



The Dynamic Relationship Between a Credit Score and Risk

How to Correctly Interpret a Credit Score During an Economic Downturn



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In an increasingly uncertain economic environment where consumer behaviors are suddenly and sharply shifting, lenders are re-examining their credit risk management practices and making adjustments to their programs in order to reduce risk exposures while meeting the needs of their existing and prospective customers.

A key item in a lender's risk toolbox is the credit scoring model. In this document, we provide a quick overview of what functions credit scoring models serve and how to interpret credit scores. We highlight the dynamic nature of the relationship between a credit score and the level of risk, and discuss strategies lenders may choose to follow to monitor and respond in a timely manner to changing risk levels in order to achieve their portfolio objectives.

HIGHLIGHTS

- Credit scoring models are widely used by lenders across the loan lifecycle, in decisions ranging from for whom to market credit products, who gets approved for a loan and at what terms, all the way to portfolio management and risk operations including collections strategies.
- Credit scores provide an assessment of the likelihood of borrowers defaulting on a debt obligation¹. The assessment is relative. That is, the score ranks consumers in a pool from the most likely to default to the least likely to default.
- The credit score does not translate into a fixed probability of default² nor predict losses. The actual rate of default will differ based on the product, the underwriting criteria being used, the quality of an organization's collections expertise and marketing channel, among other things.
- Lenders need to understand this dynamic relationship between the credit score and risk levels, and be ready to adjust their score cut-offs in order to maintain default levels within expectations as conditions change.
- A close monitoring of risk levels at a granular level is essential to responsively detect changes in risk and adjust credit policies in response.

¹ Default is defined as a failure to fulfill a debt obligation; in most cases, 90 days past due.

² Probability of default is the likelihood of a consumer's default over a particular period of time and is not only based on a consumer's credit history/financial behavior (i.e., credit score) but also takes into account the economic environment.

WHAT IS A CREDIT SCORE?

A credit score is a measurement of risk which provides an assessment of the likelihood that a consumer may fall significantly behind on a payment obligation over a certain period of time (e.g., become 90 days or more delinquent). The score is derived from a mathematical algorithm, or model, based typically on certain information available in a consumer's credit report. Credit reports are maintained by the three national Credit Reporting Companies (CRCs), Equifax, Experian and TransUnion, and contain information about credit accounts, revolving lines of credit, inquiries for new credit, collections and public records such as judgments, bankruptcies and tax liens.³

Financial institutions use credit scoring models, like VantageScore®, along with other information to make various credit decisions. Credit scoring models are also used widely in designing account management strategies, such as credit line management or retention programs, as well as in back-end risk management activities.

Credit scoring models are built on historical data samples, where the observations are meant to be representative of the more recent economic trends, lending practices and consumer behaviors. In addition to generic credit scoring models such as VantageScore, there are different types of custom models that may target a specific loan product, such as an auto loan or mortgage. Many financial institutions also build custom scoring models that are designed specifically for their portfolios.

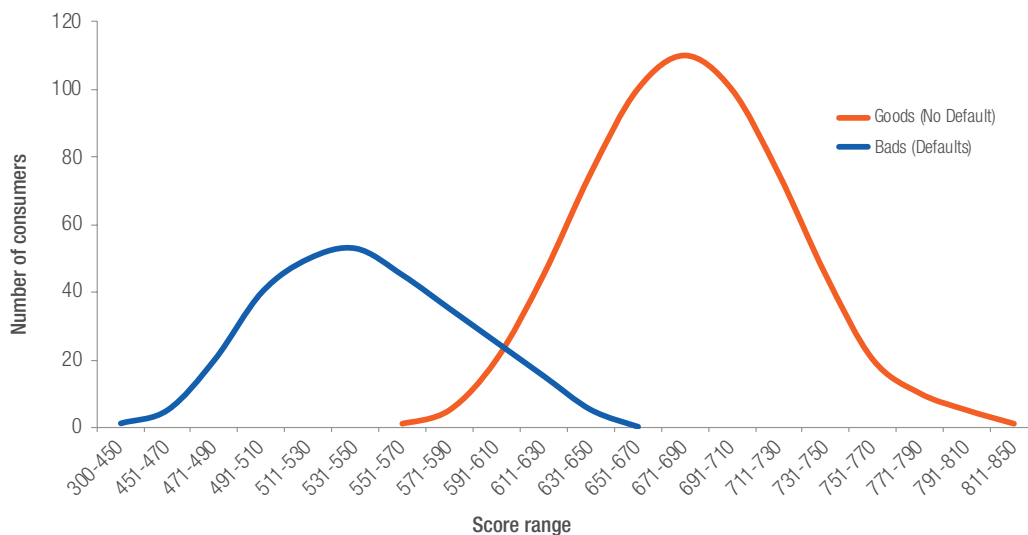
WHAT IS THE OBJECTIVE OF A CREDIT SCORING MODEL?

