EVALUATING FINANCIAL RISK WITH INVESTMENT GUIDELINES

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ABSTRACT

Cash management practices for corporate treasurers are in a state of instability in recent years. Events during the credit crisis of 2008 have had an impact on how organization's cash positions are managed. This has led corporate treasurers to juggle unprecedented amounts of cash across multiple bank counterparties and invest these funds based on previous investment policies with potentially inflexible limits. Many regulations have been passed to strengthen domestic and global financial systems, yet the risk of default is not completely removed and there are many uncertain ties that corporates face.

To succeed in the uncertain financial environment, counterparty risk tools must be put in place to improve the visibility of potential operational risk, along with a higher frequency of reviewing and updating investment policies. It is crucial for corporates to look beyond the traditional market perceptions and bank credit ratings to evaluate counterparty risk. Although these continue to be a valuable metric, they should be incorporated with other forward looking market risk metrics such as credit default swaps, capital and asset resiliency metrics, and growth and profitability metrics to their current investment guidelines review. By integrating risk metrics to help formulate an investment policy, corporates can adapt to the changing financial environment.

This thesis examined methodologies to develop a more accurate and immediate viewpoint of counterparty creditworthiness. This was done through the creation of models using market information to set values to view the strength of counterparties and the likelihood of default. Models were created for both financial institutions and countries where cash or investments are placed. Depending on the models, this restricts the

permissible investment options that an institution or country has. This approach allows the company to invest more with higher rated counterparties, and sets a maximum to those who are deemed high risk of default.

The findings of this thesis identified that it is crucial to classify the right metrics and look beyond traditional market perceptions and bank credit ratings. By implementing a balanced process that regularly monitors current market indicators of counterparty risk, an organization will be in a stronger position to define and determine the potential risk. This creates a balanced view of both backward looking and forward looking metrics such as long term debt ratings and credit default swaps. These metrics were useful indicators of a counterparty's strength. Because of the wide range of information available and cost, it went beyond the resources of the company to perform detailed ongoing analysis.

It was also identified that a risk-adjusted approach to setting counterparty limits is crucial for managing counterparty exposure and the risk of default. To optimize liquidity, it is in the company's best interest to place higher balances in institutions with the lowest risk of default. Grouping banks into tiers and assigning a percentage of total balance to each tier allows for financial institutions to have a specific limit capacity. Incorporating these tools on a frequent basis allows for real-time analysis of counterparty exposure and risk.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

CHAPTER I: INTRODUCTION

The Company's Treasury department has a fiduciary responsibility to safeguard the assets of the company through its Investment Guidelines Policy. The purpose of an investment guideline policy is to provide The Company with an approved framework for managing its investment and cash program. This policy ultimately provides the direction and an accountability structure for the Treasury department in the execution and management of cash and investment transactions. This includes investing available cash to ensure safety and liquidity and to provide the best return within a reasonable level of risk. The Company's cash and investment position is important to the company's future, the shareholders, and other business relationships.

The objective of this thesis is to determine the optimal framework of measuring institutional risk and country risk that minimizes liquidity and operational risk to The Company while still meeting business growth needs. The majority of the guidelines that are currently in place were put into effect quite some time ago when The Company and the financial markets were different than today. While The Company has made some modifications and allowed officer actions to change the guidelines since then, it is time to re-evaluate the current guidelines to ensure that adequate capacity is provided on a long-term basis to meet worldwide growth objectives without continuously requesting modifications and officer's actions.

When re-evaluating the current guidelines, the following principles should be considered:

- preserves principal,
- meets liquidity needs,

- delivers the best yields possible within the guidelines of this policy and market conditions,

- avoids inappropriate concentrations of investments, and

- provides fiduciary control of all investments and cash.

When investing, it is not possible to optimize all of these objectives at the same time. The achievement of one may mean that another objective may not be met. Therefore, The Company's Treasury established that the first two objectives listed above are the most important to prioritize. One way to preserve principal and ensure liquidity within the financial institutions funds is placed is to measure each bank's counterparty risk.

As large corporations, such as The Company, continue to grow their business, an understanding of how the world's economies and markets are becoming more interrelated leading to the expansion of investment internationally is crucial. The greater the potential for default, the higher the level of credit risk. Depending on the nature of the failure, this could result in a loss of principal, liquidity or return on the investment itself. The Company also has counterparty exposure to a particular bank through investment such as deposits, short-term securities, and bonds. All of these activities need to be accounted for across all of The Company's business and subsidiaries to ascertain the full extent of counterparty exposure. New models, methodologies, and approaches to counterparty and credit risk are evaluated in the thesis.

CHAPTER II: LITERATURE REVIEW

The objective of the thesis is to develop a strategic investment strategy for managing global cash, short-term investment decisions, and the associated risks. There are a number of risk factors that may influence the overall policy, such as counterparty risk, liquidity risk, market risk, and country risk.

2.1 Counterparty Risk

According to a report published by JPMorgan in 2010 (Hughes), credit and counterparty risk arises when there is a transaction between an investor and some form of payment obligation from another party, in this case a financial institution. There is inherent risk that the bank will not be able to meet its repayment obligation or ultimately default. The greater the potential for default, the higher the level of counterparty and credit risk for that individual bank.

Counterparty risk refers to the cash investment strategy of deposit accounts, which include bankers' acceptances, demand deposit accounts (DDA), cash time deposits, non-U.S repurchase agreements, Eurodollar time deposits, or certificates of deposit of local institutions.

It is common among corporate treasury groups to feel concern about their companies' exposure to financial counterparties due to the near collapse of the banking system in the United States, the United Kingdom, and Europe as a result of the 2008 credit crisis. It is interesting to note that the total global defaults on debt were $8 billion in 2007, and increased to $430 billion in 2008 (Biers, et. al, 2010).

According to the Association for Financial Professionals (AFP) (2013), there are two elements in managing counterparty risk. The first is to avoid concentrating funds with

too few counterparties by limiting the amount of investment with any single counterparty. The second is to understand the relative strength of counterparties through financial market indicators such as credit ratings. In addition, AFP advises that many companies use published credit ratings in their investment policies, but should also look at other metrics beyond the credit rating itself.

2.1.1 Credit Rating

Credit ratings are enormously valuable and important in assessing the credit worthiness of a financial institution and its ability to pay its financial obligations. According to the Office of Investor Education and Advocacy (U.S. Securities and Exchange Commission 2013), the ability to pay financial obligations is referred to as "creditworthiness". Credit ratings are expressed on a scale of alpha symbols that are defined by the particular credit rating agency issuing those ratings. Table 2.1 shows a list of credit ratings. The top rating of 'AAA' from S&P is the highest score indicating low likelihood of default. A poor credit rating, such as a 'C' indicates a credit rating agency's opinion that the institution has a high risk of defaulting based on the historical and economic analysis completed by the rating agency.

According to the policies and guidelines issued by the Nationally Recognized Statistical Rating Organizations (NRSROs) (SEC 2013), credit ratings are generally intended to indicate the relative degree of credit risk of a financial institution rather than reflect a measure of specific default probability or loss expectation. NRSROs generally use qualitative as well as quantitative analysis to derive their credit ratings. The quantitative analysis focuses on financial indicators such as profitability, margins, cash flows, resilience to market volatility, and market position. The qualitative analysis takes into consideration

4

such items as industry characteristics, country risk, leverage and financial policies, and corporate management. Many panel participants at a public hearing held in November 2002 favored the regulatory use of credit ratings issued by NRSROs as a simple, efficient benchmark of credit quality.

The three most prominent NRSRO credit rating agencies are Moody's Investors Services Inc. (Moody's), Standard and Poor's Inc. (S&P), and Fitch Inc. (Fitch). A credit rating is considered investment grade if it is BBB- or higher, using the Fitch or S&P credit rating. Anything rated BB+ and below is considered to be speculative grade or otherwise "junk" investments. Table 2.1 shows the three credit rating agencies descriptions of ratings, whereas the thick black line is the distinction between speculative (junk) and investment grade credit ratings.

Table 2.1: Long-term credit ratings from Moody's, S&P, and Fitch

Moody's	S&P	Fitch	Description
Aaa	AAA	AAA	Prime
Aa1	AA+	AA+	High Grade
Aa2	AA	AA	
Aa3	AA-	AA-	
A1	A+	A+	Upper Medium Grade
A2	A	A	
A3	A-	A-	
Baa1	BBB+	BBB+	Lower Medium Grade
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
Ba1	BB+	BB+	Non-Investment Grade Speculative
Ba2	BB	BB	
Ba3	BB-	BB-	
B1	B+	B+	Highly Speculative
B2	B	B	
B3	B-	B-	
Caa1	CCC+	CCC+	Substantial Risks
Caa2	CCC	CCC	
Caa3	CCC-	CCC-	
Ca	CC	CC	Extremely Speculative
C	C	C	
NR	NR	NR	Not Rated

The Securities and Exchange Commission (SEC) published a statement on their website advising there is a great amount of evidence that credit ratings can be a lagging indicator since they do not address other risks such as liquidity risk, interest rate risk, market risk or prepayment risk (2013). Yet despite the recent criticism, credit ratings remain the most popular method used to measure corporate credit quality. Hilscher and Wilson (2013) found that ratings are poor predictors of corporate failure. In addition, the report suggested that it is not possible for one measure to capture all the relevant financial information and may be prone to misinterpretation.

