a much higher incremental rate of default for that group. Finally, at an enterprise level, the CFO can look at both his discretionary balance sheet and his customer-driven balance sheet as if all assets were in investment-rated tiers. He could visualize, and quantify, the layers of risk present at a holding company level, and he would be able to better determine how well capitalized the institution was based on the resulting enhanced corporate risk profile.

From a regulatory view, the new lending system would have significant implications for assessing the safety and soundness of financial institutions, the state of a nation's credit system, and even the global financial system. Essentially, the handle structure can be deployed and aggregated at any level. This facilitates benchmarking and peer comparisons across institutions, lines of business, industries, channels, regulatory jurisdictions, geographies, countries, and regions. At the country level, given some common reporting definitions, side-by-side comparisons could be made between countries relative to the percentage distribution among the handle-based risk tiers, the average loan default rate, and the average CCAF score (Figure 12). In fact, by consolidating across countries and continents, a handle-based global view of risk is possible. This would be most helpful to top government officials and global regulatory bodies who are concerned with managing systemic risk, in addition to large institutional and country risks.

CCAF Tiers	Mexico	Colombia	Argentina	Brazil	Guatemala	Peru
1	2	2	3	4	1	2
2	3	4	5	6	7	5
3	5	7	9	10	8	6
4	9	7	11	13	10	11
5	14	10	13	13	11	12
6	16	18	15	14	15	13
7	18	23	19	20	18	19
Below 7	33	29	25	20	30	32
Average Default Rate	6.2	6.6	5.6	5.3	5.7	5.8
Avg. CCAF Score	699	696	708	712	707	705

Figure 12. Country CCAF Rating Tiers—Hypothetical % Distribution

Finally, group composite country benchmarks could be created for comparing countries that fall into different groupings according to market size, population, economic activity, or other criteria.

CONCLUSION

Following are some key points around what is needed in a loan underwriting system:

- 1) greater flexibility to address unmet needs of all segments of society,
- 2) better risk measurement that emphasizes consideration of the full context of the transaction,
- 3) simpler is better,
- 4) should be thorough, yet concise,
- 5) should be transparent,
- 6) should get more, not less, predictive over time,
- 7) should be consistent,
- 8) should be backed by the facts,
- 9) must pass the test of common sense.

How are we to get there? The short answer is through collaborative effort to adopt a comprehensive analytic framework—by lenders, regulators, policy makers, data aggregators, technologists, academics, and, of course, a representative sample of consumers. Among other things, the following must be determined:

- 1) the primary areas that should make up a framework (5 C's of Credit is the default) using best judgment
- 2) the best indicators for those areas using the best science and available data
- 3) how to identify indicator threshold values and then assign generic ratings (for example, good, fair, poor)
- 4) how to combine indicator-based ratings into categorical ratings for each primary factor area

I would suggest that everyone needs to keep an open mind to possibilities and not succumb to the tendency toward business as usual. Also, it is best to start with a pilot and demonstrate success. This begs the question: "What are the rewards of closing the gap?" First, the needs among the underprivileged are better addressed, such as:

- 1) making it less costly to transact (paying and being paid),
- 2) making it easier to save,
- 3) improving everyday life,
- 4) making asset building more possible, and
- 5) having the opportunity to improve one's standard of living.

Second, more sustainable growth in consumer and small business sectors can be achieved. Third, greater economic stability and strength will be possible as we would be better positioned to cope with economic shocks and possibly avoid short term liquidity problems. Finally, there would be greater prosperity for society at large. On the other hand, failure to act translates to paying a higher price later on, in addition to suffering the consequences of inaction.

Let us join together to dispel myths, to discover truths, and to seize opportunity to foster inclusion in the financial mainstream. The system I have described to you will enable consumers to be evaluated more completely, so they can be put into the right product at the right price to meet their needs and enjoy a higher quality of life. It will enable lenders to evaluate risk accurately so that they can conduct business more profitably and deliver more value to their shareholders. For regulators, the new lending system renders the loan underwriting process more transparent and more easily monitored so that they can ensure that safe and sound practices are in place which will protect borrowers, lenders, investors, and the public at large.

The road to closing the gap between credit access and risk management is paved with better information used in the proper context. It is built through collaboration and trust, and it is illuminated by innovation and technology that delivers the power to know.

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Name: Clark R. Abrahams
 Enterprise: SAS Institute, Inc.
 Address: 700 SAS Campus Drive, T-4062
 Cary, NC 27513
 Work Phone: (919) 531-9316
 Fax: (919) 677-4444
 E-mail: clark.abrahams@sas.com
 Web: www.sas.com
 Blog: <http://blogs.sas.com/fairlending/>

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¹ Fair Lending Compliance: Intelligence and Implications for Credit Risk Management, Clark Abrahams and Mingyuan Zhang, Copyright © 2008, John Wiley & Sons, Inc., Chapter 6.

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⁸ Op. Cit. Abrahams and Zhang (2008), pp.280-283

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