Credit analysis is the method by which one calculates the creditworthiness of a business or organization. The audited financial statements of a large company might be analyzed when it issues or has issued bonds. Or, a bank may analyze the financial statements of a small business before making or renewing a commercial loan. The term refers to either case, whether the business is large or small.

Credit analysis involves a wide variety of financial analysis techniques, including ratio and trend analysis as well as the creation of projections and a detailed analysis of cash flows. Credit analysis also includes an examination of collateral and other sources of repayment as well as credit history and management ability.

Before approving a commercial loan, a bank will look at all of these factors with the primary emphasis being the cash flow of the borrower. A typical measurement of repayment ability is the debt service coverage ratio. A credit analyst at a bank will measure the cash generated by a business (before interest expense and excluding depreciation and any other non-cash or extraordinary expenses). The debt service coverage ratio divides this cash flow amount by the debt service (both principal and interest payments on all loans) that will be required to be met. Bankers like to see debt service coverage of at least 120 percent. In other words, the debt service coverage ratio should be 1.2 or higher to show that an extra cushion exists and that the business can afford its debt requirements.

Debt service coverage ratio(used in credit analysis)
The debt service coverage ratio (DSCR), or debt service ratio, is the ratio of net operating income to debt payments on a piece of investment real estate. It is a popular benchmark used in the measurement of an income-producing property's ability to produce enough revenue to cover its monthly mortgage payments. The higher this ratio is, the easier it is to borrow money for the property. The phrase is also used in corporate finance and may be expressed as a minimum ratio that is acceptable to a lender; it may be a loan condition, a loan covenant, or a condition of default.

Calculation

In general, it is calculated by: DSCR = Net Operating Income / Total Debt service

To calculate a property's debt coverage ratio, you first need to determine the property's net operating income. To do this you must take the property's total income and deduct any vacancy amounts and all operating expenses. Then take the net operating income and divide it by the property's annual debt service, which is the total amount of all interest and principal paid on all of the property's loans throughout the year.

If a property has a debt coverage ratio of less than one, the income that property

generates is not enough to cover the mortgage payments and the property's operating expenses. A property with a debt coverage ratio of .8 only generates enough income to pay for 80 percent of the yearly debt payments. However, if a property has a debt coverage ratio of more than 1, the property does generate enough revenue to cover annual debt payments. For example, a property with a debt coverage ratio of 1.5 generates enough income to pay all of the annual debt expenses, all of the operating expenses and actually generates fifty percent more income than is required to pay these bills.

If you want to purchase an income property, chances are your lender is going to require a minimum debt coverage ratio. The debt coverage ratio allows the lender to see if a property generates enough income to cover the property's operating expenses and debt service. To a lender the higher the debt coverage ratio, the less risk there will be with the investment. Debt coverage ratio requirements vary from lender to lender with some being as low as 1.1 and others charging as much as 1.35. Most lenders will accept a debt coverage ratio of 1.2 or above.

A DSCR of less than 1 would mean a negative cash flow. A DSCR of less than 1, say .95, would mean that there is only enough net operating income to cover 95% of annual debt payments. For example, in the context of personal finance, this would mean that the borrower would have to delve into his or her personal funds every month to keep the project afloat. Generally, lenders frown on a negative cash flow, but some allow it if the borrower has strong outside income.

Typically, most commercial banks require the ratio of 1.15 - 1.35 times (net operating income or NOI / loan amount) to ensure cash flow sufficient to cover loan payments is available on an ongoing basis.

CREDIT & FINANCE RISK ANALYSIS
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Credit Analysis Ratios & Accounting

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Credit analysts are called upon to review and approve potential counterparties for money market products and capital market products / investments: money market investments usually have a term of one year or less, while capital market transactions have a duration that exceed one year.

Not all corporations, financial institutions or investments look the same. However, there is a common approach to at least commencing the process and there is some similarity in the presentation of the information. First, it is ideal to obtain at least the past three years of audited financial statements, annual reports, SEC filings (10-K, 10-Q, etc.), along with the most recent quarter's financials and any projections for the coming period(s) for the counterparty. The point to this is that you never know what you are going to need and you never know what you are going to find. Always ask for audited statements.

If the company has recently terminated its relationship with an auditor then it must adequately explain the situation.

In addition, credit analysts are blessed with the existence of the World Wide Web, which provides one with the opportunity to locate sources of information that were unheard of in the past. Learn how to conduct serches via the WWW correctly by keyword manipulation and searching within search results.

Research the industry that the company operates in: you cannot understand the company unless you understand what its products are, who it sells to, where it fits into the larger world and what is the future for its product(s) or service.

Similarly, always look at the competitors / peer group of the subject. What is it doing right and wrong compared to similar companies within the same industry sector?

Financial Statements normally present three successive years of entries in columns, which makes a comparison easier. If the statements do not come that way to you then re-spread them (MS EXCEL or a proprietary program) into comparative columns. Become familiar enough with macro construction within MS EXCEL in order to have the spread sheet automatically compute ratios for you as the annual financial data is entered.

Work directly and cordially with the Account / Relationship Manager. Credit applications do not fall from heaven. Rather, a relationship with a company must be nurtured. However, never allow the Account / Relationship Manager to dictate what should be included in a credit analysis: everything should be included in an analysis.

Similarly, do not be hesitant or afraid to contact the subject directly to get their views and input on information about them that either you located within the financial documents or is issued in a public news release. Try to speak directly with those who are responsible for speaking with analysts or whoever prepared the information that is in your possession. Again, work cordially with the Account / Relationship Manager but do not give him / her a list of questions to contact the subject with and then get his / her interpretation of the answer from the company. Speak directly, but competently and cordially, with the company on your own in order to obtain primary data. Be cognizant of, and confidential with, information that is public and that which is non-public.

Never be hesitant in being either critical of or expressing an opinion of the operations of a company, even if it may jeapordize the business relationship with the management of the subject. If you are sure you are accurate or the opinion is legitimate, then it is your duty to present the argument or position. However, there is a nautical saying that is appropriate as once one is in the middle of the ocean and you have a problem with your equipment there is no one else to turn to except yourself: check, double check, check again and then re-check. The point is that you had better be sure about the accuracy of your work before you raise any issue or even present an application or report for review.

One will actually learn more about industries, companies, management and credit analysis during recessions and restructurings as it is more difficult and challenging to be a success, for all those involved, during adverse conditions.

There are some universal truths regarding credit analysis, lending and finance:
- No one can predict the future. No one knows what is going to happen in the markets in the next 45 minutes let alone what may happen in the next 30 days, 90 days, one year or five years.
- Everything changes, the world is always in a constant state of change.
- An asset is only worth what it can be sold for.
- A loan is only as good as its collateral.
- Loans should be "self-evident," the facts should not be stretched to make the loan work.
- It is easy to decline a loan application. It is harder to approve a loan application. However, you are in the business to lend money, if you are not lending then you are not earning. Loans do not drop from trees so the Credit Analyst has to be aware of the business origination / development aspects and make the effort to get the loan approved.
- You are not always going to approve every loan application presented to you for review.
- No matter how hard you try, if you are in this business long enough you are going to have a bad loan.
- There is no piece of information that you cannot ask for as long as you do so in a polite and friendly manner.
- Any, and every, statement on a loan application or financial statement should be verified independently.
- Products, companies' profits, industries and national economies are cyclical.
- There are two words that may not be used in lending and finance: "Never" and "Hope". It is impossible to say that an event will never happen: anything can happen and everything has happened. Similarly, one cannot hope that something may happen: an asset, loan or investment either performs as it was intended or it does not, and part of risk management is being able to resolve the problem when it occurs. (If you ever use both words in the same sentence, such as "I hope we never have a problem with this loan", then it is time to get out of this business).

Finally, the most important, single concept you can ever learn even after taking classes, reading books or years of experience: Would you take the money out of your own pocket and lend it to the borrower? If you are not willing to put your own money into the transaction then you have a fiduciary duty not to place your employer's money in it either.

Accounting

Credit analysts must be proficient in basic accounting concepts, GAAP guidelines and FASB statements and interpretations. The key for credit analysts is that although the financial statements are a history lesson by the time one sees them, they do provide data to indicate the trend of a company's earnings and condition, and the trend indicates as to whether past strategic decisions by management are now producing positive results.

The GAAP acronym stands for Generally Accepted Accounting Principles, which are the accounting rules and guideliens as articulated by the Financial Accounting Standards Board (FASB). The United Kingdom has its own GAAP guidelines and there is presently the movement toward the adoption of a global common International Accounting Standards (IAS).