2.1.2 Credit Default Swap

Accurately defining and quantifying overall counterparty risk can be challenging; however using real-time information may offer valuable insight. Pu, Wu, and Wang (2011) investigate the role of credit default swaps (CDS) as an insurance contract against the default of debt instruments. The sensitivity of CDS spreads to liquidity and counterparty risk is higher when default risk increases.   CDS prices are considered to be an excellent indicator of the markets' perception of a firm's default risk, and can create a balanced view of forward looking market risk metrics.

2.2 Liquidity Risk

Liquidity risk is the risk that an investor cannot access funds when they are needed, which does not allow the investor to meet cash flow commitments. The AFP (2013) found that any loss of liquidity is likely to affect the net return on any investment and should be managed by having an effective cash position forecasting system in place. The AFP also found that the investment policy should restrict the use of investment instruments of longer maturities to manage liquidity risk.

2.3 Market Risk

Studies such as Carey and Stulz (2005) indicate that market risks are generally defined to be risks associated with fluctuations in prices of financial instruments. As companies gain more exposure to the market with short-term investments, they are likely to be exposed to interest rate and foreign exchange risk. The argument that market participants choose to address changes in the markets by developing formalized, quantitative risk measurement and management technologies is made by Cary and Stulz.

2.4 Country Risk

Country risk refers to the political, business, and economic risks that are specific to a country. With the promise of growth, emerging markets have caught the attention of many companies looking to grow their business internationally. Bloomberg (2013) argues that by understanding the interaction between a country's government, economy, and the financial markets, a firm is able to better identify the overall strengths and weaknesses of a particular country.

It is crucial to determine and define the factors that may influence the overall investment policy such as counterparty risk, liquidity risk, market risk, and country risk. These arise whenever a treasury makes a decision and executes a policy or procedure that could result in losses of principal, liquidity, and potential return. Historical analysis and benchmarking are key gauges for how to proceed with future cash placements and investment decisions. Defining these risks leads to the development of a strategic investment process and implementation plan that can support treasury in making the right decisions.

CHAPTER III: THEORY AND METHODS

It is hypothesized that by creating institution and country models to score market indicators, The Company will be able to achieve the main objective. The creation of new risk models and methodologies would ensure The Company is providing adequate investment capacity on a long-term basis to meet worldwide growth goals and reduce counterparty risk, exceptions and violations.

3.1 Solution Development

Using the ERIC model, Figure 3.1, there are many opportunities for enhancement and for value creation. By asking these questions, it opens the door for unlocking new ideas on how to manage daily investments and cash positions. The end results do not require The Company to "compete" with other businesses in their investment resolutions. It drives the company to scrutinize every factor within the investment banking world to help discover the range of implicit assumptions that are unconsciously made in the decision making process.

Figure 3.1 ERIC Model, action framework for investment guideline changes

Eliminate
- Use of only 1 metric (credit rating) for valuing bank risk
- Old Guidelines
- Use of consolidated institution limits.

Reduce
- Exceptions & Violations
- Counterparty Risk

ERIC

Create
- New risk models
- New methodologies for risk calculations
- Bulletins with limits
- New Investment Resolution Guidelines

Increase
- Risk metrics
- Reviews
- Awareness of bank risk
- Interpretation of guidelines

3.2 Eliminate

Through the elimination of the old guidelines, it creates more possibilities for the creation of a new investment resolution policy. Different viewpoints were analyzed, including those of bank representatives, peer reviews, and discussions with managers within the department who have seen the benefits and disadvantages of the current guidelines.

Through this process, The Company would eliminate the use of a single risk metric. Counterparty risk can be measured across three categories: market risk outlook, capital and assets resiliency, and growth and profitability. The goal is to create a balanced view of forward looking market risk metrics to ensure that The Company measures multiple levels of risk. Metrics considered are one or five year bank CDS levels, stock price, debt to asset

11

ratios, Moody's long-term deposit rating, and efficiency ratios, etc. Choosing the right measures and weighting of metrics is a very critical step in this process.

Using one metric, the credit rating, doesn't allow The Company to have a full measure of bank counterparty risk. By adding more metrics, it creates additional effort and analysis for the individual completing this task. The Company doesn't have additional resources to add more employees to work on the compilation of metrics on an on-going basis. A solution would be to select metrics that are easily accessible, even if they aren't the best market risk indicators. In the past, this is why credit-ratings were used. Given access to programs through Bloomberg, there are ways to obtain data to complete thorough bank analysis. This will most likely be the route that The Company takes for collecting data.

The final item eliminated is the use of consolidated institution limits which limits are given to banks that have multiple accounts throughout the world. Since The Company does not have one central treasury system accounting for all cash and investments, it is difficult to manage different limits within one bank throughout the world. To eliminate these consolidated limits, The Company would have only one bank limit to follow. The difficulty is to ensure that each country knows what their portion of the total limit is and the communication of these limits. The Company would need to have all international funding group managers discuss limits that each country needs with "shared" banks such as Citi, JPMorgan, and U.S. Bank. Once these are set, The Company would distribute the amounts to individual units in the various countries.

3.3 Reduce

There are low-value factors in the current investment guidelines that should be reduced such as the amount of exceptions there are to the current guidelines, violations that occur, and the amount of counterparty risk. Since the current guidelines do not evaluate how The Company is growing as a business and that has an effect on its cash balances, there are many exceptions. Since exceptions are approved by the CFO of The Company, exceptions that are really viewed as unnecessary are not considered.

Although exceptions for amounts that are important should be made, some exceptions need to be made for Brazilian banks. These banks are generally risky, and would likely not qualify for higher limits due to their risk. Since The Company is growing business in Brazil, Russia, India, and China, there is a need for cash balances to expand. If exceptions for banks are not made, adequate growth capacity will not be available.

Under the current guidelines there are multiple violations within the banking group The Company places cash within. These are reported to the Treasurer, CFO, and CEO based on the guidelines that do not allow for the capacity for the growing business. Because exceptions for higher limits were not requested, violations occur. This means more cash at banks in excess of their limit ultimately putting The Company at more risk than desired. If a bank were to go bankrupt, The Company could potentially lose the cash held at that bank creating liquidity issues.

Another part of the overhaul of the investment guidelines is to reduce the chance of placing money in a bank that has a higher potential of default. The Company's current guidelines may not be capturing all of the inherent risk that occurs in the banking industry.

3.4 Create

An important opportunity is the creation of non-existent desirables such as new risk models and methodologies, and the new guidelines. The Company has never had a risk model for banking institutions that measures counterparty risk. For over 20 years, The Company's treasury department has used the same investment guidelines, with only minor updates and changes. They do not fit the current business needs The Company has for its daily cash balances. Creating a risk model also would quantify the metrics and allow for analysis to be based on market indicators. Accurately defining and quantifying overall counterparty risk is challenging using real time information but may offer valuable insight.

There are potential disadvantages to creating a new model such as the man-power to create it and tools available to the Treasury department. Also, the issue of selecting correct metrics to the model is important.

Another benefit of the new guidelines is a published accounting bulletin made available to all units with the investment policies and the specific limit that each can invest with particular banks. These would be published and be made available on a timely basis. This would lead to increased understanding of the cash investment options. To publish an accounting bulletin at The Company will take some time because it goes through a rigorous review process and must be approved by different groups. The process may be slow and tedious, but in the end it will prove to be beneficial to the implantation of the new guidelines.

3.5 Increase

Current guidelines only use one risk measurement in place and the methodology is confusing to those who interpret the guidelines. The goal with the creation of a new investment policy is to increase the user understanding and interpretation of the guidelines so that they understand how to invest and handle The Company's cash balances. The Company is currently doing a satisfactory job of handling investments of cash, but it could improve. Various items could be increased such as: awareness of counterparty risk, increased frequency of bank reviews, and increased clarification of procedures.

The Company's treasury group understands counterparty risk, but not at a deep level. The Company must also ensure that they know their full exposure to any particular counterparty. There may be indirect counterparty exposure to the same bank if The Company invests cash in overnight time deposits, demand deposit accounts, and commercial paper all within that counterparty. Therefore, the total counterparty exposure to the bank may be much greater than expected.

There are many banks that are owned by a larger group of banks or part of a larger parent group. If Deutsche bank is partially owned by Citibank, then Deutsche would need to be included in Citibank's exposure. The Company does not want to put itself in a riskier position by giving both banks owned by the same group the same limit. If both defaulted, this could result in large losses. Parent guarantees, especially as to what extent one bank owns the other, are hard to measure due to frequency of buyouts in the financial industry. Counterparty risk should be measured by full exposure to any particular counterparty, based on the parent company.

Definitions in the current guidelines are confusing to understand, and terminology in the investment community can be hard to follow. By broadening the definitions pertaining to the new investment guidelines, The Company would allow units to increase their understanding and interpretation of the guidelines. Clear and concise wording allows for better investment decisions.

