S&P Dow Jones Indices

A Division of S&P Global

S&P/Experian Consumer Credit Default Indices

Methodology

August 2020

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Introduction

Index Objective and Highlights

The S&P/Experian Consumer Credit Default Indices are designed to measure the proportion of consumer credit account balances that go into default each month.

The Index family consists of four headline indices by loan type and a composite index:

- S&P/Experian Auto Default Index ('Auto Index')
- S&P/Experian First Mortgage Default Index ('First Mortgage Index')
- S&P/Experian Second Mortgage Default Index ('Second Mortgage Index')
- S&P/Experian Bankcard Default Index ('Bankcard Index')
- S&P/Experian Consumer Credit Default Composite Index ('Composite Index')

The balance weighted national composite index is designed to measure default rates across all four loan types. Additionally, granular indices by geography (at the Metropolitan Statistical Area, state, census division and census region levels) are available, and custom indices can also be created based on specific client requirements.

The indices are calculated based on data extracted from Experian's extensive consumer credit database. This database is populated with individual consumer loan and payment data submitted by lenders to Experian every month. Experian's base of data contributors includes leading banks and mortgage companies, and covers approximately $11 trillion in outstanding loans sourced from 11,500 lenders. These lenders report to Experian based on billing cycles, which are spread throughout a month. All these data are aggregated monthly as of the archival date, which is the last Saturday of every month. The index values are, then, published on the 3rd Tuesday of the following month.

The index values are calculated based on the empirical payment behavior of an underlying sample population. In January 2009, a 5% sample was taken from Experian's name list of 280 million consumers. This base sample is refreshed every month with new customers that are added to the Experian database. All relevant accounts (auto loans, credit cards, etc.) for the consumers in the sample are included in the index calculation. These data are, then, used to calculate the balance-weighted proportion of accounts that have gone into default for the first time for each loan type.

The definition of default varies by product terms; for closed end installment loans (auto, first mortgage, and second mortgage), default is defined as 90 days past due (dpd) or worse (i.e. 120 dpd, 180 dpd, foreclosure) and for open end revolving products (bankcard) default is defined as 180 days past due or worse. In addition, bankruptcy, repossession, and a write-off also constitute a default. By design, an account will be classified as a default only the first time it meets the criteria, to prevent double counting of the same event. The published indices measure consumer defaults at an aggregated level, and do not contain any information on individual loans, consumers or transactions.

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

Collaboration

These indices are calculated and published under an agreement between S&P Dow Jones Indices and Experian.

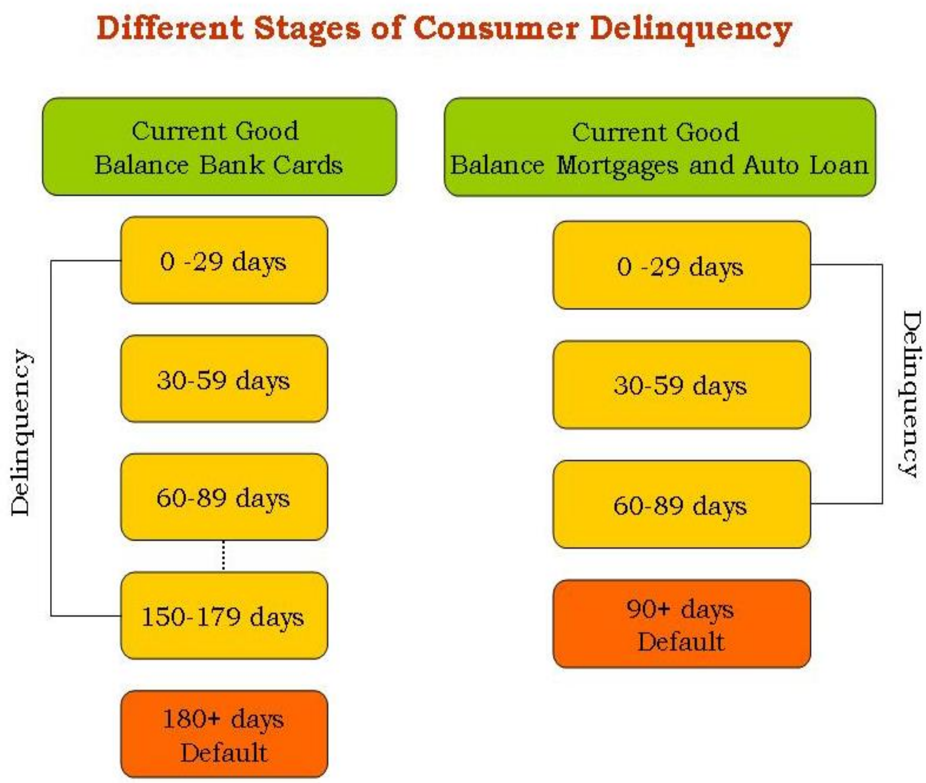
For a list of defined terms used throughout this document, please refer to the Appendix.