Financial statements are a record of a company's accounts, financial condition and the results of its operations at a given point in time. The financial statements include the Balance Sheet, Income Statement (also sometimes referred to as a Profit and Loss statement), and the Statement of Cash Flows. Many large company's also include a Statement of Change in Stockholder's Equity or Statement of Reatined Earnings. The Balance Sheet is divided into three accounts: Assets, Liabilities and Stockholder's Equity. The Income Statement has 2 major accounts: Income or Revenue and Expenses. The Statement of Cash Flows has 3

accounts: Net Cash Provided/Used by Operating Activities, Net Cash Provided/Used by Investing Activities and Net Cash Provided/Used by Financing Activities. In the U.S., at the very least a company must present a balance sheet and an accompanying income statementfor the period together to meet a minimum GAAP requirement.

In the United States, GAAP accounting is based on the accrual system, which is an estimate of booking income when earned (not actually received) and expenses when incurred (not actually paid). This requires that a company accurately estimate any non-cash revenue was earned within a given period (revenue recognition) and accurately estimate how much in related expenses were incurred in earning that revenue.

Accounting and bookkeeping in the United States is based on the a double entry system for recording financial transactions any copmpany may engage in. Accounting is also based on the accrual concept (as opposed to a cash concept). The individual entry for the transaction describes its reason (for instance, wages paid, rent paid, payment for services dispensed or goods sold), and the source of the transaction (cash or credit).

The double entry system means that there are always 2 entries per a transaction. The basic accounting equation is:

$$\text{Assets} = \text{Liabilities} + \text{Stockholder's Equity}$$

For instance, if a company is started with a $50,000 investment, the accounting equation would mandate.

$$\text{Assets} = \text{Liabilities} + \text{Stockholder's Equity}$$
$$\$50,000 \text{ (Cash)} = \$50,000 \text{ (Equity)}$$

If the company purchases $4,500 in production equipment with a $4,500 bank loan, then the new balance of the accounts looks like:

$$\text{Assets} = \text{Liabilities} + \text{Stockholder's Equity}$$
$$\$54,500 \text{ (Cash + Equipment)} = \$4,500 \text{ (Loan)} + \$50,000 \text{ (Equity)}$$

The basic accounting equation can be solved for its various components:

$$\text{Assets} = \text{Liabilities} + \text{Owners' Equity}$$
$$\text{Liabilities} = \text{Assets} - \text{Owners' Equity}$$
$$\text{Owners' Equity} = \text{Assets} - \text{Liabilities}$$

The Asset, Liabaility and Stockholder's Equity accounts all have transaction accounts that are included under these three main accounts. For instance, under Assets one would find Cash, Accounts Receivable, Inventory, Equipment, etc., or any any type of asset that was created during the normal course of the company's business operation.

The accounting process begins with basic bookkeeping, which involves recording financial transaction in order of occurrence in a General Journal and then recording (posting) the same transaction in the proper account (i.e., rent payment, equipment purchase) in a General Ledger. Each transaction posted to the Ledger account must update the running balance in the account. The balance in the Ledger on a given date is what will be entered into the financial statements. For instance, a Ledger balance of $3,575 in the Accounts Receivable ledger account on March 31st would be entered onto the Asset account of the Balance sheet for those monthly or quarterly March 31st financial statements.

Entries into the Journal and Ledger follow the Debit and Credit accounting guidelines. Debit and Credit refers to a column entry in the Journal or Ledger, and Debit refers to the Left Column and Credit refers to the Right Column. A typical Journal entry would look like:

Date Account Debit Credit

Date	Description	Debit	Credit	Balance

It is sometimes difficult to remeber when to use a Debit or Credit in a journal or Ledger. First, it should be remembered that there are Journal and Ledger account entries for both Assets, Liabilities and Stockholder's Equity accounts. Additionally, for ever entry in an Asset Journal or Ledger account there must be a matched (double) entry into either a Liability or Stockholder's Equity Journal or Ledger account.

An Asset account (for instance, Cash) will increase with an entry in the Debit / Left column.

Date	Description	Debit	Credit	Balance
March 7	Payment received for services	$750		$750

An Asset account (again, Cash) will decrease with an entry in the Credit / Right column.

Date	Description	Debit	Credit	Balance
March 8	Payment disbursed for office supplies		$200	$550

However, a Liability account (for instance, Accounts Payable) will increase with an entry in the Credit / Right column.

Date	Description	Debit	Credit	Balance
March 8	Payment (Check No. 301) disbursed for office supplies		$200	$200

Thus, Asset accounts and Liability accounts always increase through opposite entries (Debit for Asset accounts and Credit for Liability accounts). They will also decrease through opposite accounts (Credit for Asset accounts and Debit for Liability accounts).

Revenue accounts will also increase with a Credit entry with a corresponding increase (Debit) in an Accounts Receivable (Asset) account.

Most companies conduct sales and services on granted terms (credit sales, for instance, payment is due in 30 days of receipt of the service or goods by the customer). Conversely, the same company may pay its bills based on the terms accorded to it by its own supplier(s). Thus, the Income statement will indicate accumulated income and expenses as of a certain date while the Accounts Receivable account and Accounts Payable account on the Balance sheet will indicate what still is pending.

Cash Flow Statement (GAAP)

The Cash Flow Statement was first defined by the Financial Accounting Standards Board (FASB) in 1987. The Cash Flow Statement has three cash flow accounts:

1) Operating Cash Flow generated by normal business operations.
2) Investing Cash Flow from the purchase or disposal of assets such as plant buildings, real estate, investment portfolios, equipment.
3) Financing Cash Flow from investors or long-term creditors.

Operating Cash Flow

Net Income After Tax
+ Depreciation and amortization
+/- Decrease (Increase) in Accounts Receivable
+/- Decrease (Increase) in Inventory
+/- Decrease (Increase) in Other Current Assets
+/- Increase (decrease) in Accounts Payable
+/- Increase (decrease) in Accrued Expenses
+/- Increase (decrease) in Other Current Liabilities

Total Operating Cash Flow

Investing Cash Flow

+/- Decrease (Increase) in Fixed Assets
+/- Decrease (Increase) in Notes Receivable
+/- Decrease (Increase) in securities, investments
+/- Decrease (Increase) intangible, noncurrent assets

Total Investing Cash Flow

Financing Cash Flow

+/- Increase (decrease) in Borrowings
+/- Increase (decrease) Capital Stock
- Dividends Paid

Total Financing Cash Flow

TOTAL CASH FLOW
Cash at beginning of period
Cash at end of period

Ratio Analysis

Asset Quality

Average Assets

Total assets (previous year) + Total assets (present year)

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2

Net Charge-offs to Loans (Charge-offs net of recoveries)

$$\frac{\text{Net Charge-offs}}{\text{Total Loans}}$$

Net Charge-offs to Total Assets (Charge-offs net of recoveries)

$$\frac{\text{Net Charge-offs}}{\text{Total Assets}}$$

Profitability / Earnings

Sales Growth Rate

$$\frac{\text{Sales in Period 2 - Sales in Period 1}}{\text{Sales in Period 1}}$$

Gross Profit Margin

$$\frac{\text{Gross Profit (Sales minus Cost of Goods Sold)}}{\text{Sales}}$$

Operating Profit Margin

$$\frac{\text{Operating Profit}}{\text{Sales}}$$

Pretax Profit Margin

$$\frac{\text{Income before Taxes}}{\text{Sales}}$$

Return on Sales (Net Income Margin)

$$\frac{\text{Annual or period net income}}{\text{Sales}}$$

Return on Average Assets (ROAA) (measures how effectively an institution utilized its assets)

$$\frac{\text{Annual or period net income}}{\text{Total Average Assets}}$$

Return on Average Equity (ROAE) (measures what an institution earned on its shareholders' investment)

$$\frac{\text{Annual or period net income}}{\text{Total Average Shareholders' Equity}}$$

ROAE can be manipulated by increasing net income from asset sales (a one-time event) or by reducing equity through share buy-backs or write-downs. When a company purchases another company and creates intangible goodwill, the equity side of the balance sheet also increases.

