

# **Capitalytics Data Requirements For Cashflow Modeling**

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**for more information: contact Capitalytics  
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# CAPITALYTICS DATA REQUIREMENTS FOR CASHFLOW MODELING

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Capitalytics is a web-based data analysis service for bankers that provides a full range of asset/liability analysis services, including market growth, cashflow, liquidity, sensitivity, interest rate risk, and competitive analyses. This document describes Capitalytics data requirements for modeling client bank portfolios (i.e., “asset/liability modeling”). These requirements are presented in three sections:

1. Supported instrument types, and data requirements
2. Instrument Tags (including Chart of Accounts information)
3. Additional Information
4. Data transmission and protocol requirements

## Section 1. Supported Instrument Types, and Data Requirements

Capitalytics cashflow analysis system supports modeling several types of typically encountered financial instruments. These types of instruments and their associated data requirements are enumerated in the following sections.

### 1.A. Per-instrument Attributes

In order to provide timely information to a client, Capitalytics requests receiving the following information on a regular basis. While Capitalytics can discuss and adapt to the circumstances of a bank, we find that the greatest value is generated when we receive changes to the following information on a daily basis, and value is substantially reduced when receive information less frequently than on a monthly basis.

#### Fixed-Rate & Floating-Rate Bonds, and Mortgage Backed Securities

Required Data	Type of instrument (see “chart of accounts” information below)
	Face value
	Origination date
	Premium payment schedule
	Maturity date
	Rate information (including rate index and offset)
	“Unusual information” such as non-standard payment calendar, purchase discount, settlement period, etc. (see below)
Optional Data	Unique identifiers, and relevant attributes (see below)

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### Vanilla Swaps

Required Data	Instruments being swapped
	Rate information for both sides of swap
Optional Data	Unique identifiers, and relevant attributes (see below)
	Unusual settlement information, if necessary

### Fixed-Rate & Floating-Rate Closed End Loans

Required Data	Type of instrument and product (see “chart of accounts” information below)
	Loan amount
	Origination date
	Payment schedule
	Maturity date
	Rate information (including any applicable “teaser rates”, index, offset, etc.)
	“Unusual information” such as non-standard payment calendar, purchase discount, settlement period, etc.
Optional Data	Unique identifiers, transfer pricing data, and relevant attributes (see below)

### Fixed-Rate & Floating-Rate Open End Loans

Required Data	Type of instrument and product (see “chart of accounts” information below)
	Credit Limit
	Payment schedule
	Minimum payment amount terms
	Rate information (including any applicable “teaser rates”, or penalty rates)
	Payment & spending history (as much as possible, per transaction, in order to estimate future patterns)
Optional Data	Unique identifiers, transfer pricing data, and relevant attributes (see below)
	Origination date

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### Balloons, Hybrid ARMs, and “non-standard” Loans

Required Data	Loan information as specified for “closed end” loans (below)
	Balloon amount and schedule information for Balloon Loans
	Rate and schedule information for Hybrid ARMs
	Minimum payment amount terms
	Rate information (including any applicable “teaser rates”, or penalty rates)
Optional Data	Unique identifiers, transfer pricing data, and relevant attributes (see below)

### CDs and Demand Deposit Accounts (incl. Money Market Accounts, checking accounts, savings accounts, etc.)

Required Data	Rate information
	Interest accrual schedule
	Relevant terms and conditions for accountholder agreement (e.g., monthly fees, relevant usage fees, minimal/maximal interest, etc.)
	For Demand Deposit accounts, deposit & withdrawal history (as much as possible, in order to estimate future patterns)
Optional Data	Unique identifiers, transfer pricing data, and relevant attributes (see below)
	CD termination penalty data (probability of termination, and penalty)

In the previous tables, it is noted that Capitalytics supports transfer pricing. With appropriate spread data or values, we can easily provide accounting for per-product, per-branch, and/or per-officer value generation tables.

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### 1.B. Rate Curves

Capitalytics supports several rate curves to determine the prices or values of instruments. The following publicly available curves are currently available for use. If you require any additional rate curves (public or proprietary) to be automatically imported for use with our service, please contact us.