Defining Consumer Default

Lenders typically classify their consumer accounts based on a graduated scale of payment in arrears. Payments in arrears are reported monthly to Experian in the form of days past due. Two payments in arrears is the first level reported to Experian as dictated by Fair Credit Reporting Act (FCRA) guidelines and corresponds to 30 days past due. Each subsequent missed payment adds 30 days to the delinquency; hence a consumer who has a 90 day past due account has missed four payments. When a lender deems the statement balance of a consumer account to be uncollectible, the consumer account is said to be in default. A default is deemed to have occurred with any of the following:

1) Serious Delinquency – Serious delinquency shall mean accounts where a payment is in arrears 90 days or more for first mortgages, second mortgages, or auto loans, and 180 days or more for bankcards.

Below is an example of the typical stages that a bad account may go through.



2) Write-off – This occurs when a lender determines that a loan is no longer collectible, and writes off the loan amount.

3) Bankruptcy – Bankruptcy occurs when a borrower seeks court protection to re-organize their debts. In such circumstances outstanding loans are typically deemed non-recoverable and in default.

4) Repossession – Repossession occurs when a lender takes back ownership of the collateral that a loan is based on. In this event the loan is immediately considered in default.

By design, an account will be classified as a default only the **first time** it meets the criteria, to prevent double counting of the same event. Once an account is classified as a default, it is removed from the sample regardless of its status in subsequent months. The consumer’s other accounts in the data sample are not removed.

Sample Selection

Experian Database

The S&P/Experian Consumer Credit Default Indices are calculated based on sample data extracted from Experian's broad consumer credit database. This database is populated with individual consumer loan and payment data submitted to Experian. Experian's proprietary national database houses present and historical consumer credit pay behavior, balances and credit limits on over 280 million U.S. consumers for over $11 trillion in loans, and credit lines and leases sourced from over 11,500 contributors (e.g. banks, credit unions, retailers, etc).

By using loan level data sourced directly from lenders, the S&P/Experian Consumer Credit Default indices reflect recent consumer default trends. Unlike other indices, these indices do not use pools of securitized loans as an input, and are designed to reflect all individual loans made to consumers.

Base Random Sample

In January 2009, a 5% random sample, based on zip code and address, was selected from Experian's master database of over 280 million consumers. This translated into a significant sample size of 14 million consumers. This sample allows consumer payment behavior to be tracked over time. To keep up with the growth in Experian's consumer database, the base sample is augmented each month with a 5% random sample chosen from the new additions to the database.