The frequency of reviews occurring will increase. Currently this occurs quarterly. Since more current metrics would be used, it would only make sense to review either weekly or daily bank information to guard against deteriorating credit quality of banks.

Solutions for revising the old investment guidelines should consider Bloomberg data. Quantitative as opposed to qualitative measures would benefit The Company. In many complex processes such as the investment guidelines, the numbers can be analyzed.

A particular strength of quantitative research is that statistical analysis allows for generalization. The results are based on numeric analysis and statistics. Qualitative data does provide a depth and richness not possible with quantitative data, and could be used by upper management at The Company.

This could ultimately create an environment that supports the ideas and methodologies required to implement a strategy for the new investment guidelines and ensure that The Company is providing adequate capacity on a long-term basis to meet the worldwide growth objectives without continuously requesting modifications and officer's actions. It will take more than just one analyst to compile all of this data, to gather information, and develop a system to capture all inherent counterparty risk associated with The Company's growing business.

CHAPTER IV: RESULTS AND RECOMMENDATIONS

This chapter explains and reports the results of the models and whether or not changes should be recommended towards The Company's current investment policy. Corporates must mitigate risk across multiple levels. To accurately define and quantify overall counterparty risk can be challenging, however using the right set of broad market metrics can improve counterparty evaluation.

4.1 Probability of Default Theory

Predicting risk and the probability that a financial institution will default is the basis behind the probability of default theory. Probability of default is a quantitative assessment of the likelihood that the obligor, in this case the financial institution that The Company places deposits, will default within a specified period of time. Probability of default can be estimated and assigned either to a single client or to a portfolio of clients with similar characteristics.

The Basel Accords are a set of agreements that provide recommendations on capital, market, and operational risk to guarantee banks have enough capital to not default on obligations. Banks need to estimate a probability of default for each of their obligors. The Company is essentially doing this for their banking group.

Default models are used to support or supplant credit analysis and to calculate counterparty limits. The most valuable tool to measure credit risk is the financial institution's credit rating score. Ratings are expected to differentiate stronger firms from weaker ones, which will assign high ratings to those that are less likely to default on their credit obligations.

The Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric

Rating, 1998-2011 was used as the basis for The Company's probability of default model

(Moody's). Table 4.1 shows issuer-weighted historical average default rates by rating

category over various investment horizons. The rating categories are categorized by the

number of years the investment horizon spans. The longer the investment spans, the higher

the risk of default. The data were determined by averaging the multi-year default rates of

cohorts in the financial industry. These are statements of historical fact that have been

found to be useful benchmarks for the expected likelihood of default for obligations. In

this study, Moody's connects the historical performance of Moody's ratings as predictors

of default and loss severity for corporate issuers. This is a valuable tool to measure default

patterns, and allows for The Company to quantify groups of credit risks together. For

example the global default rate for an A2 rating for six years is 1.364%.

Table 4.1 The Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1998-2011

Rating / Year	1	2	3	4	5	6	7	8	9	10
Aaa	0.000	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
Aa1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aa2	0.000	0.013	0.202	0.430	0.591	0.787	0.914	1.056	1.228	1.443
Aa3	0.050	0.150	0.213	0.314	0.480	0.625	0.814	0.967	1.157	1.429
A1	0.147	0.343	0.604	0.903	1.235	1.535	1.848	2.210	2.601	3.161
A2	0.112	0.317	0.538	0.727	0.978	1.364	1.860	2.503	3.238	4.024
A3	0.087	0.270	0.528	0.781	1.172	1.464	1.862	2.420	3.081	3.676
Baa1	0.178	0.414	0.646	0.826	1.015	1.258	1.476	1.725	1.905	2.358
Baa2	0.223	0.532	0.918	1.414	1.808	2.257	2.625	2.929	3.360	3.848
Baa3	0.355	0.937	1.585	2.162	2.884	3.421	4.104	5.148	6.242	7.872
Ba1	0.424	1.563	2.997	4.139	5.426	6.656	7.850	8.907	10.426	12.307
Ba2	0.705	1.639	2.938	4.437	5.621	6.714	7.705	9.510	10.833	12.870
Ba3	1.124	3.359	5.969	8.856	10.731	12.524	14.172	16.814	20.375	23.749
B1	1.673	5.480	9.628	13.165	16.150	19.057	22.220	25.213	28.366	32.061
B2	3.323	8.594	14.111	19.255	23.075	26.649	29.982	32.890	36.043	38.697
B3	5.161	12.737	20.691	27.135	32.581	37.511	41.784	46.242	50.733	54.739
Caa1	8.835	19.371	29.080	37.076	44.676	50.269	53.718	57.712	62.719	69.292
Caa2	18.164	30.967	40.946	48.286	54.486	59.435	64.250	69.465	74.000	74.000
Caa3	28.900	44.698	54.405	61.683	67.443	67.544	68.582	69.930	69.930	69.930
Ca-C	44.070	58.018	67.605	72.936	76.087	76.235	76.235	76.235	76.235	76.235
Inv Grade	0.139	0.359	0.619	0.884	1.185	1.482	1.812	2.216	2.665	3.222
Spec Grade	5.007	10.389	15.521	19.807	23.188	26.036	28.557	31.110	33.790	36.455
All rated	1.999	4.091	6.026	7.590	8.811	9.811	10.696	11.600	12.528	13.508

*Data in percent

* This table provides the average cumulative default rates after Moody's introduced the modified ratings within the Caa category in 1997.

Source: Moody's

For the purpose of this study, a Tier Limit Model was created based on Moody's Probability of Default study. The study compiled 13 years of data measuring the historical performance of Moody's ratings as predictors of default and loss severity for corporate issuers. This model uses the one year probability of default percentages, because The Company's cash and investments are relatively short term and do not extend over 12 months.

The tier cut-offs for the Tier Limit Model determining the cutoff Tier 1 and Tier 2 are based off of Moody's credit rating categories as in Figure 4.3 below. The following cut-off methodology is used where credit ratings are applied:

Tier 1: Aaa-A3

Tier 2: Baa1-Baa3

Tier 3: Ba1-Ba3

Tier 4: B1-C and Non-rated banks.

All banks and countries are divided into four tiers, with 1 being the least risky and 4 being high risk with a higher likelihood to default. The base limit is the highest amount that The Company deems safe to invest with any one counterparty. This makes up the Tier 1 limit for the Tier Limit Model. A base limit calculation is projected for each fiscal year is the total of The Company assets by 0.5%. Tier 1 is the maximum amount The Company is willing to put with any one institution. An example is if The Company's forecasted total assets are $50 billion; multiply that by 0.5% will equate to $250 million. A convention of rounding up or down to the nearest $5,000,000 is applied to the calculated dollar amounts.

It was critical that the Company's new investment guidelines allow for the company's growing business structure. The previous guidelines did not have sufficient capacity and had hard dollar amounts set with no methodology to support the limits for each counterparty. By setting a base limit to the Tier Limit Model, this allows for the limits within the guidelines to grow with the business.

Tiers 2 and 3 are calculated by taking the averages of the probability of default percentage from Limit 1 to Limit 2 multiplied by the Limit 1 dollar amount. Figure 4.3 shows this in more detail. By multiplying the base limit of $250 million by the Tier 2

average of 0.25%, the Tier 2 limit equates to $65 million. The same methodology in Figure

4.3 is used to calculate Tier 3, where 0.75% is multiplied by the Tier 2 limit of $65 million

to get a Tier 3 limit of $20 million. This approach does not apply to the 4th tier, as it would

calculate an impractical tier limit. Therefore, the 4th tier assumes double the risk of the 3rd

tier, adhering to the previously mentioned rounding convention.

**Figure 4.2 The Company's Total Assets, Total Equity, and Market Capitalization
comparison from October 2002 – October 2012.**
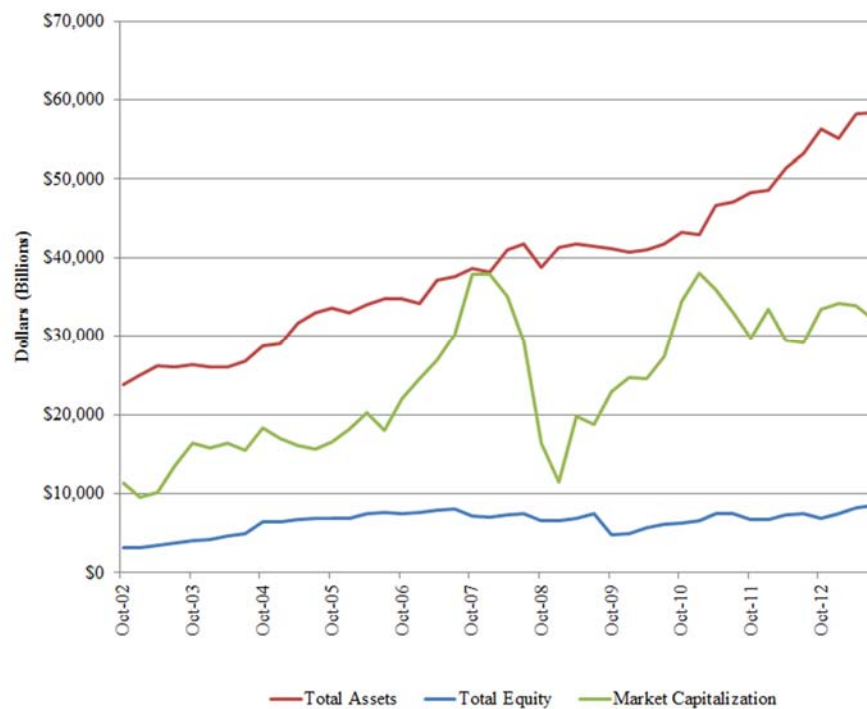
For the base limit calculation, the model needed to have a metric that allows

flexibility as the company grows. Metrics analyzed were The Company's total assets, total

equity, and total market capitalization. Many discussions throughout the Treasury

department, bank advisors, and peers revolved around maximum amount corporates should

be willing to lose in total at any counterparty. The discussion resulted in 1% of market

capitalization, which would roughly be $250 - $300 million. After reviewing historic

market capital, it was clear that it is not a steady growth metric. Instead the thought process

was to think in terms of equity, and transfer into assets, backing into the 0.5% calculation.