Abbreviation	Rate Curve Description
PrimeRate	Prime Rate
FedFunds	Federal Funds Effective Rate
BondBuyer	Bond Buyer Go 20-Bond Municipal Bond Index
Conv30YrMort	30-Year Conventional Mortgage Rate per the Federal Reserve Board of Governors
TBillsThreeMonth	3 Month T-Bill Rate
TBillsSixMonth	6 Month T-Bill Rate
TBillsOneYear	1 Year T-Bill Rate
Moody'sAAA	Moody's Seasoned Aaa Corporate Bond Yield
Moody'sBAA	Moody's Seasoned Baa Corporate Bond Yield
NomTreas1Month	1-Month Treasury Constant Maturity Rate
NomTreas3Month	3-Month Treasury Constant Maturity Rate
NomTreas6Month	6-Month Treasury Constant Maturity Rate
NomTreas1Year	1-Year Treasury Constant Maturity Rate
NomTreas2Year	2-Year Treasury Constant Maturity Rate
NomTreas3Year	3-Year Treasury Constant Maturity Rate
NomTreas5Year	5-Year Treasury Constant Maturity Rate
NomTreas7Year	7-Year Treasury Constant Maturity Rate
NomTreas10Year	10-Year Treasury Constant Maturity Rate
NomTreas20Year	20-Year Treasury Constant Maturity Rate
NomTreas30Year	30-Year Treasury Constant Maturity Rate
LIBOROvernight	LIBOR Overnight Index Rate
LIBOROneMonth	LIBOR 1 Month Index Rate
LIBORTwoMonth	LIBOR 2 Month Index Rate
LIBORThreeMonth	LIBOR 3 Month Index Rate
LIBORFourMonth	LIBOR 4 Month Index Rate
LIBORFiveMonth	LIBOR 5 Month Index Rate
LIBORSixMonth	LIBOR 6 Month Index Rate
LIBORSevenMonth	LIBOR 7 Month Index Rate
LIBOREightMonth	LIBOR 8 Month Index Rate
LIBORNineMonth	LIBOR 9 Month Index Rate

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Abbreviation	Rate Curve Description
LIBORTenMonth	LIBOR 10 Month Index Rate
LIBORElevenMonth	LIBOR 11 Month Index Rate
LIBOROneYear	LIBOR 1 Year Index Rate
SwapOneYear	Swap Rate with 1 Year Maturity
SwapTwoYear	Swap Rate with 2 Year Maturity
SwapThreeYear	Swap Rate with 3 Year Maturity
SwapFourYear	Swap Rate with 4 Year Maturity
SwapFiveYear	Swap Rate with 5 Year Maturity
SwapSevenYear	Swap Rate with 7 Year Maturity
SwapTenYear	Swap Rate with 10 Year Maturity
SwapThirtyYear	Swap Rate with 30 Year Maturity

## **1.C. Supported Cashflow Schedule Algorithms & Conventions**

Since Capitalytics models all of its instruments on a day-by-day basis, knowing the exact dates that a bank should expect payment on investments is extremely important. Capitalytics supports several different types of schedules and parameters for computing dates for future cashflows, listed in the following sub-sections. Any of these variations can be applied to appropriate instruments based on the data received by Capitalytics from your bank regarding instruments in your bank's portfolio. If your bank's needs are not provided by these definitions, or if you require any additional clarification, please contact us to see what additional support Capitalytics can provide.

### **1.C.1. Schedules**

Schedules are built based on two basic components: the arbitrary starting point for computing the cashflow payment schedule, and the recurring nature of the schedule. Capitalytics supports the following algorithms for specifying the starting point for a schedule.

<i>Backward</i> (default)	Backward from termination date to effective date.
<i>Forward</i>	Forward from effective date to termination date.
<i>Zero</i>	No intermediate dates between effective date and termination date.
<i>ThirdWednesday</i>	All dates but effective date and termination date are taken to be on the third wednesday of their month (with forward calculation.)
<i>Twentieth</i>	All dates but the effective date are taken to be the twentieth of their month (used for CDS schedules in emerging markets.) The termination date is also modified.
<i>TwentiethIMM</i>	All dates but the effective date are taken to be the twentieth of an IMM month (used for CDS schedules.) The termination date is also modified.
<i>OldCDS</i>	Same as TwentiethIMM with unrestricted date ends and log/short stub coupon period (old CDS convention).
<i>CDS</i>	Credit derivatives standard rule since 'Big Bang' changes in 2009.