Once the initial base list of consumers was determined, all accounts associated with each of the consumers were retrieved from the Experian archives. Accounts eligible for inclusion in an Index fall into four Account Product Types:

- Auto Loans – all auto loans and leases
- Bankcards – revolving cards issued by banks (excludes private label or retail cards)
- First Mortgages – first home mortgages
- Second Mortgages – closed end second mortgages and home equity loans (excludes Home Equity Lines of Credit)

Other account product types are not within the scope of this Index family, and were excluded. Each consumer may have multiple accounts per Account Product Type, or across different Account Product Types. Thus the number of accounts may exceed the number of consumers in the Base Random Sample.

The group of consumers drawn in the January 2009 sample, in addition to the new ones taken every month, stay in the Base Random Sample permanently. The same named list of consumers is also used to generate the index history. Since Experian does not eliminate defaulted accounts or consumers from its master database, and the sampling procedure was not based on any credit worthiness metric, the sample has no survivorship bias.

The zip codes and addresses that the sample is based on, preserves a geographic distribution and lends itself to data aggregation along the lines of state, census division and census region levels, as well as at the Metropolitan Statistical Area level.

The Metropolitan Statistical Areas (MSAs) are geographical divisions based on central urban areas as defined by the Office of Management and Budget. Each area has a large population core with adjacent counties that surround it. MSAs are used by federal agencies to gather and analyze various statistical data.

The Census Bureau divides the United States into four census regions and nine census divisions for statistical and representational purposes. The Census regions are the West, Midwest, Northeast, and South. The Census divisions are New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East south Central, West South Central, Mountain and Pacific.

Exclusions or Down-Weighting of Accounts Based on ECOA Code

To seek to ensure that default rates are calculated more accurately, some individual accounts may need to be excluded or down-weighted. Individual loans can appear on credit reports for multiple consumers when there are joint owners, authorized users, or a cosigner. When credit reports gathered on consumers are used to gather statistics on the underlying accounts, the multiple associations can lead to over-counting of loans. However this can be systematically adjusted for, since each account on a credit report contains an ECOA (Equal Credit Opportunity Act) code indicating the consumer's relationship to the account, reported by the lender. Some ECOA values indicate that the loan appears also on a different consumer's report (see table below). Using these codes to exclude or down weight accounts, more accurate loan counts can be obtained. For example, authorized users are excluded since authorized users are not responsible for paying the bills on the account. Similarly joint accounts and accounts held with cosigners are down-weighted. This prevents the indices from underestimating the default rates as joint accounts generally perform better than accounts held by an individual.

The table below shows the different ECOA codes and the weights given in the index to individual loans based on the code type.

ECOA	Weight	Relationship Indicated
0	1.0	Undesignated
1	1.0	Individual Account
2	0.5	Joint Liability
3	0.0	Authorized User
4	0.5	Joint (2 or more consumers on the account)
5	0.5	Co-Signor Not Spouse
6	1.0	On Behalf of Account
7	0.5	Subject Primarily Responsible But Has Co-Signor

Refreshing the Sample

In order to prevent the base sample from aging disproportionately, new consumers are added to the sample monthly. The base sample selected in January 2009 is augmented every month with additional new consumers. The new consumers are a random 5% sample of the consumers that have had a Personal Identification Number (PIN) generated during the previous month, thus preserving the sample as a representation of the entire set of consumers. A filtering process is used to separate consumers which have a PIN and credit account from those who only have a PIN. Only consumers with an existing open account(s) are selected. Then, each new consumer added to the sample is assigned a number sequentially; thus, the first new consumer in a given month is assigned the number following the last added consumer from the previous month. This provides the ability to track how many new consumers were added and during which period. Once a consumer is in the sample, the consumer theoretically remains in the sample forever, although an indication that the consumer is deceased or lack of recent account activity will eliminate the consumer from inclusion in the various indices.

The table on the next page shows how new consumers are added to the sample each month. The table below shows the last sequence number in the sample on a given month, and a count of new consumers added to the sample for each month in 2009. The count of new consumers is broken down by those with and without account data to highlight that most of the new consumers added to the sample do not have account data in the first month they are added to the sample.