Figure 4.2 shows the volatility in market capitalization, equity, and total assets over time.

The Tier Limit Model is applied to both the Institution Tier Model and Country

Tier Model. For example, a Tier 1 bank would be given a maximum limit of $250 million

and a Tier 1 country would also be given a maximum limit of $250 million. This allows

for one consistent policy with amounts allowed to invest within each Tier. Figure 4.3

shows this in more detail.

The permitted investment level for each risk tier is determined as follows:

- o **Tier 1:** Base Limit

- o **Tier 2:** Division between averages Probability of Default Percentage from
  Limit 1 to Limit 2 multiplied by the Limit 1 dollar amount.

- o **Tier 3:** Division in average Probability of Default Percentage from Limit 2
  to Limit 3 multiplied by the Limit 2 dollar amount.

- o **Tier 4:** 50% of Limit 3 dollar amount.

Figure 4.3 Tier Limit Model

Tier	Rating	1 year Prob of Default	Limit
1	Aaa	0.00%	
	Aa1	0.00%	
	Aa2	0.00%	
	Aa3	0.05%	
	A1	0.15%	
	A2	0.11%	
	A3	0.09%	
	Average	0.07%	250,000,000
2	Baa1	0.18%	
	Baa2	0.22%	
	Baa3	0.36%	
	Average	0.25%	65,000,000
3	Ba1	0.42%	
	Ba2	0.71%	
	Ba3	1.12%	
	Average	0.75%	20,000,000
4	B1	1.67%	
	B2	3.32%	
	B3	5.16%	
	Caa1	8.84%	
	Caa2	18.16%	
	Caa3	28.90%	
	Ca-C	44.07%	
	Calculated	1.50%	10,000,000
Total Assets	50,000,000,000		
0.50%	250,000,000		

4.2 Counterparty Risk

Counterparty risk is the risk that an entity with which an investment instrument is

held fails to meet its obligations as promised. The greater the potential for default, the

higher the level of credit risk. Depending on the nature of the failure, this could result in a loss of interest, and/or principal. The Company also has counterparty exposure to a particular bank through investments such as deposits, short-term securities, and bonds. All of these activities need to be accounted for across all of The Company's business and subsidiaries to ascertain the full extent of counterparty exposure. The Company's main concern is to preserve principal by avoiding potential negative credit migration.

4.3 Credit Risk Theory

The safety of most financial institutions can be judged from bond ratings provided by a credit rating agency such as Moody's, Standard & Poor's (S&P), and Fitch. Figure 4.4 lists the possible bond ratings a financial institution can receive by declining order of quality. The highest rating, which would be Aaa or AAA, indicates that the financial institution has a very low credit risk profile. A rating of Ba or worse would be referred to as speculative grade, and are of higher credit risk and potential of default. For evaluating financial institution's risk level, the higher the credit rating, the higher the limit of deposits The Company could place at that individual financial institution.

Figure 4.5 shows the long term debt credit rating of Moody's, S&P, and Fitch's credit rating comparisons with descriptions and The Company's tier cutoff points. This accounts for the first of two metrics in the Institution Tier Model. The lowest grade given by any one of the three credit rating agencies is used in the model, which allows for a more conservative credit review. This metric accounts for half of the total Institution Tier score.

Figure 4.4 Moody's, Standard & Poor's, and Fitch Credit Ratings

Moody's	Standard & Poor's and Fitch
Aaa	AAA
Aa	AA
A	A
Baa	BBB
Ba	BB
B	B
Caa	CCC
Ca	CC
C	C

Source: (Brealey, Myers and Allen 2011)

Further credit rating definitions and descriptions are listed at the end of this thesis in the

Appendix A, the bond credit rating descriptions.

Figure 4.5 Moody's, S&P, and Fitch's credit rating descriptions with the associated Tier cutoff points for the credit rating score.

Moody's	S&P	Fitch	Description	Tier
Aaa	AAA	AAA	Prime	Tier 1
Aa1	AA+	AA+	High Grade	Tier 1
Aa2	AA	AA	High Grade	Tier 1
Aa3	AA-	AA-	High Grade	Tier 1
A1	A+	A+	Upper Medium Grade	Tier 1
A2	A	A	Upper Medium Grade	Tier 1
A3	A-	A-	Upper Medium Grade	Tier 1
Baa1	BBB+	BBB+	Lower Medium Grade	Tier 2
Baa2	BBB	BBB	Lower Medium Grade	Tier 2
Baa3	BBB-	BBB-	Lower Medium Grade	Tier 2
Ba1	BB+	BB+	Non-Investment Grade Speculative	Tier 3
Ba2	BB	BB	Non-Investment Grade Speculative	Tier 3
Ba3	BB-	BB-	Non-Investment Grade Speculative	Tier 3
B1	B+	B+	Highly Speculative	Tier 4
B2	B	B	Highly Speculative	Tier 4
B3	B-	B-	Highly Speculative	Tier 4
Caa1	CCC+	CCC+	Substantial Risks	Tier 4
Caa2	CCC	CCC	Substantial Risks	Tier 4
Caa3	CCC-	CCC-	Substantial Risks	Tier 4
Ca	CC	CC	Extremely Speculative	Tier 4
C	C	C	Extremely Speculative	Tier 4
NR	NR	NR	Not Rated	

4.4 Diversification

Diversification among a group of financial institutions decreases risk of default and a substantial reduction in variability in deposits and investments. By spreading out where cash is held, corporates have a smaller likelihood of losing all of their funds if there are problems in the market or economy. This would assume a risk-adjusted approach to investing that places cash balances at banks not based solely on yield.

4.5 Country Risk

Country risk, refers to the interaction between a country's government, economy and the financial markets, is key to identifying the strength and weakness a country's risk level. Emerging markets have caught attention of investors around the world with the increased opportunities for investments and developing economies. Companies looking to invest internationally look at political risk as one factor among a number of metrics that can help evaluate country risk. Political risk is the risk or threat that a government will change or break a promise after the investment of cash has already been made. This would also include corruption, regulatory and other business risks.

The global financial crisis highlighted the different financial and business risks associated with doing business abroad. In some circumstances, there will have to be exceptions to country risk to continue to grow business internationally. There are significant geographies, or growth countries that need higher balances than what its calculated risk level would advise. Also, some countries are highly regulated, causing "trapped" cash balances that are not accessible.

The Company will most likely have business needs that supersede the country risk such as with Brazilian banks. These banks are generally risky and most likely would not qualify for higher limits due to their high risk. Since The Company is growing business in countries such as Brazil, Russia, India, and China, there is a need for high cash balances to grow the business and therefore keep cash within the country. If The Company does not allow exceptions for banks then growth would be constrained.

These risk theories are the first line of defense in managing potential credit or counterparty risk. Processes should be in place so that bank exposure can be properly monitored and reported on an ongoing basis. This will ensure that exposures can be known at any time across all parts of the business and allow for The Company to better maintain any risk of default by its banking group.

The following Country Tier Model assigns each country a risk tier rating of one through four, with one being the least risky country. The following equation is used for this model:

50% Composite Country Score plus 50% Bloomberg Risk Score = Country Limit

Using a 50% weighting of a composite country score and a 50% Bloomberg risk score, the model can be used to determine what that individual country's limit should be. The first metric, the composite country score, is the lowest rating assigned to a given country by any of the three rating agencies. This metric is an evaluation of the credit worthiness of the country, and their likelihood of default. It also indicates the risk level of the investing environment of a country associated also with political risk.

The Bloomberg risk score, the second metric to the Country Tier Model, ranks countries on a scale of 1-100 on 32 individual metrics including:

- Financial Risk: 5Y CDS, 10Y Bond Spread, 1Y Price Change (%), Index Returns to Global Ave (Z-Score), Index PE Ratio, EIU Banking Risk, FX Forecast, Historical 3M Volatility, FX Volume – 3M Implied Volume, Real Rates, Real Effective Exchange Rate

- Economic Risk: GDP YOY%, GDP Forecast, GDP Value (BLN USD), Currency Reserves (BLN USD), Reserves 1Y Chg (%), Short Term External Debt (%GDP), Total External Debt (BLN USD), CPI Actual, CPI Forecast, Current Account (% of GDP), Imports (BLN USD), Exports (BLN USD), Unemployment, Unemployment (Forecast).