The objective of a credit scoring model is to accurately differentiate consumers who are more likely to default on their debt obligations from those who are not. The score assigned to a consumer represents the relative risk of that particular consumer compared with the broader pool of consumers who are being assessed.

Typically, the models are designed such that a higher score denotes a lower level of relative risk (a score range of 300-850 is commonly used in generic credit scoring models). An effective scoring model consistently assigns lower scores to consumers who present a higher risk, and higher scores to consumers who are lower risk.

When the score distributions of consumers who eventually default over the measured timeframe (or “bads”) are compared to the score distributions of consumers who do not default (or “goods”), the two score distributions look similar to what is displayed in Figure 1 below:

FIGURE 1: Credit Score Distributions – Defaults vs No Defaults

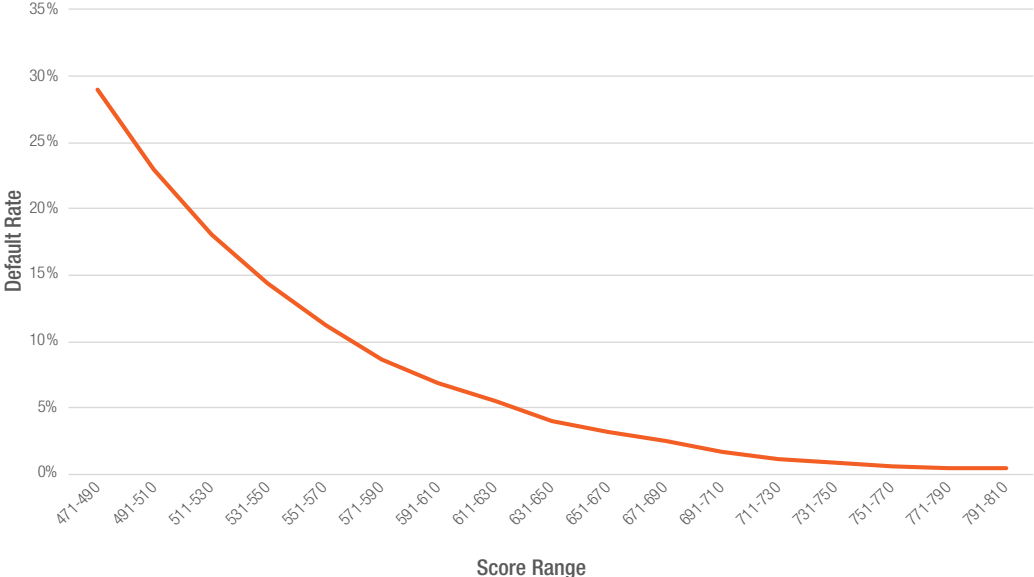


Models that are effective in discriminating between higher and lower risk consumers will result in score distributions for “goods” and “bads” that are significantly different.

³ Not all credit scoring models include collections and public records. The VantageScore 3.0 and VantageScore 4.0 models maintain credit scoring accuracy and predictive power - without lowering risk standards - by removing tax liens, civil judgements, medical and non-medical collections from credit files. For more information, read the whitepaper “[Negative Data Suppression and Impacts on Credit Score Models](#)”.

An effective model will provide a monotonic relationship – one that doesn't increase nor decrease - between the score and actual default rates. Further, the steeper slope of the curve that represents the score-to-default relationship, the stronger the underlying model performance is; whereas, a flat line will imply a completely ineffective model. Figure 2 represents such a relationship where the actual default rates, as measured by 90+ days delinquency, are plotted for each corresponding credit score interval. The model displayed here appears to be highly effective in separating risk.

FIGURE 2: Score-to-Default Rate (90+ Days Delinquent in 24 months) Relationship



THE DYNAMIC RELATIONSHIP BETWEEN CREDIT SCORE AND RISK

A robust model maintains its effectiveness over time in rank ordering consumers based on their relative risk. Further, if the model is built on sufficiently large and representative samples, it can accurately assess risk across different credit products. In other words, a score of 600 always suggests a higher level of risk than a 700 and a lower level of risk than a 500, regardless of when this assessment is made and for what type of credit product. It is important to note, however, that the absolute levels of risk, or the percentage of defaulting consumers in a given score range, may fluctuate.