## 1.C.2. Frequencies

Capitalytics supports the following frequencies for cashflows.

<i>NoFrequency</i>	null frequency
<i>Once</i>	only once, e.g., a zero-coupon
<i>Annual</i>	once a year
<i>Semiannual</i>	twice a year
<i>EveryFourthMonth</i>	every fourth month
<i>Quarterly</i>	every third month
<i>Bimonthly</i>	every second month
<i>Monthly</i> (default)	once a month
<i>EveryFourthWeek</i>	every fourth week
<i>Biweekly</i>	every second week
<i>Weekly</i>	once a week
<i>Daily</i>	once a day
<i>OtherFrequency</i>	some other unknown frequency

## 1.C.3. Cashflow Date Adjustment Conventions

Consideration for adjusting cashflow dates is a necessary inevitability in determining any schedule. Capitalytics supports the following conventions to adjust a date in case the one normally computed is not a valid business day.

<i>Following</i>	Choose the first business day after the given holiday.
<i>ModifiedFollowing</i> (default)	Choose the first business day after the given holiday unless it belongs to a different month, in which case choose the last business day before the holiday.
<i>Preceding</i>	Choose the first business day before the given holiday.
<i>ModifiedPreceding</i>	Choose the first business day before the given holiday unless it belongs to a different month,



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in which case choose the first business day after the holiday.

*Unadjusted* Do not adjust.

## 1.C.4. Calendars

Capitalytics also supports several (globally-oriented) calendars, but will utilize the standard United States calendar of holidays and business days unless notified by a client of other needs. Within the US, however, there are four major calendars that differ in terms of recognized holidays. Any of these four calendars may be associated with individual instruments or account groups.

*Settlement*  
(default)

Public holidays (see: <http://www.opm.gov/fedhol/>):

- Saturdays
- Sundays
- New Year's Day, January 1st (possibly moved to Monday if actually on Sunday, or to Friday if on Saturday)
- Martin Luther King's birthday, third Monday in January
- Presidents' Day (a.k.a. Washington's birthday), third Monday in February
- Memorial Day, last Monday in May
- Independence Day, July 4th (moved to Monday if Sunday or Friday if Saturday)
- Labor Day, first Monday in September
- Columbus Day, second Monday in October
- Veterans' Day, November 11th (moved to Monday if Sunday or Friday if Saturday)
- Thanksgiving Day, fourth Thursday in November
- Christmas, December 25th (moved to Monday if Sunday or Friday if Saturday)

*NYSE*

Holidays for the stock exchange (see <http://www.nyse.com/>):

- Saturdays
- Sundays
- New Year's Day, January 1st (possibly moved to Monday if actually on Sunday)
- Martin Luther King's birthday, third Monday in January (since 1998)
- Presidents' Day (a.k.a. Washington's birthday), third Monday in February
- Good Friday
- Memorial Day, last Monday in May
- Independence Day, July 4th (moved to Monday if Sunday or Friday if Saturday)
- Labor Day, first Monday in September
- Thanksgiving Day, fourth Thursday in November
- Presidential election day, first Tuesday in November of election years (until 1980)
- Christmas, December 25th (moved to Monday if Sunday or Friday if Saturday)
- Special historic closings (see <http://www.nyse.com/about/1022221392381.html>)

*GovernmentBond*

Holidays for the government bond market (see <http://www.bondmarkets.com/>):

- Saturdays

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- Sundays
- New Year's Day, January 1st (possibly moved to Monday if actually on Sunday)
- Martin Luther King's birthday, third Monday in January
- Presidents' Day (a.k.a. Washington's birthday), third Monday in February
- Good Friday
- Memorial Day, last Monday in May
- Independence Day, July 4th (moved to Monday if Sunday or Friday if Saturday)
- Labor Day, first Monday in September
- Columbus Day, second Monday in October
- Veterans' Day, November 11th (moved to Monday if Sunday or Friday if Saturday)
- Thanksgiving Day, fourth Thursday in November
- Christmas, December 25th (moved to Monday if Sunday or Friday if Saturday)

*NERC*

Holidays for the North American Energy Reliability Council  
(see <http://www.nerc.com/~oc/offpeaks.html>):

- Saturdays
- Sundays
- New Year's Day, January 1st (possibly moved to Monday if actually on Sunday)
- Memorial Day, last Monday in May
- Independence Day, July 4th (moved to Monday if Sunday)
- Labor Day, first Monday in September
- Thanksgiving Day, fourth Thursday in November
- Christmas, December 25th (moved to Monday if Sunday)

## 1.C.5. Accrual Conventions

Finally, Capitalytics supports several monthly and annual interest accrual “day counting” conventions. See the following table for our supported conventions.