- Political Risk: EIU Political Risk, Alliant Pol & Eco Rating, Expropriation Risk, Currency Inconvertibility, Trade Credit Risk, Ease of Doing Business Rank, Starting a Business Rank.

In assigning a risk tier to a country without a Bloomberg Risk Score, the following defines the tier cut off points:

- Tier 1: 100-64.01

- Tier 2: 64-55.01

- Tier 3: 55-40.01

- Tier 4: 40-0

Countries with a credit rating equal to or higher than AA-, as rated by S&P, or the equivalent rating assigned by any other rating agency, will be evaluated based on their credit rating. Countries with a credit rating equal to or lower than A+ as rated by S&P, or the equivalent rating assigned by any other rating agency will be evaluated based on the

above calculation in which the country's Bloomberg Risk Score will default to that of a

Tier 4 country.

Figure 4.6 is an example of the Country Tier Model after both metrics are

combined. The Total Weighted Average column represents the final tier for each

individual country. This model is reviewed on an annual basis, at which time exceptions to

the model can be presented to the Treasurer and CFO to approve.

Figure 4.6 Country Tier Model Example

				50%			50%	100%
Country	Rating	Credit Rating Score		Bloomberg Country Risk profile		BB Score		Total Weighted Average
Australia	AAA	1		67.288		1		1
Austria	AA+	1		63.38076923		2		1.5
Canada	AAA	1		67.664		1		1
Chile	A+	1		56.40769231		2		1.5
Finland	AAA	1		53.54347826		3		2
France	AA+	1		67.99166667		1		1
Hong Kong	AA+	1		66.89615385		1		1
Luxembourg	AAA	1		NR		1		1
Netherlands	AAA	1		NR		1		1
New Zealand	AA	1		66.09166667		1		1
Norway	AAA	1		72.76521739		1		1
Singapore	AAA	1		71.4		1		1
Sweden	AAA	1		59.45652174		2		1.5
Switzerland	AAA	1		69.51363636		1		1
United States	AA+	1		69.836		1		1
Belgium	AA-	1		NR		1		1
Brazil	BBB	2		44.728		3		2.5
Cayman Islands	AA-	1		NR		1		1
Denmark	AAA	1		63.10869565		2		1.5
Estonia	A+	1		NR		4		2.5

The tier to which a country is assigned determines the maximum amount of total deposit accounts that may be placed in that country by all The Company entities, combined parent and subsidiaries. Deposits include the following: bankers' acceptances, demand deposit accounts (DDA), cash time deposits, non-U.S repurchase agreements, Eurodollar time deposits, or certificates of deposit of local institutions. The total country limit will be measured based on the country where the account is held and not where the The Company account holder is located.

The total of all deposit accounts at any given financial institution in a given country may not exceed the country limit for that country. An example of how the institutions within a country are still limited by the country limit is presented in Figure 4.7. Germany is a Tier 1 country, with a country limit of $250 million, which cannot be superseded by the total of all the institution limits of $890 million. The units within Germany would have a responsibility to manage their limits at these banks to stay within the model limit of $250 million. If the cash held at these German banks were to go in excess of $250 million, this would be considered a violation and would need to be reported on a quarterly basis to the CFO and Treasurer.

Figure 4.7 Total list of banks in Germany with their tier level and total instition limit amount

Germany Banks	Rating	Tier	Institution Limit	Total Country Limit
Dresdner Bank AG	A-	2	$ 65,000,000	
Sparkasse	NR	4	$ 10,000,000	
Landes Hessen Thuringen	A	1	$ 250,000,000	$ 250,000,000
Kreissparkasse Koeln	A+	1	$ 250,000,000	
Volksbank Oberberg	BBB-	2	$ 65,000,000	
Bayerische Landesbank	BBB+	1	$ 250,000,000	
			$ 890,000,000	

4.6 Institution Tier Model

The institution limit is determinedusing an institution risk tier model that is reviewed on a weekly basis or more frequently as needed. There are two metrics to this model; the long term credit rating score and five year credit default swap score (CDS). Figure 4.5 shows the breakdown of the first metric, the long term credit rating.

If an institution does not have a credit rating, it will be given a value of no rating (NR), which falls into the 4th tier of riskiness. Given that there is not enough data for a credit rating agency to assign a credit score, The Company will not assume a higher value for a NR bank.

The second metric in the Institution Tier Model is the five year CDS score. A credit default swap is essentially an insurance policy issued by banks, that would be the sellers, and taken out by investors or otherwise known as the buyers. They help protect against failure among their investors. The higher the CDS value, the higher the likelihood of default. Almost all of the larger banks The Company uses actively trade 5-year CDS. There are a few such as Toronto Dominion, Northern Trust, and Fifth Third that do not. In total, roughly 50 of The Company's 150 banks have a 5-year CDS. If a bank does not have a 5-year CDS, the bank will then default to using only the first metric, the long term credit rating metric score.

Since rating agencies can fail to identify all inherit risks, a second metric was required for the Institution Tier Model to be complete. A study done by Capital IQ (Figure 4.8) shows that the S&P short term credit rating is not very correlated to the financial institution's one-year CDS rating. The coefficient of determination, or the R^2, between

agency ratings and CDS spreads is 54%. The R^2 value explains the strength between credit ratings and CDS spreads. Many other corporates have increased the use of CDS spreads since the 2008 credit crisis.

Figure 4.8 Capital IQ study showing S&P Short Term credit ratings compared to 1-year CDS

Source: Capital IQ as of 1/7/13
*R² of 0.0 shows no correlation, R² of 1.0 shows direct correlation
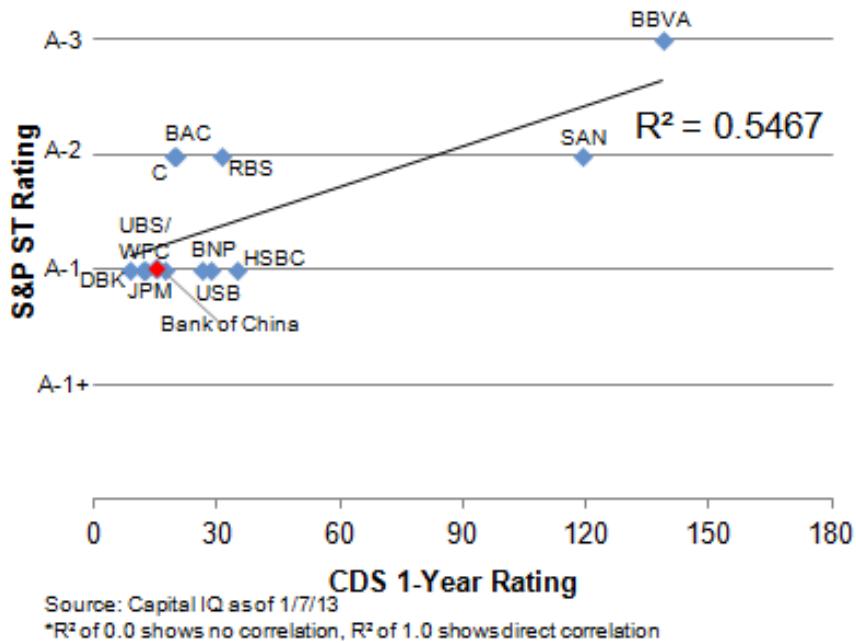
The first choice for CDS was the one year (1Y) CDS, but due to the illiquidity of the 1Y CDS market, The Company chose to go with the five year (5Y) CDS. Since The Company wanted to incorporate a metric that was readily available on the majority of its banks, the five-year CDS was best. Of the 150 banks, roughly 20 only had a one-year CDS whereas almost 50 had the five-year. An analysis of data on the 1Y CDS and 5Y CDS levels, found that the correlation between the two was 85%. This shows that there is a

fairly strong relationship between the 1Y and 5Y CDS metrics. Figure 4.9 shows this in more detail, along with appendix B.