Key factors that lead to fluctuations over time in absolute levels of risk include macro conditions, such as unemployment rate, level of economic activity and interest rates. As the recent Great Recession (2007-2010) experience reminds us, consumers' ability to keep up with their debt obligations and the hierarchy of their payments (i.e., which payment obligations they choose to meet given limited financial capacity) may change as their financial health diminishes due to adverse economic conditions. In contrast, during periods of economic growth and favorable credit conditions, we see a general reduction in risk levels across the board.

The macroeconomic environment not only impacts the distribution of credit scores (e.g., there may be more consumers with lower credit scores in an unfavorable economic environment), but also the levels of delinquencies and defaults observed for a given credit score. Similar trends may be observed when differences in macroeconomic conditions are taken into account across different regions of the country.

Other factors may also contribute to changes in risk levels over time. For example, underwriting practices may tighten or loosen (reflecting perhaps the condition of the economy, changes in level competition or changes in regulatory regime) which can then lead to differences in the levels of delinquencies or defaults observed for a given score.

A comparison of the score-to-default risk relationship across several national, independent random samples of consumers collected over multiple years illustrates this point very well.

Figure 3 depicts the relationship between the levels of credit scores and defaults (as measured by delinquencies of 90 days or more) for new loan originations across different vintages. The same credit scoring model is used at each time period and loans contained in the sample represent a variety of products, including credit card, auto, mortgage, personal loan and other products.

While the strong rank ordering ability of the model over time is visible in the graph, it is clear that the default levels vary from one yearly vintage to the other. The top curve in green represents loans originated in 2008, or at the height of the financial crisis, where observed default rates have up to 200-250% higher risk when compared with loans originated in 2017 using a similar score (gray curve in the graph). For example, a score of 620 would lead to a default rate of 6.63% for 2008 originations, compared with a default rate of 3.57% for 2017 originations. A score-cut of 680 in 2008 would be necessary to achieve the same default experience as a score-cut of 620 would provide in 2017. A sharp decrease in default risk for new originations in 2009 is observed in the graph, likely reflecting the significant tightening in underwriting standards.

FIGURE 3: Changes in Score-to-Default Relationship Over Time – New Originations

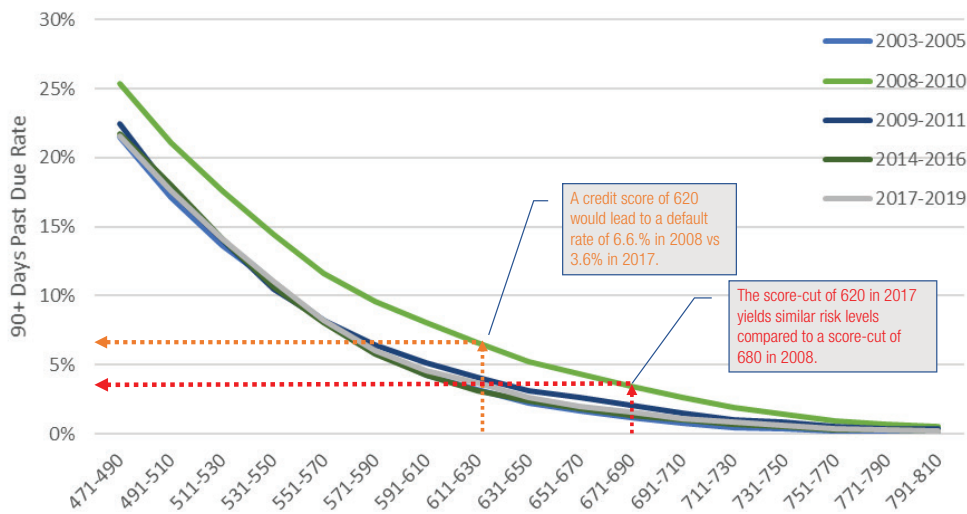
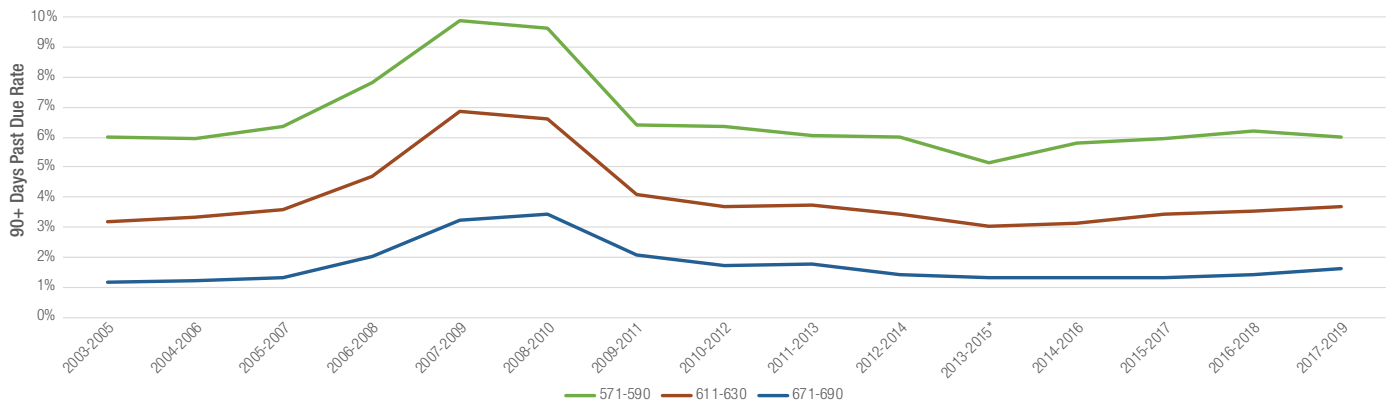