New Sequence Number Table

Month	Unique Sequence	New Sequence Numbers: With Accounts	New Sequence Numbers: Without Accounts
200901	14,409,109	0	0
200902	14,501,616	13,655	78,852
200903	14,584,354	12,098	70,640
200904	14,652,643	12,469	55,820
200905	14,730,755	13,017	65,095
200906	14,810,894	13,409	67,090
200907	14,876,831	10,326	55,611
200908	14,944,015	11,747	55,437

Adjusting for the sample percentage (by dividing by 5% and annualizing by multiplying by 12), the count of new consumers added with accounts in the first month is approximately 3 million consumers per year. Consumers without account data include both those who will, over time, acquire account data and those that never will. In the table below the first cohort of new consumers added (those from February 2009) is checked in later months to see how many later acquire accounts.

Acquisition of Accounts by the First Cohort of Consumers to Refresh

	With Accounts	Increase month over month	Increase from February
200902	13655		
200903	14485	830	830
200904	15056	571	1,401
200905	15565	509	1,910
200906	16003	438	2,348
200907	16271	268	2,616
200908	16901	630	3,246

Generating the Historical Sample

Accounts of consumers included in the Base Random sample were retrieved from February 2004 to January 2009, for a total of 60 months. The number of consumers increased from about 12 million in February 2004 to about 15 million in August 2009. Since Experian does not eliminate defaulted accounts or consumers from its master database and the sampling procedure was not based on any credit worthiness metric, the sample has no survivorship bias.

Comparing the Historical Data to Present Data

The five-year historical sample was built using a list of consumers from the Base Random Sample generated in January 2009.

The following approach was developed to measure the arrival of new consumers to the sample:

For each month, a maximum PIN was obtained from the account data. Each month, account data was analyzed to identify the sequence numbers of the files with PINs that were greater than the three month lagged maximum. The count of those sequence numbers represents an estimate of the new consumers added to the file in a trailing quarter. A distribution of the number of PINs per sequence number was also calculated and the proportion of sequence numbers for which the new PIN was the only one was also captured. This is a measure of the degree to which a sequence number with a new PIN is interchangeable with a new PIN. The analysis validated that the rate at which new consumers are added to the sample is fairly consistent before and after January 2009.

Index Calculation

Measuring New Defaults

The S&P/Experian Consumer Credit Default indices measure only new defaults (i.e., a specific account in default will be included in the Index only once. Thereafter it is excluded from all future index calculations.) To seek to ensure that this is the case, a High Water Mark indicator is used to record the worst delinquency status of the account. Any accounts previously meeting the default definition are excluded from the index. Default is defined as 90 days past due or worse for auto loans, first and second mortgages, and 180 days past due or worse for bankcards. In addition, bankruptcy, repossession, and a write-off also constitute a default.

Approach

The foundation of the index construction is to identify the qualifying accounts in the sample, separate them into good (never defaulted) and bad (newly defaulted) accounts, count the statement balances in each group, and then calculate the proportion of the statement balances of the bad accounts to the total statement balances of both the good and the bad accounts. The bad accounts are those accounts deemed to be in payment default status; and the good accounts are accounts that are current, as well as those accounts in different stages of delinquencies, collectively referred to as accounts in good standing.

In the Experian database, dollar balance is the outstanding amount in each account. It may include original borrowing amount, plus fees, accrued interest, penalty charges, etc. This definition of dollar balance may not necessarily match the definitions used by other publicly available indices.

Archival Date and Data Consolidation

Creditors report according to billing cycles which correspond to the calendar month. Revolving products like bankcards spread their consumer statements across multiple billing cycles throughout the month and creditors typically report shortly after each billing date. Installment lenders may also have multiple billing cycles for their portfolios, but creditors typically report the refreshed data of the entire portfolio at one time near the end of the month.