Figure 4.9 One year and five year CDS correlation comparisons for large financial institutions

CDS Correlation betwen 5Y & 1Y CDS
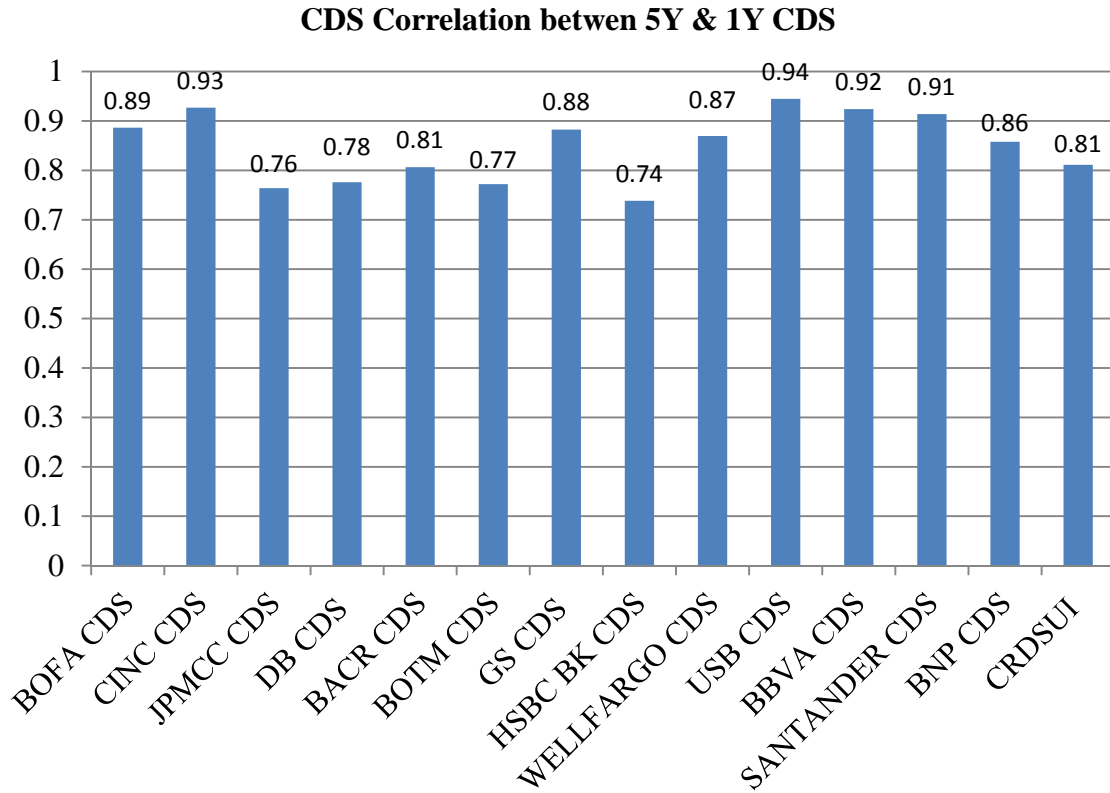
Reval, an online treasury and risk management information site, publishes an index that takes an average of all the institutions within a credit rating level's 5-year CDS spread. This index is then used to determine cut-off points for the CDS tier score. Figure 4.10, the Reval index composite of A rated banks was 103.1 on that particular day. In the CDS tier scoring metric, anything that is a 103.1 and lower would score into Tier 1. The other cutoff points were set also similar to the credit rating cutoffs in Figure 4.5.

Figure 4.10 CDS score tier breakdown with information from REVAL

Rating	Index Value
AAA	No index value
AA+	93.7
AA	93.7
AA-	93.7
A+	103.1
A	103.1
A-	103.1
BBB+	139.4
BBB	139.4
BBB-	139.4
BB+	282.25
BB	282.25
BB-	282.25
B+	425.1
B	425.1
B-	425.1

		Max	Min
Tier 1		103.1	0
Tier 2		139.4	103.11
Tier 3		282.25	139.41
Tier 4		5000	282.26
NR			

The Reval index is updated on a daily basis and moves with the markets. The Reval index should highlight issues with individual institutions that are out of line with general market trends. In addition, this will allow The Company to monitor general market shifts. Figure 4.11 illustrates when CDS levels started to rise due to negative economic data in the United States, turmoil in emerging markets, and data showing American factories expanding at the weakest pace since June 2013. This also came when Treasury Secretary Jack Lew warned that the United States could potentially run into debt ceiling and default issues.

Figure 4.11 5Y CDS levels January 13, 2014 – February 3, 2014
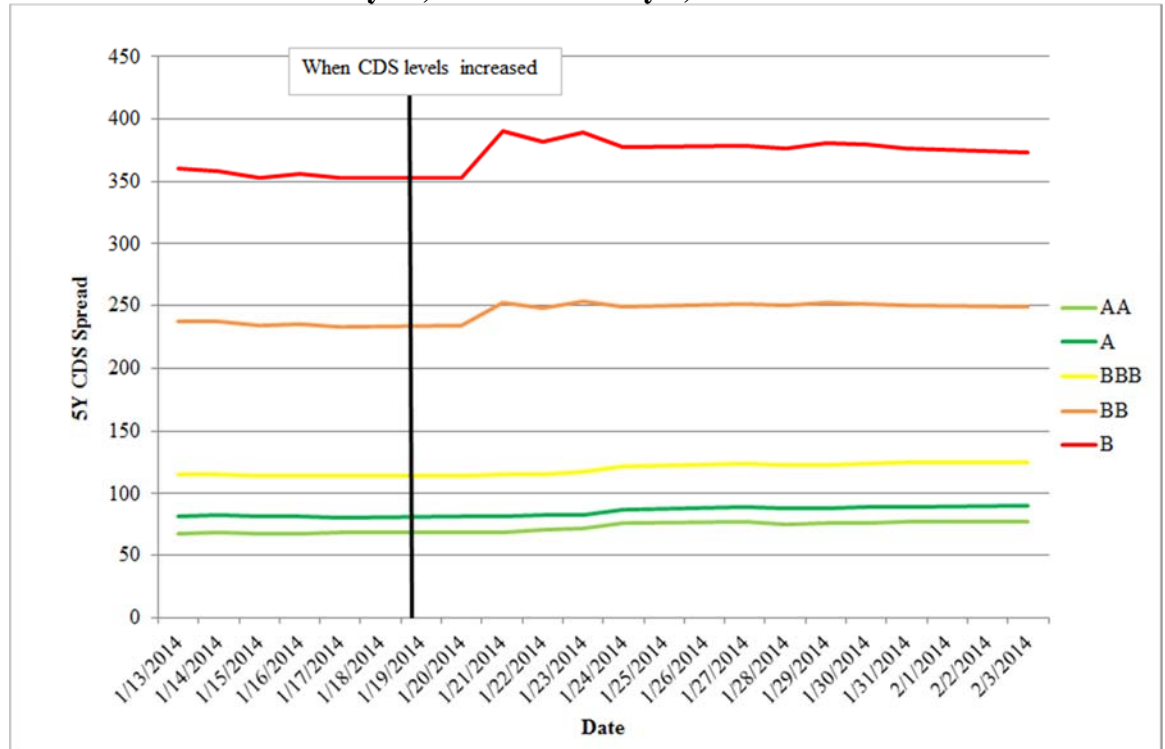
Figure 4.12 shows how the following formula for all institutions are divided into four risk tiers based on the following formula:

50% Composite Institution Long Term Debt Rating Score plus 50% 5-year CDS Score = Institution Limit

Figure 4.12 Institution Tier Model

Bank Name	Rating Agency (50%)	CDS 5-year (50%)	Total Weighted Average (100%)	Institution Tier
China Everbright Bank Co-A	2	2	2	2
Societe Generale	1	1	1	1
Banco Inverlat As-Ser A	2	2	2	2
Bank Of New York Mellon Corp	1	1	1	1
Mitsubishi Ufj Finl Grp-Adr	1	1	1	1
Banco Patagonia Sa-B Sh	4	4	4	4
Jpmorgan Chase & Co	1	1	1	1
Citigroup Inc	2	1	1.5	1
Bnp Paribas	1	1	1	1
Standard Chartered Plc	1	2	1.5	1
China Citic Bank Corp Ltd-H	2	2	2	2
Shanghai Pudong Devel Bank-A	3	3	3	3
Sberbank	2	4	3	3
Ing Bank Nv	1	1	1	1
Banco Macro Sa-B	4	4	4	4
Banco Estado Rio Grande Sul	2	2	2	2
Bank Of America Corp	2	1	1.5	1
Morgan Stanley	2	1	1.5	1
Westpac Banking Corp-Sp Adr	1	1	1	1

The Institution Limits apply to all deposit accounts that include the following: bankers' acceptances, demand deposit accounts (DDA), cash time deposits, non-U.S repurchase agreements, Eurodollar time deposits, or certificates of deposit of local institutions. The total of all deposit accounts at all worldwide locations of any institution may not exceed the institution limit assigned by the Institution Tier Model. In addition, institution limits do not apply to investments in money market funds, commercial paper, U.S. securities, and international money market funds.

The tier to which an institution is assigned determines the maximum amount of deposits that may be placed in that institution by all The Company entities on a global

basis, combined parent and subsidiaries. For example, if you look at Figure 4.12, the China Everbright Bank Co-A scores out as a Tier 2 bank on the Institution Tier Model. The limit for a Tier 2 bank, as per Figure 4.3 is $65 million. This then means that the China Everbright bank has a maximum limit of $65 million.

4.7 Recommendations

Currently The Company does not have one central Treasury system to account for all the cash held throughout all worldwide entities. Financials are collected at the end of each quarter when individual units send in their Q-8's to Treasury, but intra-quarter there is no process to measure the cash held at each institution. For larger banks that have multiple accounts around the world, such as Citi Bank N.A., this could create violations to the current guidelines because it does not separate out individual units from other countries with the specific limits. An example would be if Citi Bank has different institution limits, with one total global limit that Citi Bank cannot exceed. All of these smaller consolidated institution limits could exceed the global limit. Obviously, this creates various violations of the policy for Citi Bank for any given quarter.