Figure 4 provides an alternative visualization of the changes in risk levels over time. Here, the default rates over the subsequent 2-year performance windows for three credit score bands are plotted across several vintages of originations from 2003 to 2017. The increased levels of risk for 2006-2008 originations and the subsequent decline and relative stabilization of default rates appear to follow a consistent pattern across score ranges, while the rank ordering across the scores is maintained.

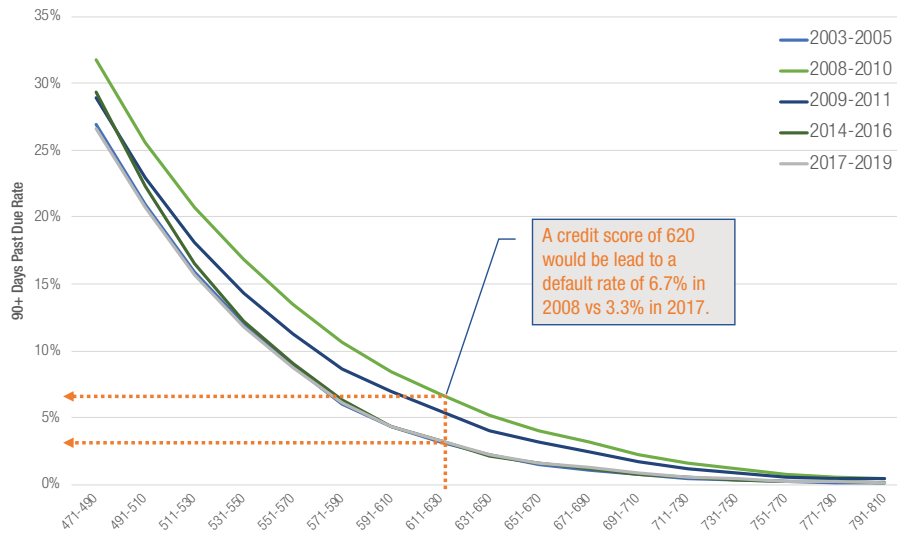
FIGURE 4: Default Rate Changes Over Time for Specific Credit Score Ranges



A similar trend is visible when the score-to-risk relationship is examined for accounts existing at different points in time (Figure 5). Similar to what was observed for originations, the observed default levels were significantly higher for existing loans in 2008 when compared to those in either the pre-crisis or post-crisis years. In fact, the default rate over the next 24 months for loans

existing in 2008 was 6.74% for a score of 620, compared to 3.26% in 2017, representing more than 200% increase. The 2009 levels show the heightened risk levels present in the portfolios during that time period, reflecting the effects of the financial crisis.

FIGURE 5: Changes in Score-to-Default Relationship Over Time – Existing Accounts



Risk levels will also differ depending on the product (for example, an unsecured credit card vs. an auto loan), particular underwriting policies used, product terms and marketing channels. Lenders understand these product and strategy-specific impacts and incorporate them into the design of their lending programs and risk projections.

The bottom line is this: a credit score does not predict the absolute level of risk; it is not designed to do that. At any point in time, the score can be translated into an estimate of risk, based on the various factors impacting risk levels, but this relationship changes meaningfully over time.