In order to calculate the index using the approach described above, a snapshot of the entire sample credit file is generated on the Archival Date (i.e., the last Saturday of every month.) This process results in archive periods of either four or five weeks, depending on the number of days in the months and how close the last Saturday is to the last day of the month. The current archive is processed, the account information of the base random sample is updated, and a profile sample is created. The current profile sample is, then, compared with the previous month's Profile Sample to exclude accounts that have been in default in the previous month.

Finally, quality assurance reports are run to seek to ensure data integrity. In the event that data contributors delay in sending in their monthly data, the Index Committee will determine what the appropriate measures should be. Historical analysis on the timeliness of data contributors' reporting indicates that this is not a major issue.

Index Calculations

The monthly counting process creates a record for each of the loan types -- Auto, Bankcard, First Mortgage, and Second Mortgage – containing the following fields:

- sum of balances for newly defaulted accounts
- sum of balances for open good accounts

It is best to think of each monthly index calculation as a two-step process.

Step 1: The following metric is calculated for the month:

$$\frac{\sum \text{Balances for accounts that are newly defaulted in the month}}{\sum \text{Open good balances and newly bad balances in the month}}$$

Call this the monthly core metric.

This metric is annualized by multiplying the result by 12, and reported in percentage terms by multiplying by 100, to arrive at a monthly default value.

To minimize the month-to-month volatility of the index, the statement balances use a rolling three-month period. The index is, then, the rolling three-month sum of the newly bad balances divided by the rolling three-month sum of the newly bad and open good balances. Thus,

Step 2:

$$\frac{12 * 100 * \sum \text{Three months of newly defaulted balances}}{\sum \text{Three months of newly bad and open good balances}}$$

Hence, the index is the sum of the numerators of the core metric for the most recent three months divided by the denominators of the core metric for the most recent three months

An index value of 8.1751 means that an annualized rate of 8.1751% of never-defaulted balances defaulted in the most recent three-month period.

The composite index is a weighted average of the four published headline indices

- Bankcard Index
- Auto Loan Index
- First Mortgage Index
- Second Mortgage Index

The Composite Index is the balance-weighted average of the 4 indices above.

Composite Index = $\frac{12 * 100 * \sum \text{Three months of newly defaulted balances for all four loan types}}{\sum \text{Three months of newly bad and open good balances}}$

The table below gives an example of how the index value is generated through a rolling three month calculation.

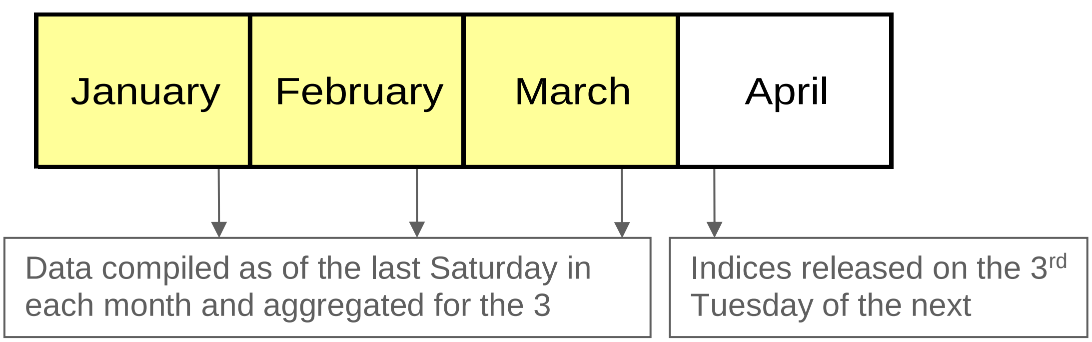
All in US$ million	Jan	Feb	Mar	Apr
New Default Balances	50	54	36	39
Open Good Balances	29,398	28,525	28,391	30,934
Total Balances	29,448	28,579	28,428	30,973

March Index Value	=12 * 100* (50+54+36)/(29,448 + 28,579 + 28,428)=	1.94
April Index Value	=12 * 100*(54+36+39)/(28,579 +28,428 +30,973)=	1.76

Publishing Schedule

For a given monthly value, the index is published on the 3rd Tuesday of the following month.