DuPont ROA

$$\frac{\text{EBIT - Tax}}{\text{Assets}}$$

DuPont ROE

$$\frac{\text{EBIT - (Taxes + Interest)}}{\text{Shareholder's Equity}}$$

Cash Flow

Cash Flow

$$\text{Net Income before} + \text{Depreciation Expense}$$

Operating Cash Flow

$$\text{Income before Interest and after Taxes} + \text{Depreciation}$$

Interest Coverage

$$\frac{\text{Operating Cash Flow}}{\text{Interest Expense}}$$

Debt Service

$$\frac{\text{Operating Cash Flow}}{\text{Interest} + \text{Principal}}$$

Debt Service after Non-discretionary CAPEX (Capital Expenditures)

$$\frac{\text{Operating Cash Flow Net of CAPEX}}{\text{Interest} + \text{Principal}}$$

Working Capital, Liquidity and Funding

Working Capital (measures the amount of cushion that current assets provide)

$$\text{Current Assets} - \text{Current Liabilities}$$

Current Ratio (should be greater than 1 : 1 to provide better coverage)

$$\frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Quick Ratio (should be greater than 1 : 1 to provide better coverage; cash + marketable securities + receivables)

$$\frac{\text{Current Assets - Inventory}}{\text{Current Liabilities}}$$

Cash Ratio

$$\frac{\text{Cash + Marketable Securities}}{\text{Current Liabilities}}$$

Receivables Collection Period (measures the length of time it takes to convert receivables to cash)

$$\frac{\text{Period End Receivables x Days in Period}}{\text{Sales for Period}}$$

Days in Inventory

$$\frac{\text{Period End Receivables x Days in Period}}{\text{Cost of Goods Sold for Period}}$$

Days Payables

$$\frac{\text{Period End Accounts Payables x Days in Period}}{\text{Cost of Goods Sold for Period}}$$

Cash Conversion Cycle

Days Inventory + Collection Days - Days Payables

Capitalization

Average Equity

$$\frac{\text{Total stockholder's equity (previous year)} + \text{Total stockholder's equity (present year)}}{2}$$

Book Value per Common Share

$$\frac{\text{Shareholders' Equity at the end of a period}}{\text{Number of common shares outstanding at the end of that period}}$$

Leverage

There are several ways to determine Leverage. One ratio is Total Liabilities to Equity. Overall, the ratio indicates what proportion of equity and debt the company is using to finance its assets. The higher the debt/equity ratio is then the greater amount od debt that the company is using to finance its growth. The credit is that in an economic down turn the company will not generate sufficient earnings to pay interest or amortizing principal. This ratio can be very high for financial institutions, however its is important to adjust the liabilities for matched repurchase agreement / reverse REPO financing.

Debt to Equity

$$\frac{\text{Total Liabilities}}{\text{Equity}}$$

Another is Total Debt (all short-term and long-term interest bearing debt, including commercial paper, bonds and bank borrowings) to Equity.

$$\frac{\text{Total Debt}}{\text{Equity}}$$

Another is Long-term Debt to Equity.

$$\frac{\text{Total Long-Term Debt (Total Debt less Short-Term Debt)}}{\text{Equity}}$$

Another is Senior Debt to Capital

$$\frac{\text{Total Liabilities - Subordinated Debt}}{\text{Equity + Subordinated Debt}}$$

Another is Debt plus Preferred Securities (due to their debt-like interest payments and long-term maturity feature) to Capital

$$\frac{\text{Total Debt + Preferred Securities}}{\text{Equity - Preferred Securities}}$$

Another is "Gearing", which is the U.K. term for this same ratio. Similarly, a high gearing ratio indicates a high level of debt as a percentage to equity. The U.K. balance sheet terms may look something like:

$$\frac{\text{Loan Capital (Debt)}}{\text{Capital Employed (Shareholders Equity)}}$$

Market Valuation

Price Earnings Ratio (P/E) (Historically, a stock's price has been a multiple of 14 to 15 times earnings; Suggests the number of years necessary for a company to earn its present market capitalization; The "earnings" denominator includes items that do not affect cash flow, such as depreciation, thus the figure is somewhat misleading)

$$\frac{\text{Market Price per Share}}{\text{Earnings per Share}}$$

Dividend Yield

$$\frac{\text{Dividends per Share}}{\text{Price per Share}}$$

Market to Book Value

$$\frac{\text{Market Price per Share}}{\text{Book value per share}}$$

Tobin's Q

$$\frac{\text{Market Value of Assets}}{\text{Estimated Replacement Cost}}$$

Merger and Acquisition Value (Theoretical takeover price relative to generated cash)

$$\frac{\text{Enterprise Value (Company's market capitalization + Debt - Cash)}}{\text{EBITDA}}$$

S.G. Warburg originally developed an Enterprise Value (EV) defined as the sum of the company's debt and the market value of its equity less the market value of non-core assets, all compared to cash flow before interest and depreciation.

Credit Analysis Software Packages / Services

These applications are designed for financial institutions that either do not have the manpower, infrastructure, expertise or desire to conduct a standard due diligence, individual credit application analysis (direct information exchange between the borrowers and lender) and evaluation, financial assessment, industry and competition analysis or collateral analysis.

CreditQuest
- ▪ Developed through a partnership between Fair Isaac and Harland Financial Services.
- ▪ Small business loan application that combines origination, the LiquidCredit and Fair Isaac Small Business Scoring Service (SBSS) model application, and reporting capabilities.

LiquidCredit / Bank2Business
- ▪ Developed through a partnership between Fair Isaac and Baker Hill.
- ▪ The application is a browser-based small business loan origination package, which also includes the Fair Isaac Small Business Scoring Service (SBSS) model application.

Fair Isaac Small Business Scoring Service (SBSS)
- ▪ Designed to process credit lines and term loans up to $750,000, equipment leases up to $100,000 and business credit cards with limits up to $50,000.

- The SBSS decision is primarily based on reviewing the personal credit score of the principals of the business (obtained from the consumer credit reporting agencies), a business credit report (for instance, Dun & Bradstreet if available), and other applicant-supplied data from the loan application such as the number of years in business, bank balances, the principal's income, outstanding debt, financial assets, home ownership.
- Credit decision process then utilizes an analytical model that compares the pending application data with with a pool of previous small business applications from various regions in the United States and also across various SIC codes (business type) in order to develop and overall credit score (SBSS can really only be used in the United States)
- Also indicates that it develops a Credit Offer Index (the dollar amount of credit the proposed applicant can service) although the product description further indicates that the index can be provided regardless whether or not financial data is supplied as part of the application process.

Financial Statement Analysis Software Packages / Services

Baker Hill's Statement Analyzer is a browser-based financial statement analysis application.

CapitalIQ (Standard & Poor's) is primarily designed for analysis and monitoring large, international public and private companies and provides a business overview, financials, key management, competitors, suppliers and shareholder information.

ECI Web Equity Manager can be used to generate a financial Analysis, ratio analysis and reports.

Moody's Financial Analyst can be used to generate a financial Analysis, ratio analysis and reports.

OneSource is primarily designed for analysis and monitoring large, international public and private companies.

Sageworks Analyst exports to Microsoft Excel and will compute Cash flow, ratio, and trend analysis.
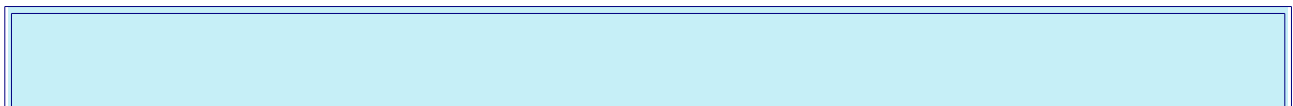
Tyler Analytics Corporation's TAC CREDIT Spread and Analysis Module can be used to generate a financial Analysis, ratio analysis and reports.

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Credit Analysis Basics and Risk Definitions

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Focus

Credit Analysis is neither entirely a science nor entirely an art. What credit analysis does allow us to do is gain an accurate profile of a subject at a given point in time by not only considering the publicly reported accounting statements of the subject but by also considering the:

- microeconomics of the entity being examined,
- the microeconomics of the industry or service it is in (how its industry or service peer group operate),
- the micro/macroeconomics of the country the subject is domiciled in and/or operates in (how the nation is perceived),
- and the macroeconomics of the world (what business cycle and economic cycle presently exist),
- the structure of the transaction, and whether the Risk/Reward Profile is accurate and adequate.

Remember, a review of a subject's past performance, even the most recent previous quarter, is still nothing more than a history lesson. Conversely, it is impossible to predict the future. Thus, **credit analysis does not predict the future of a company or the behavior of markets. Rather, it indicates what can be expected and anticipated from a company**. However, no matter how one tries there is still going to be a credit that becomes troublesome no matter what the due dilligence revealed about the subject at the time of a transaction resulting in a loan to, or investment in, the subject. The "Science" of credit analysis is digging through the facts and presenting them coherently and accurately. The "Art" of credit analysis is the experience that one gains and gut feeling that one has about the subject. **The past performance of a company is no indication of how it may perform tomorrow and past earnings will not pay tomorrow's expenses**.