<i>ActualActual</i> (default)	Actual day counts are used for monthly and yearly calculations; for more details see <a href="http://www.isda.org/publications/pdf/Day-Count-Fraction1999.pdf">http://www.isda.org/publications/pdf/Day-Count-Fraction1999.pdf</a> .
<i>Actual365Fixed</i>	Actual day counts are used for monthly calculations, but annual calculations assume that all years are 365 days in length.
<i>Actual360</i>	Actual day counts are used for monthly calculations, but annual calculations assume that all years are 360 days in length.
<i>Thirty360</i>	Monthly calculations assume that months are all 30 days in length, and annual calculations assume that all years are 360 days in length.

## Section 2. Instrument Tags

Capitalytics uses a “tag”-oriented scheme to classify instruments that are defined to be modeled for a bank. To be more exact, Capitalytics does not implement any specific classification system per se, but allows a bank to specify any arbitrary tags (i.e., one, many, or no tags) to any instruments in their portfolio.

There are several ways that this scheme can be leveraged to work for your bank. For instance, tags may be used to identify

- ⤴ Risk rating
- ⤴ Collateral classification/rating
- ⤴ Call report categorization
- ⤴ Account-holder's industry, NAICS, or SIC code

This scheme is arbitrarily flexible, and we can work with a bank to help them understand the benefits of this scheme, and how it may be able to be leveraged by a bank for maximum benefit.

### **2.A. Chart of Accounts**

Capitalytics uses tags to implement a “chart of accounts” which can be used to aggregate the forecasts for individual instruments into manageable groups or lines of business. By default, Capitalytics provides the following chart of accounts; if your bank requires any additional account types, please contact us.

In the following chart, please notice the additional columns. The entries in a bank's “chart of accounts” are slightly different from the simple “tags” that were previously described. These tags which are entries in a bank's chart of accounts are also used for forecasting future production, and, as such, they allow a user to specify an aggregate instrument that will model that future production for revenue purposes. This table enumerates the default parameters associated with the modeled instruments. Again, these values may all be customized on a per-bank basis as necessary for your bank's purposes.

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Account Type	Instrument Modeled	Default Index	Accrual Convention (see next section)	Calendar
"U.S. Treasuries"	Fixed Rate Bond	NomTreas10Year+0.0	Thirty360	GovernmentBond
"Municipal Bonds – Fixed-Rate"	Fixed Rate Bond	FixedRate+0.75	Thirty360	GovernmentBond
"Municipal Bonds – Floating-Rate"	Floating Rate Bond	BondBuyer+0.10	Thirty360	GovernmentBond
"U.S. Govt Agency Bonds – Fixed-Rate"	Fixed Rate Bond	NomTreas10Year+0.50	Thirty360	GovernmentBond
"U.S. Govt Agency Bonds – Floating-Rate"	Floating Rate Bond	NomTreas10Year+0.50	Thirty360	GovernmentBond
"Mortgage-Backed Securities 360mo – Fixed-Rate"	Fixed Rate Mortgage Backed Security	Conv30YrMort	ActualActual	NYSE
"Mortgage-Backed Securities 360mo – Floating-Rate"	Floating Rate Mortgage Backed Security	Conv30YrMort	ActualActual	NYSE
"Mortgage-Backed Securities 240mo – Fixed-Rate"	Fixed Rate Mortgage Backed Security	NomTreas20Year+0.3	ActualActual	NYSE
"Mortgage-Backed Securities 240mo – Floating-Rate"	Floating Rate Mortgage Backed Security	NomTreas20Year+0.5	ActualActual	NYSE
"Corporate Bonds – Fixed-Rate"	Fixed Rate Bond	BondBuyer+0.0	Thirty360	NYSE
"Corporate Bonds – Floating-Rate"	Floating Rate Bond	BondBuyer+0.0	Thirty360	NYSE
"Other Fixed-Rate Bonds"	Fixed Rate Bond	PrimeRate+1.0	Actual365Fixed	NYSE
"Other Floating-Rate Bonds"	Floating Rate Bond	PrimeRate+1.0	Actual365Fixed	NYSE
"1-4 Family Residential Construction Loans"	Open-End Floating Rate Loan	PrimeRate+1.5	ActualActual	Settlement
"Other Construction Loans and All Land Development and Other Land Loans"	Open-End Floating Rate Loan	PrimeRate+2.0	ActualActual	Settlement
"Loans Secured by Farmland"	Closed-End Floating Rate Loan	PrimeRate+1.5	ActualActual	Settlement
"Revolving, Open-End Loans Secured by 1-4 Family Residential Properties and Extended Under Lines of Credit"	Open-End Floating Rate Loan	PrimeRate+0.75	ActualActual	Settlement
"Closed-End Loans Secured by 1-4 Family Residential Property First Liens"	Closed-End Floating Rate Loan	Conv30YrMort	ActualActual	Settlement
"Closed-End Loans Secured by 1-4 Family Residential Property Junior Liens"	Closed-End Floating Rate Loan	PrimeRate+1.5	ActualActual	Settlement
"Loans Secured by Multifamily Residential Properties"	Closed-End Floating Rate Loan	PrimeRate+2.0	ActualActual	Settlement