CREDIT SCORE CUT-OFFS

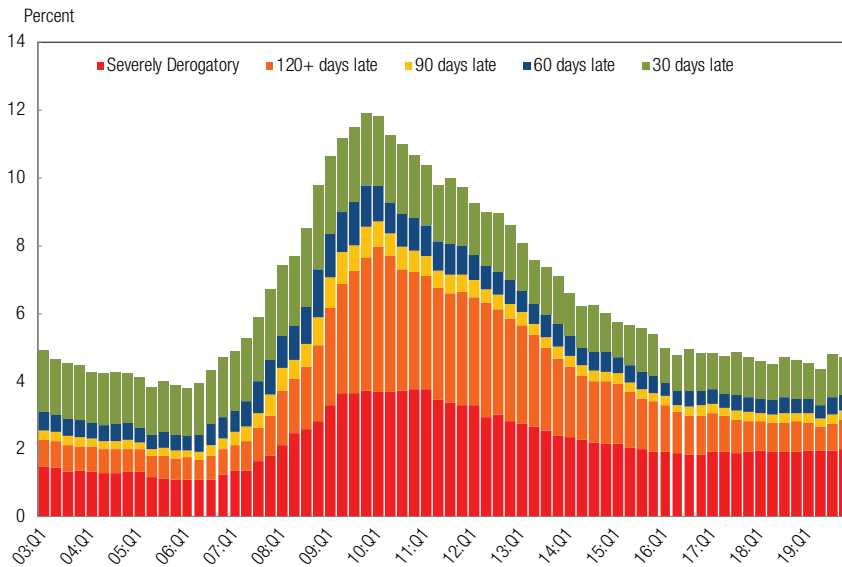
Lenders leverage credit scoring models in different ways as part of their loan originations, underwriting and portfolio management decisions. Typically, a cut-off score is established in line with the institution's risk tolerances, where the cut-off represents the point below which expected risk level is high enough such that credit will not be extended or the consumer will be subject to a different treatment, such as additional risk controls or overlays. Lenders may have multiple cut-off scores in place, each tailored to a specific consumer, portfolio segment or pricing strategies.

Defining the cut-off score value requires detailed analyses of the economic tradeoffs between the marginal benefit (i.e., potential additional revenue) and marginal cost (i.e., the potential of increased credit loss). The score-to-default relationships are evaluated in determining the score cut-off, and, given the dynamic nature of this relationship, close monitoring of risk results and building in forward-looking expectations and scenarios around how those results may change are necessary in setting, or sometimes re-calibrating, the score cut-offs. This is where macroeconomic projections, changes in targeted consumer populations, expected changes in account management strategies, etc., are considered to arrive at estimated future default levels corresponding to various credit score ranges.

MONITORING FOR CHANGING ECONOMIC TRENDS

As of early 2020, the U.S. economy was experiencing the longest economic expansion in history following the fallout of the Great Recession. Lenders were experiencing favorable credit market conditions, with delinquencies remaining at low and stable levels (Figure 6) and consumer confidence remaining strong. However, with the abrupt and massive slowdown in economic activity experienced in March due to COVID-19, and the significant level of uncertainty regarding how quickly the economy will rebound, how bad unemployment will become and how quickly consumer confidence will recover, it is almost certain that consumer credit risk will exhibit severe deterioration. Even though the current crisis represents a unique and unpredictable source of uncertainty, credit cycles do present themselves with some regularity.

FIGURE 6: Trends in Consumer Credit Delinquency Levels



Source: New York Fed Consumer Credit Panel/Equifax

In an environment where risk levels and consumer behavior are rapidly shifting, it is imperative that institutions using models put in place effective monitoring mechanisms to timely detect and react to changes in risk levels and risk behaviors, in order to make adjustments to score cut-offs, underwriting and risk management practices.

Credit scoring models should continue to provide effective rank ordering of risks provided that the historical credit behaviors observed in the development samples continue to remain representative of the ‘through-the-door’ consumer populations. Monitoring the stability of the populations by looking at how consumer profiles, key credit factors and credit score distributions are changing and shifting will be essential. The rank ordering ability of credit scoring models can be tested through a series of statistical measures, and early performance indicators can be added to the battery of tracking metrics.

Changes in score-to-default rates will need to be closely monitored, and score cut-offs may require recalibration to reflect changing expectations about future performance and increasing levels of uncertainty. Risk managers often incorporate additional levels or conservatism to their risk projections to account for uncertainty and will apply on-top adjustments to model outputs in an attempt to compensate for increased model risks, particularly in segments where the model performance may be weaker. Timely monitoring of risk performance at a sufficiently granular level will allow lenders to actively detect and respond to adverse changes in risks; helping maintain the safety and soundness of their portfolios.

The VantageScore credit score models are sold and marketed only through individual licensing arrangements with the three major credit reporting companies (CRCs): Equifax, Experian and TransUnion. Lenders and other commercial entities interested in learning more about the VantageScore credit score models, including the VantageScore 4.0 credit score model, may contact one of the following CRCs listed for additional assistance:

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