What recent events from the mid 1990s to 2001 demonstrated was that Credit and Equity Analysts exercised a great deal of power and high public profile in their coverage of companies and financial institutions. There appears to have been a failure by certain analysts of forgetting that they served their institution or clients by being overly optimistic or supportive of their target review subjects. The failure was that the analysts did not remain objective and professional. Anyone can appear to be a financial genius during a boom economic period, and that includes the company and the Analyst. However, one must always be realistic, rational and never be hesitant in being either critical of or expressing an opinion of the operations of a company, even if it may jeapordize the business relationship with the management of the subject. Credit and Equity Analysts are being paid to protect the assets of the institution or clients that they work for. Conversely, Analysts must also always remember that business does not fall from a tree, it has to be developed and maintained. Finding, evaluating and maintaining acceptable credit risks is the true role of the Credit Analyst, however it results in a situation where one is caught between the past and the future of a potential counterparty, between earning a living but perhaps being placed in the position of jeapordizing one's career by having to challenge the status quo, and of knowing how to accurately identify and expose outright fraud.

Credit and Finance Risk Analysis can provide the credit analyst with the ability for:
- Analysis of the Business and the Industry Category

- Financial Statement Analysis for Strengths and Weaknesses
- Cash Flow Analysis and Projections for Loan Repayment
- Collateral Analysis
- Analysis of Credit Risk
- Adequate Loan Structure and Pricing
- Analysis of Loan Documentation for Completeness

The five "Cs" of Credit Analysis:

- Capacity to repay from the cash flow of the business, the timing of the repayment to match cash flow, and the probability of successful repayment, payment history on existing credit relationships is an indicator of future performance, contingent sources of repayment.
- Capital is what the owner has invested and what that person(s) have at risk should the business fail.
- Collateral or guarantees are additional forms of security provided to a lender as a repayment in case the loan cannot be repaid under anticipated means, or some other entity agrees to repay the loan in the event of the primary borrower's default.
- Conditions focus on the intended purpose of the loan, the local economic climate and the conditions within the industry that may effect the borrower.
- Character is the subjective opinion/impression (education, experience references and trust) of the borrower by the lender.

Types of Risk in Credit Analysis

There are only three things you can do with regard to Risk:
- Eliminate it.
- Mitigate it.
- Accept it.

Liquidity Risk:

The possibility that the cash available to a bank could be exceeded by customer's calls on it, or the income generated by a corporation, along with the funds it can raise through equity or debt issuance and/or borrowing, are insufficient to cover operating obligations (suppliers, employees, operations) forcing the corporation to cease operations. Can also be caused through thin markets sometimes resulting from disruptions, which result in the unavailability of hedging instruments at economic prices or the inability to sell assets without a reduction in their value.

Most institutions face two types of liquidity risk. The first relates to the depth of markets for specific products and the second to funding the financial-trading activities of the firm. When establishing limits for various major risk types and products, senior managers must factor in the size, depth and liquidity of a particular market or product, because the liquidity of the market/instrument affects the ability of the firm to alter its risk profile quickly and at a reasonable cost. Some firms, for example, even have contract limits for every futures contract based on the volume of turnover and outstandings. Senior managers must also develop procedures to identify and monitor the firm's liquidity sources to ensure it can meet the funding demands of its activities. This is achieved by monitoring the differences in maturities between assets and liabilities and by analyzing future funding requirements based on various assumptions, including the firm's ability to liquidate positions quickly in adverse conditions.

Firms which deal in the over-the-counter market must also draw up contingency procedures to deal with potential liquidity risks that may rise from the early termination of contracts.

Liquidity risk is inherent in banking: financial institutions hold long-term pledges that cannot easily be collected or sold. Liquidity risk also correlates with credit risk (see next) as the more questionable the ability of the borrower to repay the more difficult it is to sell the security or the loan. During 2008 / 2009 liquidity risk became a real issue: banks would not lend to each other due to concern of the quality of the other bank's loan portfolio (banks were holding on to liquidity). Secondly, investors would not purchase

securitizations due to the concern of the quality of the underlying assets thus financial institutions ended up holding assets on balance sheet that could not be priced due an inactive market (the assets could not be sold to raise cash). The only way to resolve the situation was for central banks to make billions of dollars available to commercial banks and then ease the terms of borrowing, and to guarantee the value of certain on-balance sheet assets of various institutions.

Credit Risk (Counterparty Risk):

The likelihood of default by the borrower or counterparty such that loans, bonds or leases will not be repaid on time / in full, or the counterparty will fail to perform on an obligation to the institution (trade, OTC derivative contract). The likelihood of this happening is measured through the repayment record/default rate of the borrowing entity, determination of market conditions, default rate of a loan portfolio of similar borrowers (which should not exceed a certain percentage of the total portfolio), and is mitigated / controlled through sound credit analysis guidelines, monitoring, loan covenants and collections. Counterparty Risk usually refers to trading activities.

With loans or bonds, the amount of the total risk is determined by the outstanding balance that the counterparty has yet to repay. However, the credit risk of derivatives is measured as the sum of the current replacement cost of a position plus an estimate of the firm's potential future exposure from the instrument due to market moves and what it may cost to replace the position in the future.

Senior managers must establish how the firm calculates replacement cost. The Basel Committee indicates that it prefers the current mark-to-market price to determine the cost of current replacement. An alternative approach would be to determine the present value of future payments under current market conditions.

The measurement of potential future exposure is more subjective as it is primarily a function of the time remaining to maturity and the expected volatility of the asset underlying the contract. The Basel Committee for Banking Supervisionindicates that it prefers multiplying the notional principal of a transaction by an appropriate add-on factor / percentage to determine potential replacement value of the contract (simply percentages of the notional value of the financial instrument). These percentages are deemed to be an estimate of potential exposure of the instrument and banks are charged regulatory capital based on these add-ons in addition to current exposure.

Senior management may also determine whether this potential exposure should be measured by using simulation (or other modeling techniques such as Monte Carlo, probability analysis or option valuation models). By modeling the volatility of the underlying it is possible to estimate an expected exposure.

Credit risk limits are part of a well-designed limit system. They should be established for all counterparties with whom an institution conducts business, and no dealings can begin before the counterparty's credit limit is approved. The credit limits for each counterparty must be aggregated globally and across all products (i.e. loans, securities, derivatives) so that a firm is aware of its aggregate exposure to each counterparty. Procedures for authorising credit limit excesses must be established and serious breaches reported to the supervisory board. These limits should be reviewed and revised regularly. Credit officers should also monitor the usage of credit risk by each counterparty against its limits. Researching the identity and legal status of a new client should be part and parcel of any credit assessment of new counterparties. Staff should be encouraged to put a face to all counterparties and should not be overwhelmed or seduced by a client's reputation into authorizing unjustified credit lines.

Once a counterparty exceeds the credit exposure limits, no additional deals are allowed until the exposure with that counterparty is reduced to an amount within the established limit. Open contracts remain in force.

Senior managers should try to reduce counterparty risks by putting in place master netting as well as collateral agreements. Under a master netting agreement, losses associated with one transaction with a counterparty are offset against gains associated with another transaction so that the exposure is limited to the net of all gains and losses related to the transactions covered by the agreement. The Basle Committee

for Banking Supervision estimates that netting reduces current (gross) replacement value on average by 50% per counterparty. However, board members, senior management and line personnel must be aware that netting agreements are not yet legally enforceable in several European and Asian countries; a factor which they must take into consideration in their daily dealings with counterparties in these countries; not to do so will engender a false sense of security. The forms of collateral generally accepted are cash and government bonds.

Another type of counterparty risk is <u>Pre-settlement risk</u>, the risk that a counterparty will default on a forward or derivative contract prior to settlement. The risk of a default event prior to the settlement of a transaction. The specific event leading to default can range from disavowal of a transaction, default of a trading counterparty before the credit of a clearing house is substituted for the counterparty's credit, or something akin to Herstatt risk, where one party settles and the other defaults on settlement.

Sovereign Risk:

Connected to counterparty risk is also Sovereign Risk, which is the risk that a government action will interfere with repayment of a loan or security. This is measured, again, by the past performance of the nation and present default rate and conditions (political, social and economic), and is controlled by strict credit analysis, limiting exposure as a percentage of portfolio, and incorporating covenants into the loan documents.

Market Risk:

Market risk deals with adverse price or volatility that affects the assets contained in a firm's or fund's portfolio. It is the possibility that sharp downward movements in market (stock, bond, commodity and currency) prices will destroy a financial institution's capital base (i.e. sensitivity of a bank's trading portfolios to changes in market prices), or the sensitivity of an asset or open contract to a movement of the market. Secondly, it can also be defined as the uncertainty of a financial institution's earnings resulting from changes in market conditions such as the price of an asset, interest rates, market volatility and market liquidity. It can be defined in absolute terms as a dollar amount or as a relative amount against some benchmark.