The current guidelines only evaluate counterparty risk associated within each bank based on its credit rating score from Moody's, Fitch, or Standard and Poor's. These rating agencies provide credit ratings for short and long term debt securities. Rating agencies may not identify all inherit risk, and shouldn't be relied upon fully for evaluating counterparty risk since they are considered by some a "lagging indicator", primarily based on data that is already in the market (Association for Financial Professionals, 2013). It would be best to have the new guidelines that are more forward looking and include more metrics than just credit ratings. This is an important topic, because The Company's number one priority is to

preserve principal and ensure The Company's liquidity position is protected. To accomplish this, risk measurements must be adequate.

4.8 Investments Results

The investment portion of the guidelines and the suggested changes primarily involve government security investments, repurchase agreements, money market mutual funds, international money market funds, and commercial paper. These data were collected through a peer review study completed through conversations with multiple investment banks.

Securities that are direct obligations of the U.S. Government are generally considered very low risk. In most cases, it can be assumed that sovereign institutions such as the United States will honor their debt obligations. Examples of federally guaranteed obligations The Company is allowed to invest in include Treasury Notes, Treasury bills, and Treasury backed prime money market funds. Since the U.S. is considered economically stable and the debt is considered guaranteed by the full faith and credit of the United States government, The Company will allow an unlimited global capacity in these investments.

Repurchase agreements sold by institutions that at the time of the trade are on the list of approved primary U.S. government securities dealers of the Federal Reserve, as published from time to time. Collateral Issuer Limits must qualify for investment under Institutional Limits and are allowed by The Company to have a global limit of $250 million and an individual broker limit of $100 million. Both limits were determined after peer

analysis review as close to an industry standard and historical analysis of repurchase agreements use.

Prime money market mutual funds that meet the following guidelines: eligible under U.S. Investment Company Act Rule 2(a)(7), and must be AAA/AAAm rated. Rule 2(a)(7) includes restrictions around credit quality, maturity and liquidity as well as rules around ongoing operations and transparency to investors. Money market funds have a global limit of 5% of the funds' Assets Under Management (AUM), that must be applied for each individual fund. The 5% AUM was determined after a peer analysis of other corporates investment percentages.

International Money Market Funds that meet criteria similar to that of U.S. Investment Company Act Rule 2(a)(7) money market mutual funds and are rated AAA/AAAm. International money market funds have a global limit of 5% of the funds' Assets Under Management (AUM), that must be applied for each individual fund. Certain international funds, such as Deutsche, have funds with multiple currencies. Each individual fund with separate currencies will be counted as their own fund since they have individual AUM's.

Commercial paper rated at least A-1, P-1, or F-1 respectively, by at least two rating agencies will be given a global limit of $250 million and individual issuer limit of $50 million. These limits were determined based off of peer analysis and The Company's maximum investment amount of $250 million as per the tier limit model. The Company also has the option to invest globally $150 million and by issuer of $25 in commercial paper rated at least A-1, P-1, or F-1 respectively, by at least one rating agency. These were also deemed as industry standard when compared to other companies and bank analysis.

4.9 Review Criteria

Accurately defining and quantifying overall counterparty risk is challenging, but using real time information and reviewing it offers valuable insight. To ensure that The Company is capturing all market risks and the appropriate personnel are reviewing it, there will be multiple reviews put in place. Some need to occur more frequently than others, such as five-year CDS levels and credit ratings.

4.9.1 Annual Review

The Company will review on an annual basis the metrics for the Tier Limit Model, which is the forecasted total assets multiplied by the 0.5% to come up with the base limit amount. The base limit amount needs to be reviewed annually to keep with The Company's growth ambitions and to allow for flexibility within the guidelines. Forecasted assets are established by The Company's forecasting group at the beginning

The Country Tier Model will also be re-estimated at this time due to the Bloomberg Risk Score being updated on an annual basis. If the Bloomberg Risk Score were to be updated on a more frequent basis, it would be recommended to also increase the frequency of country reviews. Any exceptions to the models will be approved by The Company's CFO and Treasurer. Upon completion of the annual review, limits will be revised. An Accounting Bulletin will be distributed to all The Company units worldwide. This bulletin will be issued to provide visibility to the revised Investment Guidelines as well as to provide specific institution and country limits for the geographies in which units conduct business.

4.9.2 Quarterly Review

   Institution tiers will be reviewed and any quarterly violations will be brought to the

attention of the Treasurer and CFO. Also on a quarterly basis other exceptions that need to

be made due to changes in models or business needs will be made and signed off by the

Treasurer.

4.9.3 Weekly Review

   On a weekly basis, the finance analyst within the Treasury group will collect

Bloomberg information. This includes five-year credit default swap (CDS) levels and credit

ratings. The five-year CDS levels will also be updated through Reval to reflect current

market data to benchmark CDS levels. Reval is global provider of treasury and risk

management information. The Company uses Reval for foreign exchange trading and other

various information, such as the benchmarking for financial CDS benchmarking. The

Institution Tier Model will then be calculated with the updated data and banks will be

reviewed by upper management by the frequency and amounts they shifted in tiers.

4.9.4 Weekly Review Criteria

   Weekly reviews will be completed using Figure 4.13 to distinguish when banks

need to move tiers, which would indicate a need to update the master bulletin. Since CDS

levels can move more frequently because they show current market conditions, The

Company's models need to take this into account. At the same time, The Company does

not want to have frequent movements in tiers due to inconsistent CDS levels. This would

cause constant confusion to update the Accounting Bulletin with these changes in tiers, and

units would be expected to constantly move cash around based on these changes.

   To capture frequent movements in CDS levels along with credit risk, while

balancing significant market changes, Figure 4.13 advises when a bank will actually move

tier levels. During a weekly review, if a bank meets any one of the four criteria, it will be moved at that time. This leaves room for The Company to be as objective as possible, while still leaving room for subjective review. Any exceptions to the review criteria would need to be approved by an officer's action by the CFO and Treasurer.

Change in Credit Rating Tier: during the weekly review if a financial institution changes tiers based on an increase or decrease in credit ratings, which would include the lowest credit rating of the three credit rating agencies, immediate action will be taken. The bank will assume the lower tier limit.

Shifting Two Tiers: during the weekly review if a financial institution changes two tiers immediate action will be taken. The bank will assume the lower tier limit. Changing two tiers would significantly increase the perceived risk that the bank will default.

Shift One Tier: The Company will document the changes and monitor. No immediate change needed if the tier shift is based on CDS levels. CDS can be volatile based on market information, so in order to keep banks from moving constantly, The Company will not take action until the bank has been at the shifted tier four consecutive weeks.

Four Weeks Consecutive Tier Movement: the bank will assume the lower or higher tier if on the fourth consecutive week it has remained at the changed tier. An example would be if Citi was originally a Tier 1 bank, and moves to Tier 2 due to changes in CDS in a weekly review. Citi would need to remain at Tier 2 level for another consecutive three weeks to actually move down to that tier and have Accounting Bulletin changes distributed.

Figure 4.13 Weekly Review Criteria for Institution Tier Model

Change in Credit Rating Tier	Shift 2 tiers	Shift 1 tier	4 weeks consecutive tier movement
• Immediate action • Will assume lower tier limit • Bulletin notice of new amount	• Immediate action • Will assume lower tier limit • Bulletin notice of new amount	• The Company will document change • No immediate action to be taken	• Immediate action • Will assume lower/higher tier amount • Bulletin notice of new amount

4.10 Implementation of the Models

For the first fiscal quarter of 2014, The Company implemented the models and methodologies presented in this thesis. In total, there were eight different financial institutions that changed according to the criteria listed in Figure 4.13. The two main components of the Institution Tier Model are the 5Y CDS and long term credit rating. The 5Y CDS levels were the main driver of any change to an institution's tier level.

Figure 4.14, 4.15, and 4.16 show three banks that had actual tier movement in Q1 of 2014. Societe Generale and Dresdner Bank both had increases in late November 2013 from Tier 2 to Tier 1 due to increases in CDS levels. Bayerische Landesbank had a decrease in January 2014 due to a decrease in CDS. This brought Bayerische from a Tier 1 to a Tier 2. The decline in CDS remained for four consecutive weeks at a different tier than what they were originally assigned.