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"Loans Secured by Owner-Occupied Non-Farm Nonresidential Properties"	Closed-End Floating Rate Loan	PrimeRate+0.5	ActualActual	Settlement
"Loans Secured by Other Non-Farm Nonresidential Properties"	Closed-End Floating Rate Loan	LIBORThreeMonth+0.25	ActualActual	Settlement
"Loans to Other Commercial Banks in the U.S."	Closed-End Floating Rate Loan	FedFunds+0.25	Thirty360	Settlement
"Loans to Finance Agricultural Production and Other Loans to Farmers"	Closed-End Floating Rate Loan	PrimeRate+0.8	ActualActual	Settlement
"Commercial and Industrial Loans to U.S. Addressees"	Closed-End Fixed Rate Loan	LIBORThreeMonth+0.2	ActualActual	Settlement
"Consumer Credit Card Loans"	Open-End Floating Rate Loans	PrimeRate+0.5	ActualActual	Settlement
"Loans for Other Consumer Revolving Credit Plans"	Open-End Fixed Rate Loans	PrimeRate+1.0	ActualActual	Settlement
"Other Consumer Loans"	Closed End Fixed Rate Loan	PrimeRate+1.25	ActualActual	Settlement
"Obligations of States and Political Subdivisions in the U.S."	Closed End Fixed Rate Loan	Moody'sAAA+0.3	Thirty360	Settlement
"All Other Loans"	Open End Fixed Rate Loans	FixedRate+2.0	Thirty360	Settlement
"Demand Deposit Accounts"	Demand Deposit Accounts	FixedRate+0.1	Actual365Fixed	Settlement
"Money Market Deposit Accounts (MMDAs)"	Demand Deposit Accounts	FedFunds+0.1	Thirty360	Settlement
"Time Deposit Accounts"	Certificates of Deposit	TBillsSixMonth+0.25	Actual365Fixed	Settlement
"Other Savings Deposit Accounts"	Demand Deposit Accounts	FixedRate+0.1	ActualActual	Settlement

## **Section 3. Additional Information**

### ***3.A. Simulated Policies***

Capitalytics can implement specific policies to be triggered within its simulations on a “per bank” basis. For instance, if your bank would like to trigger the termination of new production of a product line or type of product based on a known condition, internal or external, we can implement that condition and note if/when its condition is met in the simulation analysis output as appropriate.

### ***3.B. Interest Rates Curves***

Capitalytics currently monitors several rate curves from reliable public sources in order to aid in using its features. We currently feature LIBOR, Prime, and FRB swap and yield curves in our calculations. Additional rate curves can be integrated into our services upon request provided we are able to easily collect the requisite history.

### ***3.C. Cashflow Modeling Variations***

In conjunction with the base cashflow modeling engine, Capitalytics can provide for automated liquidity risk, interest rate risk, and stress testing scenarios. These facilities can open up significant opportunities for strategic planning and thought exercises that revolve around significant changes in a client bank's operating climate.