Market risk is different from an asset's mark-to-market calculation, which is the current value of the firm's financial instruments. Market risk represents what the firm could lose if prices or volatility changed in the future. A firm must measure the market risks resulting from its portfolio of financial instruments and senior managers must decide the frequency of this measurement. Firms with active portfolios should calculate their exposures daily while those with small portfolios could do so less frequently.

Market risk is measured as the potential gain or loss in a position or portfolio that is associated with a price movement of a given probability over a specified time horizon. This is the value-at-risk (VAR) approach. How it should be measured is a decision taken by the board of directors on the advice of senior managers; external consultants and auditors can be consulted if senior managers feel that they have inadequate knowledge to deal with this very technical issue.

Settlement Risk:

Related to credit risk but not identical, settlement risk is the risk that an expected settlement payment on an obligation will not be made on time due to bankruptcy, inability or time zone differential. A common example involves bilateral obligations in which one party makes a required settlement payment and the

counterparty does not. Settlement risk provides an important motivation to develop netting arrangements and other safeguards. It is sometimes also called Delivery Risk.

When related to currency transactions, the term **Herstatt Risk*** is sometimes used. This is the risk that one party to a currency swap will default after the other side has met its obligation, usually due to a difference in time zones. The settlement of different currencies in different markets and time zones from the moment the sold currency becomes irrevocable until the purchased currency receipt is confirmed (duration and amount of risk faced by market participants affects ability to accurately determine actual exposure). The two parties are paid separately in local payment systems and may be in different time zones, resulting in a lag time of three days and mounting exposure that may exceed a party's capital.The risk is reduced by improved reconciliation (such as including unreconciled trades) and netting agreements.

* Bankhaus Herstatt (a private German bank); On June 26, 1974, the bank was closed by German financial regulators (Bundesaufsichtsamt für das Kreditwesen) who ordered it into liquidation during the banking day but after the close of the interbank payments system in Germany. Prior to the announcement of Herstatt's closure, several of its counterparties had, through their branches or correspondents, irrevocably paid Deutsche Mark (approximately $620 million) to Herstatt on that day through the German payments system against anticipated receipts of US dollars later the same day in New York in respect of maturing spot and forward transactions. Upon the termination of Herstatt's business at 10.30 a.m. New York time on 26th June (3.30 p.m. in Frankfurt), Herstatt's New York correspondent bank suspended outgoing US dollar payments from Herstatt's account. This action left Herstatt's counterparty banks exposed for the full value of the Deutsche Mark deliveries made (credit risk and liquidity risk). Moreover, banks which had entered into forward trades with Herstatt not yet due for settlement lost money in replacing the contracts in the market (replacement risk), and others had deposits with Herstatt (traditional counterparty credit risk). (Bank For International Settlements, Settlement Risk In Foreign Exchange Transactions, March 1996) www.bis.org/publ/cpss17.pdf (.pdf format).

Interest Rate Risk:

The risk that changes in interest rates will result in financial losses related to asset/liability management. It is measured by past and present market volatility and the profile of the asset/liabilities of the bank and its possible exposure through gap management, and it is controlled by hedging (swaps, futures and options) the assets and liabilities and accurately researching and quantifying pending changes and scenarios.

Foreign Exchange Risk:

The risk that foreign exchange rate changes will cause foreign exchange denominated assets to fall in value or foreign exchange denominated liabilities to rise in expense (trading positions; loans; overseas branches). It is measured by marking-to-market the value of the asset, or increase of the liability, by the actual movement of the exchange rate between the currency of the asset/liability and the currency of the booked or pending asset or liability, or country of earnings repatriation. It is controlled by hedging (swaps, futures and options) the assets and liabilities and researching pending changes and scenarios.

Capital Risk:

The risk that the institution has inadequate capital for losses it may incur, which can result in bankruptcy or regulatory closure; or that it has a sub-optimal equity-debt capital profile which negatively impacts the market price of its stock. It has controlled by provisions and reserves from past earnings sufficient enough

to cover operating losses; and by evaluating the loan, securities and trading operations accurately for any pending losses or deterioration.

Fraud Risk:

The risk that the bank's own employees or its customers will defraud the bank. This is one of the most difficult situations to measure or control as demonstrated by trader problems at Barings, Daiwa and Sumitotmo. It is controlled by separating trading and settlement functions, periodic internal and external audits, and a centralized computer system to track and quickly/accurately reconcile the bank's position, portfolio and operations.

Reputation Risk:

The risk that fraud, poor service, poor regulatory compliance or other improper behavior by the employees of a company or organization that can cause defection of customers, the ability to establish new relationships or services, or continue servicing existing relationships. The risk is present throughout all levels of the organization: the behavior of senior management or rank and file employees can be equally damaging.

Legal Risk:

The risk that potential for lawsuits from disgruntled employees, clients, improper documentation, criminal or negligent conduct, workplace regulations or environmental contamination will severely disrupt the company's operations.

Operations Risk:

The risk that human or machine (hardware/software) error/failure will result in financial losses due to documentation deficiency, securities processing, clearing issues, and systems failure. It is difficult to measure errors but the loss could be substantial related to settlement problems or customer liability suits. It is controlled through back-up data processing systems, computerized accounting/audit system that can flag a problem, and reserves for related losses.

Overhead Risk:

The risk that overhead expenses will excessively burden the company's viability. It is measured by the ratio of total other expenses/net interest income and total other income; other expenses (expenses other than interest expense and loan loss provisions, such as salaries and employee benefits plus occupancy plus depreciation and amortization plus provisions) tend to rise faster than income in a time of inflation. It can also be measured as a percentage of operating income to determine the portion of the income stream

available to cover overhead. It is also measured by the Efficiency Ratio, the ratio of operating non-interest expenses as a percentage of net operating revenues, which is a measure of productivity of the bank. It is controlled by keeping a lid on expenses within prudent ratio guidelines, funding expansion through internally generated capital, and monitoring the efficiency of the bank and reducing staff if necessary.

Regulatory Risk:

The risk that change in regulations will adversely affect. It is measured by how a change will affect an established operation or curtail entry into a new operation, or affect capital reserve requirements, or operating requirements of the respective national banking regulator. It is controlled by lobbying federal and state legislature to keep abreast of pending changes and attempt to influence the decision making process.

Economic Conditions Risk:

The risk that an adverse change in economic conditions would unduly put the bank at risk. It is measured by how the loan portfolio would perform, what interest rates would do, how the securities portfolio may decline in market value, how liabilities may increase, deposit withdrawals increase resulting in liquidity problems. It is controlled through sound credit analysis, prudent investment, asset/liability gap management, and prudent expansion/business operations plan.

Credit Rating Agency Risk:

This really did not exist prior to 2007 through 2009, and who would think that it would ever really be a problem. However, the substanial amount, in both number and dollar amount, of various types of securities that were assigned AAA ratings by the three major credit rating agencies, and then were marked down (some to below investment grade) within 12 to 18 months of issue essentially turned the whole concept of "credit rating" on its head. The credit issue is whether the ratings assigned by these companies can really be relied upon.

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Portfolio Credit Risk Measurement and Management

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In addition to analyzing individual companies and agencies it is also necessary to review the credit risk of a single obligor over a length of time, the credit risk of the daily and long-term trading activity (equities, debt, commodities, deriviatives), and the credit risk of managing a portfolio of investments (debt and / or equity securities and related derivative instruments).

Measurement

At the most basic measurement, loan counterparty / credit default increases with the existence and depth of an economic recession when profitability is under pressure. Essentially, an individual company is not earning enough (nor has sufficient equity) to cover its operating expenses or cover interest and principal repayment of borrowed funds. Thus, the "quality" of the present business / economic cycle is a possible predictor of default.

However, the basic model does not take into account for additional business ventures or acquisitions a company may engage in during ideal economic conditions. Nor does it consider the level of sophistication companies and financial institutions engage in to purchase financial products or utilize methodologies to manage and mitigate risk. It does not recognize the risk of managing a portfolio of assets (and corresponding liabilities). Nor does it consider the sophistication of markets and exchanges or electronic networks and payments systems or computer database systems and software applications that respond immediately to market, social and political volatility.

Thus, quantitative measurement tools and methodologies are used to determine the value of an asset in response to market volatility or the likelihood of incurring a loss related to the predicted value of an asset over time in response to market volatility or default risk, and what value may be recovered from an impaired asset.