Example: March Index Value



Index Series

Separate index series are published for each of the account types -- Auto, Bankcard, First Mortgage, and Second Mortgage. In addition, a national balance-weighted composite index is also published.

Indices are also calculated by geographical breakdown, and are published at the Metropolitan Statistical Areas (MSA) level as well as at the state, census division and census region level. MSAs are subject to change as a result of revisions to metro area definitions by the White House Office of Management and Budget.

Index Maintenance

Rebalancing

Every month, data are captured in the Experian database on the last Saturday of the month. The data are analyzed and filtered for the appropriate criteria and the indices are calculated by Experian. The account data and index values are sent to S&P for review, verification and publication.

Restatement Policy

The Index Committee will be the sole body deciding on any restatement, if warranted.

Base Date

The inception date for the indices is May 18, 2010.

Index Governance

Index Committee

The S&P/Experian Consumer Credit Default Index is maintained and governed by the S&P/Experian Index Committee. The Index Committee members are drawn from S&P Dow Jones Indices and Experian. S&P Dow Jones Indices designates the Index Committee Chairman.

The Index Committee has complete discretion to determine how the index is calculated. In addition, the Index Committee may revise index policy covering rules for selecting consumers to be considered for the index and extraordinary events, such as natural disasters, that may result in special consideration in the index in any given month.

S&P Dow Jones Indices considers information about changes to the S&P/Experian Consumer Credit Default Index and related matters to be potentially market moving and material.

Therefore, all Index Committee discussions are confidential.

Holiday Schedule

The monthly indices are published at 9:00 AM ET on the third Tuesday of each month. In the event this falls on a holiday, the data will be published at the same time on the next business day.

Quality Assurance

S&P Dow Jones Indices maintains quality assurance processes and procedures for the calculation and maintenance of its indices that include a regularly scheduled meeting to review incidents or errors , if any, that occurred during the previous week and identify causes, determine repetitive issues and evaluate whether any long term changes are necessary (e.g. a change in process). Incidents and errors are tracked through S&P Dow Jones Indices' internal system and significant matters are escalated, requiring, at times, an ad hoc meeting of the same group.

Internal Reviews of Methodology

Annual Review Process. In addition to its daily governance of indices and maintenance of index methodologies, at least once within any 12 month period, the Index Committee reviews each index methodology to ensure the indices continue to achieve the stated objective, and that the data and methodology remain effective. The annual review process includes the gathering of information on the appropriateness, representativeness, and effectiveness of the index methodology from colleagues responsible for commercializing the indices. In the case that a Methodology is reviewed off cycle from the annual review, the Index Committee reserves the right to cancel the Annual Review if the requested review covers all the relevant issues.

Consultation with Stakeholders. S&P Dow Jones Indices consults with stakeholders through continuous communication through its Product Management and Client Relations Teams. Additionally, in connection with its maintenance of index methodologies, the Index Committee may at times consult with investors, market participants, security issuers included in or potentially included in an index, or investment and financial experts. Typical consultations may include:

- Meetings of Advisory Panels where market participants, investors and financial experts are invited to attend
- Surveys by mail, email or telephone
- Conference calls, or
- Face-to-face meetings

Stakeholders also have the ability to provide S&P Dow Jones Indices with input on its indices by contacting a representative of S&P Dow Jones Indices via phone, email, or by completing a Client Services Request Form available on the S&P Dow Jones Indices Web site at *http://us.spindices.com/feedback/client-services*. All requests are reviewed and responded to by the S&P Dow Jones Indices Client Services team.

Complaints Procedure. For any inquiry, comment, or complaint regarding the indices governed by this methodology, a Client Services Form can be found at *http://us.spindices.com/feedback/client-services*.