### ***3.D. Liquidity Risk Analysis***

Capitalytics offers 17 different scenarios for automatically augmenting provided revenue drivers. The scenarios that are currently provided are as follows. Additional scenarios can be easily offered upon agreement.

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New production at 90% projected levels  
New production at 75% projected levels  
New production at 50% projected levels  
New production at 25% projected levels  
No New Volumes

*(the following scenarios are also with no new volumes)*

Uninsured withdrawals increased by 25%  
All withdrawals increased by 25%  
Uninsured withdrawals increased by 50%  
All withdrawals increased by 50%  
Uninsured withdrawals increased by 75%  
All withdrawals increased by 75%  
Uninsured withdrawals increased by 100%  
All withdrawals increased by 100%  
Uninsured withdrawals increased by 200%  
All withdrawals increased by 200%  
Uninsured withdrawals increased by 300%  
All withdrawals increased by 300%

As part of our liquidity risk analysis, we can integrate the availability of credit lines into the final results based on what information can be made available to us.

### **3.E. Interest Rate Risk Analysis**

Capitalytics offers 16 different scenarios for automatically augmenting interest rate curves. The scenarios that are currently provided are as follows. Additional scenarios can be easily offered upon agreement.

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-300bp one-time rate shock
-250bp one-time rate shock
-200bp one-time rate shock
-150bp one-time rate shock
-100bp one-time rate shock
-50bp one-time rate shock
+50bp one-time rate shock
+100bp one-time rate shock
+150bp one-time rate shock
+200bp one-time rate shock
+250bp one-time rate shock
+300bp one-time rate shock
-200bp rate change over 12 month period
-100bp rate change over 12 month period
+100bp rate change over 12 month period
+200bp rate change over 12 month period

### 3.F. Stress Testing

Capitalytics can superimpose impairments or “stress tests” on to a cashflow simulation to reflect what could happen if a certain amount of a bank's assets were to default. These impairments may be defined as affecting one or more types of accounts (e.g., "Commercial and Industrial Loans to U.S. Addressees", "Commercial and Industrial Loans to non-U.S. Addressees", "Consumer Credit Card Loans", "Loans for Other Consumer Revolving Credit Plans", etc.).

For each type of account affected as part of an impairment, the percentage of accounts of that type which are affected must be specified (e.g., **30%** of "Consumer Credit Card Loans"), along with a sorting criteria that would identify which exact accounts would be affected. Capitalytics currently supports, with data provided by a client bank, the following criteria:

Asset/Loan Age (new-to-old)
Credit Score (low-to-high)
Asset/Loan Size (large-to-small)

The parenthetical phrases in the above list clarifies which assets would be selected for impairment first, specifically newer loans, lower credit scores, or larger loans. As part of an impairment, Capitalytics would model these assets as producing no revenue for the bank from the point at which the impairment is modeled as occurring.

Impairments may be specified as occurring over a finite period during a simulation. For instance, if an impairment is to affect 10% of a set of accounts, beginning in the second month of a simulation and continuing for five months, then not less than 2% of the accounts (computed based on the sizes of assets in dollars) would be impaired in the second month of the simulation, and not less than 4% of the accounts would be impaired in the third month, not less than 6% would be impaired in the fourth month, and so on, until not less than 10% are impaired during the sixth month (and thereafter).



**3.G. *Scheduled Execution***

Capitalytics can schedule sets of simulations to be run automatically for a client bank periodically upon request. Please contact Capitalytics to discuss your needs.

## Section 4. Data Transmission & Protocol Requirements

Capitalytics prefers to receive the above-mentioned information in comma-separated value (CSV) format (see [http://en.wikipedia.org/wiki/Comma-separated\\_values](http://en.wikipedia.org/wiki/Comma-separated_values) or <http://tools.ietf.org/html/rfc4180> for any clarifications), with ASCII, UTF-7, or UTF-8 (not EBCDIC) characters and either “CR” (0x0D) or “CR/LF” (0x0D+0x0A) line terminations. These requirements are easily met by most contemporary Windows, Apple, and Linux data access applications; please contact us for questions or alternative arrangements.

Capitalytics offers access to our secure file upload facility in our SAS-70 certified datacenter, which allows banks to securely “push” data files to us for processing, or we can “pull” data files from a client's site based on a common understanding or protocol. Again, please contact us for an account on our server or other details.