The ability to measure risk often assumes the rationality and efficiency of markets. This suggests that markets, or the participants (analysts and investors) in the specific asset market, can obtain and consider all of the available and relevant information. For instance, with respect to any specific commodity that any and all stocks of the commodity are located and identified, present and future demand, potential regulations, and present and possible development of substitutes. In the equity or debt market the key issue would be the potential default of the security issuer. Thus, spot and futures prices will accurately reflect the synthesis of this information and the incorporation of any new information.

In 1900, Louis Bachelier proposed in his thesis, the Theory of Speculation, that every equity share traded on an exchange had a 50% chance of either increasing in value or decreasing in value in the next price movement. The reason why this is so is that many participants are obtaining the same information but there are just as many optimists (bulls) about a stock as there are pessimists (bears) and as each individual keeps buying or selling the stock an equilibrium point is eventually reached. At the point of equilibrium, the very next price movement has a 50% chance of moving in either direction because the actions of all of the

participants have essentially cancelled each other. This suggests that the attempt to anlyze the price movement, regardless of analytical skill or strategy, is really nothing more than being similar to a coin toss, and the price movement is subject to the same probability laws. In the early 1960s, Eugene Fama at the University of Chicago reviewed several decades of price data and proposed that there was no predictability to price movements and any analyst (amateur or professional) also essentially had a 50% chance of accurately predicting the future price of any stock regardless of what information they thought they may possess because of the efficiency of the market. The later reinterpretation of this thesis produced the notion of the "random walk", which suggests that the price merely staggers around in an unpredictable path as information is revealed and considered by the market participants and each acts on it. The notion of market efficiency led to further developments such as the mean-variance portfolio diversification thesis (Harry Markowitz) and options pricing formula (Fischer Black, Myron Scholes).

The key point is that while price movements of an asset, commodity or security cannot be predicted they can at least be observed and recorded. Plotting the daily price movements (actually, the amount in change from the previous day's closing price) of a specific asset over a specific time period on a graph would result in a fairly recognizable bell curve of the normal distribution of the changes in price per day during the specific time period. Most price changes would be clustered toward the middle of the graph, while very small price changes and very large price changes would be at either extreme end of the graph. Thus, some type of predictability of the occurrence of price movement can be observed although the past performance is never a prediction of future performance. By calculating the mean price movement and the standard deviation / sigma (or two standard deviations / 2 sigma) it is believed that the known range of prices can be predicted for a specific period and what the chance is that such a price movement may occur in either direction.

Fund / Portfolio Risk Measurement

Alpha (α)

Alpha (α) is a gauge of how the the actual return of a portfolio compared to expected returns given the Beta risk (see next). A positive Apha indicates that the portfolio has performed better than the portfolio's Beta would predict.

Beta (ß)

Beta (ß) is a gauge of sensitivity to market moves; if one invests in many stocks across a wide sector of services, industries and geographic location, then one is considered to have a portfolio that matches the market and is well diversified as a decline in some stocks will be offset by the increase in value of other stocks, thus beta equals 1.0 (or the market). Stocks are measured relative to their historical movement in relation to the market (a well diversified portfolio or benchmark such as the S&P 500). Thus, a stock with a Beta over 1.0 will move further, either positively or negatively in value, in relation to market movements, while a Beta less than 1.0 will not move/fluctuate as much as the market. Beta is historical and may not accurately reflect a portfolio/stock's present volatility.

Before drawing any conclusions from a portfolio or fund's beta, it is a good idea to find out the R2 associated with the beta. R2 is a measurement of how well the portfolio's performance correlates with the performance of the benchmark index measured over three years. An R2 of 1.0 indicates a perfect correlation, while an R2 of 0.00 indicates no correlation

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Monte Carlo simulation: random path generating as a simulation method to depict a wide range of potential market outcomes (parametric probability model). The "odds" of various events are calculated. The odds of an extreme event is usually calculated as lower than a more common event (example: incremental price movements in the market or a series of event probabilities distributed along a standard bell curve). However, the problem with the model is that there is no standard approach to constructing the

assumptions / parameters of the simulation and if an extreme event does occur then the loss could be substantial (the probaility of the extreme event occurring is always out toward the tail of either side of the bell curve, or near zero but they do occur). The failure to accurately measure the occurrence of the extreme event would also suggest that risk cannot accurately be measured.

MPT: Modern Portfolio Theory, an investor looks at expected returns and the standard deviations (volatility of returns) thereof to construct an efficient portfolio.

Sharpe Ratio: A measure of risk adjusted return, this ratio compares the reward for pure risk-taking with the volatility of the investment. The formula is the annual rate of return minus the rate of a risk-free (T-bill) investment divided by the annualized standard deviation. The larger the figure the better the investment. It can also be determined as a Monthly figure:

$$\text{Monthly Sharpe Ratio} = \frac{\text{Average Monthly Return - Risk Free Return}}{\text{Monthly Standard Deviation}}$$

RAROC (Risk-Adjusted Return On Capital) was originally developed by Banker's Trust for the allocation of capital to business investments and has been revised for risk management by determing the characteristics of a portfolio in terms of "risk buckets" (equity, currency, interest rate, etc.).

Standard Deviation: quantitative measurement of the historical volatility of an asset/portfolio's returns in terms of the dispersion of returns (independent of some benchmark). The purpose is to determine how much fluctuation there has been around the average annual return. Example: if the average annual return is 12%, and the standard deviation is 10%, then that means the asset/portfolio's return could have been as high a 22% (12% + 10%) or as low as 2% (12% - 10%). However, as a statistical analysis tool, one standard deviation indicates that there is only a 68% chance that the return will be within this range. Two standard deviations give us a 95% confidence level that the range of return will be between -8% (2% - 10%) and 32% (22% + 10%).

Stress testing: constructing possible scenarios/paradigms, everything from market to political changes, and how it may affect the value of the asset. Calculates what will happen to the value of a particular derivative or an entire portfolio if certain events occur.

volatility: is a statistical measure of the tendency of the price of a share, commodity or bond to vary over time. It is one of the most important components in pricing options and other derivatives. Volatility increases with time.

Options Measurement

Delta: how the price of an option will change as the price of the underlying asset/index will change.

Delta hedging: hedging of option positions.

Kappa: how the value of an option changes as interest rates change.

Theta: how fast an options value will decline as expiration approaches.

Vega: Coefficient measuring the sensitivity of an option value to a change or undervaluation of volatility.

Basel I Accord and Basel II Accord

Please see the separate emtry for **Basel I and Basel II Accords**

The 1988 Basel I Accord required banks to do a better job at evaluating the real risk of their various businesses and how much capital should be reserved for various finanacial transactions. Many of the credit risk measurement methodologies were developed in response. Basel II allows banks to have more flexibility in measuring credit risk by allowing them to be able to select among three regulatory frameworks to calculate capital requirements for credit risk:

- Standard
- Internal ratings based (IRB)
- Advanced IRB (approved by U.S. regulators)

VaR (Value at Risk)

VaR does not predict market volatility. Rather, it is a statistical measure / model (at 95% ot 99% confidence level) that can be used to determine the maximum potential future one-day loss in the fair value of interest rate, foreign exchange and certain equity market sensitive financial instruments that may result from market volatility based on the current exposure the firm has. The VaR acronym itself has become somewhat generic and VaR is calculated several different ways by either proprietary models at financial institutions or commercially offered packages (CreditMetrics, CreditRisk+, RiskMetrics, AlgoLimits from Algorithmics, SunGard Data systems offers Credient and Bancware through its subsidiary Trading and Risk Systems). However, the result is an industry standard and is used and reported widely to estimate the potential decline in the value of a position or a portfolio, under normal market conditions, again over a one-day holding period with a statistical 95% / 99% confidence level, by subjecting the position or portfolio to certain previously observed and recorded volatilities and correlations / sensitivity to the volatility.

VaR (Value at Risk) looks at historical data (daily, weekly or monthly price data; daily volatility is also derived from the weekly or monthly data by dividing by the square root of the number of trading days in the period) for any asset class, and reduces the risk to its common measure: the standard deviation of changes in value of the portfolio or asset over the course of a specified time period, or the time period required to sell or hedge the portfolio or asset. It considers "two sigma," or two standard deviations from the mean in order to obtain a 99% confidence level of the value of the asset (thus we will know that there is only a 1% chance that change in the value of the asset or yield of the asset will be greater than this maximum in either direction). [From statistics we know that 90% of the area under the normal distribution is to be found within + and - 1.65 standard deviations from the mean, i.e., 1.65s]. For instance, if we determine that the VaR of an asset is 2%, than the potential downside loss on a $1,000 investment in the asset is $20. Secondly, VAR also considers the covariance of how assets move against each other thus, how is the risk profile of the portfolio actually lowered through diversification. The value at risk approach is based on a forecast of the potential worst case estimate of what the actual mark-to-market could equal over a pre-determined time period.