Index Policy

Announcements

Announcements of index levels are made at 09:00 AM Eastern Time, on the third Tuesday of each month. Press releases are posted at *www.spdji.com* and *www.experian.com/capital_markets* and are released to major news services.

There is no specific announcement time for the S&P/Experian Consumer Credit Default Index except for the monthly release of index levels, as indicated above.

Calculations and Data Disruptions

If a data source required for index calculation is unable to provide required data S&P Dow Jones Indices may decide to delay or not publish an index.

Expert Judgment

Use of Expert Judgment[1] for the indices governed by this methodology may be employed in:

a) Actions by the Index Committee to determine if an index value is sufficiently exceptional to warrant exclusion or re-computation, and/or

b) Re-statements.

Data Hierarchy

Data used for the indices governed by this methodology may include asset weighted balance changes of actual transactions.

Rebalancing

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with proper advance notice where possible.

Contact Information

For questions regarding an index, please contact: index_services@spglobal.com.

[1] Expert Judgment specifically and exclusively refers to S&P Dow Jones Indices' exercise of discretion with respect to its use of data in determining an index in the following context: Expert Judgment includes extrapolating data from prior or related transactions, adjusting data for factors that might influence the quality of data such as market events or impairment of a buyer or seller's credit quality, or weighing firm bids or offers greater than a particular concluded transaction. Other areas of discretion, such as methodology changes, are not, for the purposes of this document, considered Expert Judgment.

Index Dissemination

The index levels for the national S&P/Experian Consumer Credit Default Composite Index, the Auto Default Index, the Bankcard Default Index, the Mortgage Default Index and the Second Mortgage Default Index are available through S&P Dow Jones Indices' Web site at *www.spdji.com*, major quote vendors (see codes below), numerous investment-oriented Web sites, and various print and electronic media. S&P Dow Jones Indices' Web site also provides an archive of recent index announcements and press releases.

Tickers

Index	Bloomberg
S&P/Experian Auto Default Index	SNPEAD
S&P/Experian First Mortgage Default Index	SNPEFD
S&P/Experian Second Mortgage Default Index	SNPESD
S&P/Experian Bankcard Default Index	SNPEBD
S&P/Experian Consumer Credit Default Composite Index	SNPECD

The indices based on a geographical breakdown including, but not limiting to state, region, and MSA levels are available for a subscription via FTP on a fee basis, along with the background information used to calculate these indices.

Appendix

Definition of Key Terms

Account: A contractual relationship between a lender and a consumer. For example, if a single consumer has a credit card, mortgage and auto loan with one bank, they would be classified as three separate accounts.

Account Payment Category: A hierarchical framework of Account Payment Status.

Account Payment Status: The status of the account based on a lender's record of consumer payment.

Account Product Type: One of the four credit products covered: Auto Loans, Bank Cards, First Mortgage and Second Mortgage.

Archive: A point-in-time snapshot of all the accounts.

Archival Date: The last Saturday of each month.

Archival Period: The number of weeks from one Archival Date to the next.

Base Random Sample: The benchmark sample of consumers created from the Experian database as of January 2009.

Consumer: An individual who has an account relationship with a lender.

Current Archive: Archive as of the latest Archival Date.

Data Subscribers: Lenders who transmit their account data to Experian.

High Water Mark: The worst payment status ever recorded for an account.

Monthly Payment Amount: The amount of payment required by the lender to keep the account in good standing.

Profile Sample: The set of all account information derived from the Archive. Current Profile Sample is the Profile Sample of the latest Archival Date.

Replenishment: The monthly additions of new consumers to the Base Random Sample.

Statement Balance: The outstanding dollar balance of an account. This includes the nominal amount of credit extensions, as well as any accrued interest charges, late payment fees, and other forms of charges.

Waterfall Matrix: A distribution of Profile Sample by Account Payment Category.

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