> - Historical simulation: this technique calculates the change in value of the current portfolio that would have occurred over a set of previous periods, given the actual changes in the market price indices. The standard deviation of the simulated changes is to a 65% confidence level and is limited to those observed values.
> - Variance/Covariance technique involves calculating the standard deviations of changes for a variety of relevant price indices and generating a matrix of correlations among pairs of indices. The sensitivity of the portfolio instruments to these underlying indices is derived, and the standard deviation of the entire portfolio can be calculated. However, it cannot measure non-linear price sensitivities for instruments to given changes in market indices.
> - Monte Carlo simulation is a form of stochastic simulation. On the basis of a matrix of variances and covariances of market price indices, a large number of values for the indices are generated randomly and used to calculate a range of values for the portfolio. This method is the most

complex and computation intensive, however, it is probably the most reliable and can capture non-linear risks (gamma, vega) in options portfolios.

RiskMetrics & CreditMetrics

In 1988, JP Morgan spun-off its Risk Management Products Group and RiskMetrics was created. The RiskMetrics risk management software application was developed by JP Morgan (1994) prior to CreditMetrics (1997). RiskMetrics was first designed to measure the risk associated within a trading environment. JP Morgan made the methodology and data necessary to operate both the RiskMetrics and CreditMetrics model freely available to the market. Co-sponsors of CreditMetrics also included at the time BZW, Swiss Bank Corp., Union Bank of Switzerland, Bank of America, Deutsche Morgan Grenfell and KMV Corp.

Some of the original development of the VAR concept and one of the first commercially available VAR packages was the CreditMetrics package. The company offered several quantitative credit analysis products such as RiskMetrics, CreditMetrics, DataMetrics, CorporateMetrics and RiskGrades. In August 2000, RiskMetrics and Moody's Risk Management Service (MRMS) formed a strategic alliance and Moody's RiskCalc default prediction models were integrated with RiskMetrics' CreditManager product (the software package of CreditMetrics methodology). RiskCalc / Credit Manager is used to measure total portfolio (bonds, loans and derivatives) VaR / credit exposure, especially in response to credit events such as Moody's credit upgrades and downgrades. The software application that ran CreditMetrics, Credit Manager, included a historical dataset, default probabilities, recovery rates, credit spreads, correlations and credit mitigation probabilities (the dataset was free but institutions had to purchase the software).

CreditMetrics was really designed to estblish a benchmark and then quantify credit risk across an institution's balance sheet and then produce an integrated VaR statement. CreditMetrics VaR can be measured as a Variance / Covariance model in which each instrument is associated with some market factors that determine the variance of the instrument's value. For instance, a single basis point change in market interest rates can be used to measure the variance of the price of a bond. Thus, there are a range of prices for the bond as market intrest rates increase by one basis point at a time above the coupon interest rate and a range of prices as market interest rates decline one basis point at a time below the coupon interest rate. The sophistication and complexity of VAR becomes evident if an additional hedging instrument for the bond is included in the equation and a portflio of bonds is considered rather than a single bond (variance/covariance matrix model).

With regard to loans, the methodology allows for a review of loan portfolios to determine how concentration of loans to a particular country or industry will affect the portfolio if there is widespread downgrade or default; and what the correlation might be between various concentrations within the portfolio. The analysis requires that the institution know how much it will earn if the loan matures, how likely the borrower will default, and how much the institution can expect to get back after default (weak point in the equation).

▪ Difficult to measure credit risk within the context of a portfolio as one finds less correlation in a credit portfolio as opposed to an equity portfolio as the chances of two individual entities defaulting simultaneously is remote.
  ▪ The model attempts to calculate a Credit VAR for the portfolio through:
  ▪ Calculate exposure to a specific credit (loans and/or market-sensitive products)
  ▪ Probability of each credit being subject to a credit event over a given time horizon, such as an upgrade, downgrade (migrations) or default, and calculates a distribution of values for each potential migration.
  ▪ Individual value distributions for each credit are assimilated through a portfolio to give an overall VAR statement.
  ▪ An attempt to express counterparty default probabilities as options. The default probabilities can be estimated using S&P and Moody's ratings and apply VAR calculations. The options can be sold as derivatives based on whether a trader thinks the credit rating of a company is about to go up or down.
CreditMetric utilizes a 3-step process to determine a credit VaR.
  ▪ First, the exposure to each specific credit (loans, facilities, commitments, bond positions, receivables and market-sensitive instruments such as swaps, forwards and options) must be

calculated (the application is sophisticated enough to distinguish between loan principal risk an the market value risk of a derivative).

▪ Second, the methodology determines the probability of each credit being subject to a credit event during a specific time (credit upgrade, downgrade, default, recovery rate in default) and calculates a distribution of values regarding the probability of an event.

▪ Third, individual value distributions for each credit are aggregated to determine an overall credit VaR.

On January 25, 2008, RiskMetrics Group completed its IPO and became a publicly traded company.

RIFLE (Risk Identification For Large Exposures)

Risk Identification For Large Exposures (RIFLE) is another risk measurement statistical model.

KMV (Moody's)

Moody's KMV (named after the gentlemen who developed the model, Messers. Kealhofer, McQuown, & Vasicek) is an international database (Credit Research Database / CRD) of records (approximately 30 years compilation) of loan defaults by publicly traded and private corporations. The database is utilized to develop a group of products offered by Moody's to analyze single obligor and portfolio credit quantitative default models. The purpose of the group of products is to develop a more systemic approach to credit analysis compared to a subjective review process. KMV is used by the credit analyst to determined the implied probability of the default of the counterparty.

Expected Default Frequency (EDF) is the measurement of the probability of default.

Financial Analyst is one of the key components of KMV for considering publicly traded companies with syndicated facilities in the market. The accessed database allows the credit analyst to analyze of cash flows and create customizable ratios for the subject company, and compare it to an industry peer benchmark.

CreditEdge (a web browser-based analysis product) utilizes KMV EDF Credit Measure (Expected Default Frequency) measurement of publicly traded companies to predict the likelihood of default risk on a day-to-day basis. The Portfolio Tracker option of CreditEdge produces a qunatitative EDF rating, which corresponds to Moody's standard debt rating system (for instance 3.5 / B+). The EDF Analyst option allows one to change variables (capital structure, equity market price, financial statements) of the subject company to determine how it may effect the EDF rating.

CreditRisk+

CreditRisk+ was develped by Credit Suisse First Boston (CSFB) and is a model for determining credit losses in a portfolio.

Alladin

Alladin was developed by BlackRock Solutions, which is used to measure risk exposure of equities, debt and derivatives.

Operational Risk Measurement

The Basel II Accord requires that banks set aside capital against operational risk (defined as the risk of direct or indirect loss resulting from inadequate or failed internal processes, business practices, people and systems, or from external events). The measurement of operational risk requires that financial institutions track transactions and measure the failure rate of reconciliation with counterparties. The measurement system must be able to model a probability of events that could occur and may result in an operational loss.

Basel II will allow banks to have some flexibility in measuring operational risk by allowing them to be able to select among three regulatory frameworks to calculate capital requirements for operational risk:

- Basic Indicators Approach
- Standardized Approach
- Advanced Measurement Approach (AMA, which is a financial institution developed proprietary internal capital model; approved by U.S. rgulators)

There are some commercially available software packages available such as OpData from Algorithmics

Proprietary systems are in operation with the large banks. J.P. Morgan Chase's has an operational risk measurement system that incorporates the measurement of operational errors by the name of Horizon. Citigroup utilizes EDCS (Events Data Capture System) system to capture historical operational loss data (minimum 3 years as per the Basel II regulation) across the company's entire operations and a probability of events model is based on that historical and present EDCS data.

Management

Regulatory Capital Adequacy mandates that there is sufficient capital and liquidity to cover short-term and / or unexpected on- and off-blance sheet credit risk and market risk for both financial institutions and broker / dealers.

Utilize a professional portfolio default risk measurement tool (KMV, CreditMetrics), which is designed to correlate a portfolio to real world variable and will calculate the probability of default and the percentage gross lost, and then set VAR limits.

Establish a Daily Settlement Limit with a counterparty. This represents the aggregate par value of contracts maturing on any one day.

Execute ISDA Master Trading & Netting Agreements with every counterparty and utilize novation netting (the sum of all trades between parties are added up on both sides and a single net number is transferred between the parties rather than many individual transfers).

Base point value hedge (BPV): longer-term bonds with a maturity of more than 3 years can be hedged comparatively simply by taking an opposite position in futures.
Hedge Ratio = Face Vale Bond x Price Factor CTD x BPV Bond
Face Value Future   BPV CTD

Margin limits: subjective, depending on the volatility and liquidity of the assets, its trading styles, depth and breath of the market (one never wants to end up owning the market), performance history, reputation and relationship with the institution, length of track record of the subject;

- initial margin is up-front prior to any trading or at the time of the trade
- call margin or top up margin or variational margin or maintenance margin is to cover actual or continued losses
- close-out margin terminates the losing position with any surplus returned to the counterparty
- unsecured mark-to-market threshold is when one the losses exceed a certain level, the counterparty is required to deliver margin to cover the MTM losses

Laddering: a portfolio of various issues that mature at different dates rather than a portfolio consisting of one large issue.

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BOOKMARK

Multiple Choice: Chapter Sixteen

1. Financial statement ratio analysis may be undertaken to study liquidity, turnover, profitability, and other indicators. To which does the current ratio most relate?

a.   Liquidity
b.   Turnover
c.   Profitability
d. Other indicator

HELP ME!

2. Zhang Corporation had net income of $100,000, paid income taxes of $30,000, and had interest expense of $8,000. What was Zhang's times interest earned ratio?

a.	12.5
b.	16.25
c.	17.25
d. 17.85	

HELP ME!

3. Selected information for 20X1 for the Bernstein Company is as follows:

Cost of goods sold $6,000,000

Average inventory $2,000,000

Net sales $8,000,000

Average
receivables $3,000,000

Net income $1,000,000

Assuming a 360-day business year, what was the inventory turnover ratio for Bernstein?

a.	3
b.	4
c.	5
d. 6	

HELP ME!

4. Thompson Corporation wrote off a $200 uncollectible account receivable against the $2,400 balance in its Allowance for Bad Debts account. Compare the current ratio before the write-off (X) with the current ratio after the write-off (Y).

a.	X	greater	than	Y
b.	X		equals	Y
c.	X	less	than	Y
d. Cannot be determined				

HELP ME!

5. Ames Corporation's net accounts receivable were $750,000 on December 31, 20X1, and $1,250,000 on December 31, 20X2. Net cash sales for 20X2 were $3,300,000. The accounts receivable turnover ratio for 20X2 was 16. What were the total net sales for 20X2?

a.	$12,800,000
b.	$16,000,000
c.	$16,100,000
d. $19,300,000	

HELP ME!

6. On a statement of cash flows, which of the following types of activities would not be disclosed in a separate section?

a. Operating activities
b. Investing activities
c. Financing activities
d. Contractual activities

HELP ME!

7. Which of the following activities would generally be regarded as a financing activity in preparing a statement of cash flows?

a. Dividend distribution
b. Proceeds from the sale of stocks of other firms
c. Loans made by the entity to other businesses
d. Employees' salaries and wages paid

HELP ME!

8. In preparing the statement of cash flows, how should noncash investing/financing activities be reported?

a. Not be reported
b. Be reported in a separate schedule accompanying the statement of cash flows
c. Be reported in the investing activities section of the statement of cash flows
d. Be reported in the financing activities section of the statement of cash flows

HELP ME!

9. For purposes of calculating cash receipts from customers, which of the following adjustments should be made to convert accrual basis sales to cash basis sales?

a. Add an increase in accounts receivable to accrual basis sales
b. Subtract an increase in accounts receivable from accrual basis sales
c. Add cash in bank to accrual basis sales
d. Add the change in cash to the accrual basis sales

HELP ME!

10. If the indirect approach for the statement of cash flows is presented, which of the following items should be subtracted from accrual basis net income to derive cash flow from operating activities?

a. Gains on the sale of long-term investments
b. Losses on the sale of long-term investments
c. Depreciation expense
d. Amortization expense

HELP ME!

11. As a generalization, the adjustment of accrual basis income to cash provided by operating activities requires which of the following to be added?

a. Increases in current assets related to operating activities
b. Increases in current liabilities related to operating activities
c. Decreases in current liabilities related to operating activities
d. Both (a) and (c) are correct.

HELP ME!

12. When preparing a statement of cash flows under the indirect method, supplemental disclosure should be made for which of the following?

a. Net cash consumed by operating activities
b. Cash dividend distributions
c. Cash paid for interest and taxes
d. All of the above

HELP ME!

13. Wilkin Corporation reported accrual basis sales of $200,000, cost of goods sold of $80,000, and operating expenses, taxes, and interest summing to $30,000. In evaluating Wilkin's comparative balance sheets, it is determined that accounts receivable increased $10,000, inventory increased $5,000, and accounts payable decreased $7,000. There were no changes in prepaid expenses nor were there any interest or taxes payable at the beginning or end of the year. How much was cash basis income for Wilkin Corporation for the year?

a. $68,000
b. $82,000
c. $105,000
d. $112,000

HELP ME!

14. Dixon Corporation reported 20X1 accrual basis net income of $50,000. Relevant information to adjust accrual basis income to cash basis income follows.

Depreciation expense	$12,000
Loss on the sale of land	16,000
Increase in accounts receivable	8,000
Decrease in merchandise inventory	4,000
Increase in accounts payable	3,000
Increase in taxes payable	2,000

How much is net cash provided by operating activities?

a. $47,000
b. $49,000
c. $51,000
d. $79,000

HELP ME!

15. In preparing a work sheet for the statement of cash flows, the lower portion corresponds to a statement of cash flows prepared using the indirect method. Items in the debit column of this lower portion most   closely   correspond   to   items   which:

a.   Explain   increases   in   cash.
b.   Explain   decreases   in   cash.
c.   Relate   to   financing   activities.
d. Relate to investing activities.

HELP ME!

1. a. The current ratio is a liquidity ratio.

2. c. 17.25. Income before income taxes and interest ($100,000 + $30,000 + $8,000 = $138,000) is divided by interest charges ($8,000).

3. a. 3. Cost of goods sold ($6,000,000) is divided by average inventory ($2,000,000).

4. b. The write-off of an uncollectible account reduces Accounts Receivable and the corresponding contra account, Allowance for Uncollectible Accounts. Therefore, net accounts receivable, total current assets, and the current ratio are not changed by the write-off.

5. d. $19,300,000. Total net sales equals cash sales ($3,300,000) plus credit sales ($16,000,000). Credit sales are 16 times the amount of average accounts receivable (($750,000 + $1,250,000)/2 = $1,000,000).

6. d. The statement of cash flows includes separate sections for operating, investing, and financing activities. The statement is silent with regard to contractual activities.

7. a. Dividends are a return to the owners who provided financing for the company; hence, they are reported as a financing activity. Proceeds from the sale of the stock of other firms and loans made to others are investing activities. Salaries and wages relate to operations.

8. b. Noncash investing/financing activities must be reported in a separate schedule accompanying the statement of cash flows.

9. b. Increases in accounts receivable relate to accrual basis sales not yet collected. Therefore, the amount of the increase in accounts receivable must be subtracted from accrual basis sales in calculating cash basis sales. The total change in cash and cash in bank are unrelated to the conversion process.

10. a. Nonoperating gains must be subtracted from accrual basis income in working toward operating cash flows (i.e., accrual basis income was increased for this nonoperating amount); conversely, nonoperating losses would be added. The conversion process requires that depreciation and amortization be added to accrual basis income because they reduce accrual basis income without consuming cash.

11. b. Increases in current liabilities related to operations are indicative of expenses and purchases not yet paid. Therefore, such amounts must be added to accrual basis income when computing cash from operating activities; conversely, decreases would be subtracted. Increases in current assets related to operations are also subtracted.

12. c. Choices "a" and "b" are an integral part of the statement. Cash paid for interest and taxes must be presented as a supplement.

13. a. $68,000. The accrual basis income ($200,000 - $80,000 - $30,000 = $90,000) is reduced by the increase in accounts receivable ($10,000), the increase in inventory ($5,000), and the decrease in accounts payable ($7,000).

14. d. $79,000. The $50,000 accrual basis income should be increased by depreciation expense ($12,000), loss on the sale of land ($16,000), decrease in merchandise inventory ($4,000), increase in accounts payable ($3,000), and increase in taxes payable ($2,000), and be decreased by the increase in accounts receivable ($8,000). ($50,000 + $12,000 + $16,000 + $4,000 + $3,000 + $2,000 - $8,000 = $79,000).

15. a. A close examination of the lower portion of a work sheet reveals that the debits generally relate to cash increases, whether related to operating, investing, or financing activities.