Figure 4.14 Societe Generale Bank Tier level and 5Y CDS spread for fiscal Q1 2014.
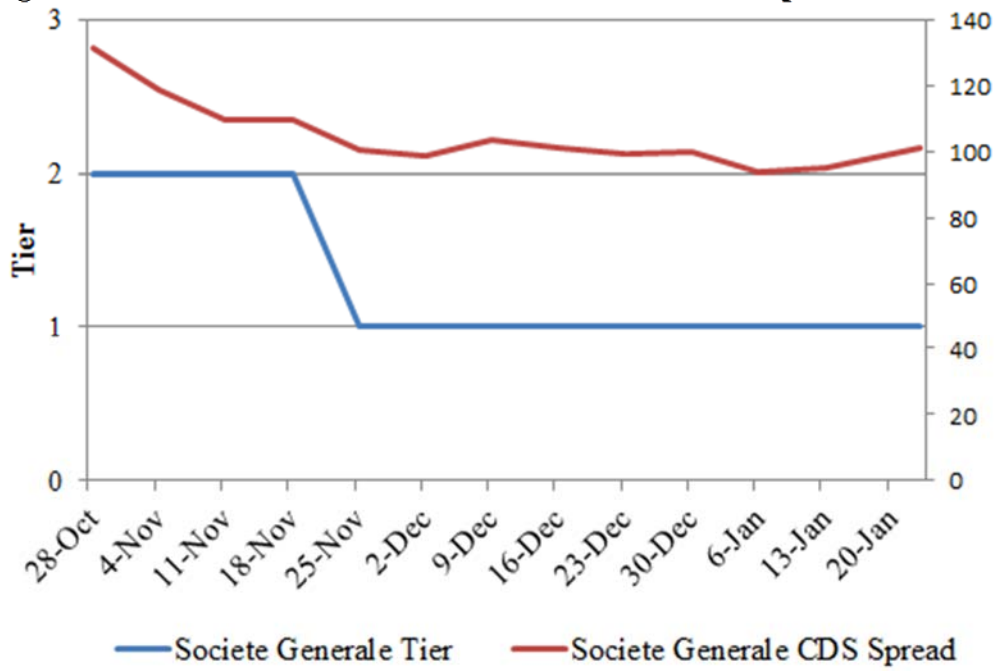
Figure 4.15 Dresdner Bank Tier level and 5Y CDS spread for fiscal Q1 2014.
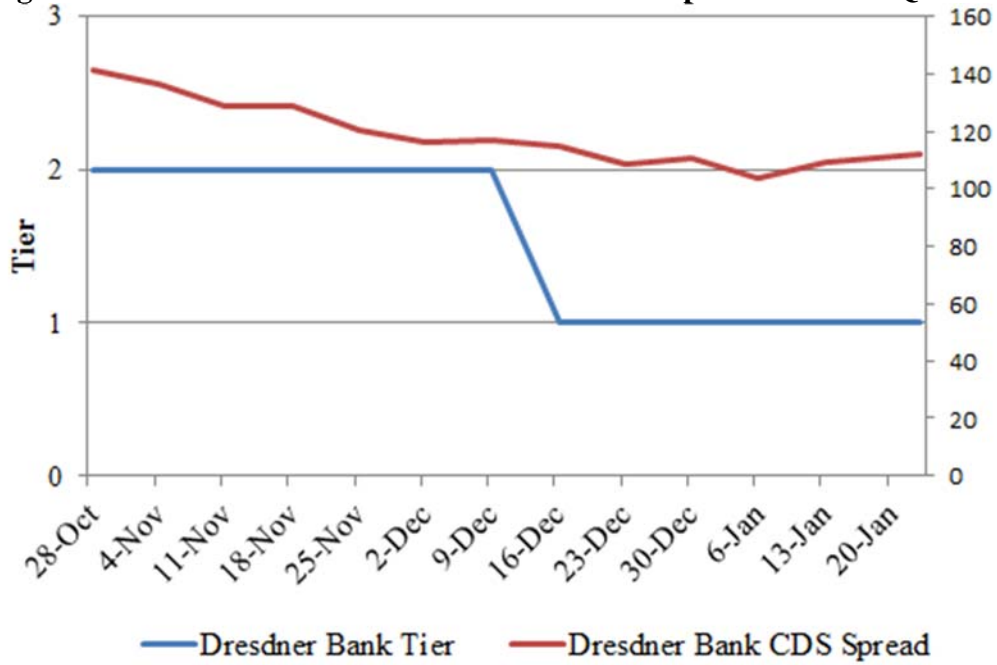
Figure 4.16 Bayerische Landesbank Tier level and 5Y CDS spread for fiscal Q1 2014.
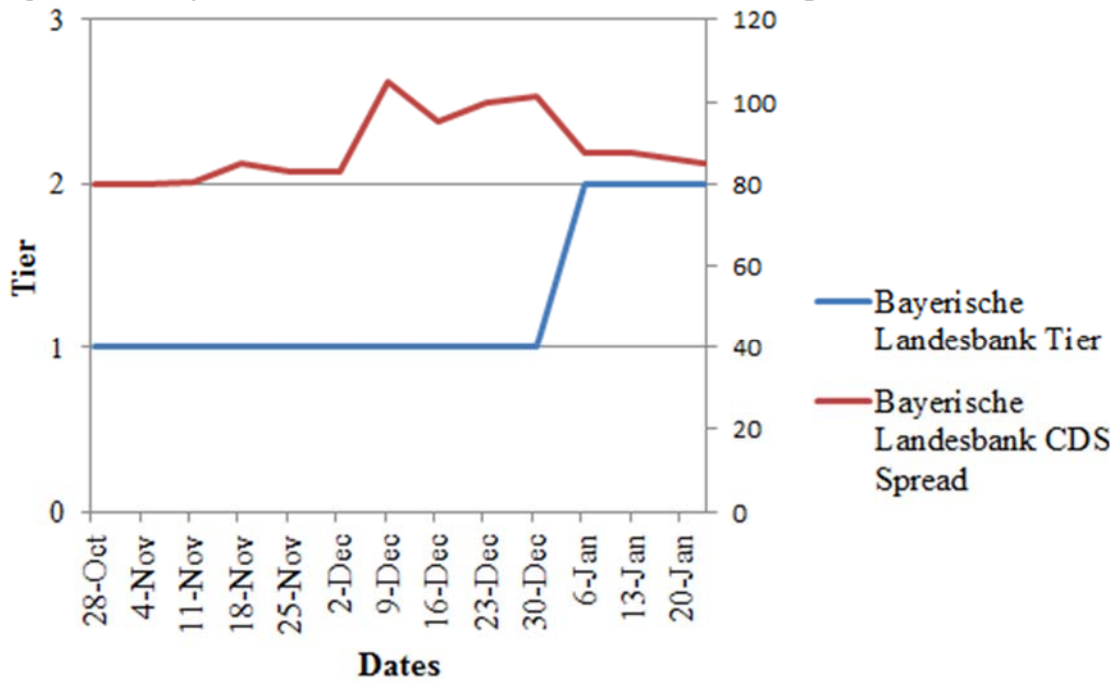
By reviewing the data on a weekly basis and using integrated risk metrics allows for the investment policy to adapt to the changing financial environment. Looking at Figures 4.14-4.16, the final tier movements resulted in a time period of four consecutive weeks where the bank remained at the changed tier. This then resulted in a move to the new tier level. If there was no time period to review if this change was significant enough to adjust limits, banks that have volatile 5Y CDS spreads could be moving constantly. This would create confusion with entities and numerous bulletins being released with the new tier information. The Company wanted to avoid frequent alterations to the final tier model, or master bulletin.

The implementation of this process for banks was completed for the Institution Tier Model with only eight resulting in final tier movements that caused the master bulletin to

change. After a review of Q1 2014, it has been decided that no changes to the model is required and that the current metrics used to analyze counterparty risk are acceptable.

Figure 4.17 shows an example of the weekly review process in which all movements are tracked based on the criteria in Figure 4.13. October 28th, 2013 was the first week of The Company's fiscal Q1 2014. This week there were no banks on watch or review. On the following week, November 4th, 2013 two banks, Credit Agricole and Societe Generale increased from Tier 2 to Tier 1 based on an increase in their 5Y CDS spreads. This signifies to the analyst that this is the first week these banks are on watch, and would need to remain at Tier 1 level for another consecutive three weeks to actually move up to a Tier 1.

Figure 4.17 Two weeks of weekly review history.

							10/28/2013											11/4/2013					
went down a score																							
went up a score																							
Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1 W	2 Shift	2 W	3 W	4 W	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2 W	3 W	4 W			
Royal Bank Of Canada	1	2	1.5	1							1	2	1.5	1									
Hsbc Holdings Plc-Spons	1	1	1	1							1	1	1	1									
Credit Agricole Sa	1	3	2	2							1	2	1.5	1		Watch							
Wells Fargo & Co	1	1	1	1							1	1	1	1									
Societe Generale	1	3	2	2							1	2	1.5	1		Watch							
Jpmorgan Chase & Co	1	1	1	1							1	1	1	1									
Us Bancorp	1	1	1	1							1	1	1	1									
Bayerische Landesbank	2	1	1.5	1							2	1	1.5	1									
Dresdner Bank Ag	1	3	2	2							1	3	2	2									

Figure 4.18 shows in more detail how upper management is informed of any bank that is categorized as on watch, on a three-week warning, or needs to be reviewed due to meeting one of the four criteria to move to a different final tier. The email alerts managers as to what the current tier the bank is scoring at, and how many weeks it has been either on watch or if it requires review.

By notifying managers of any changes permits time for discussion to take place on what needs to happen if limits are decreasing. This also allows for managers to know if they need to put together an exception to the policy from the CFO and Treasurer. This would be the case if multiple units use bank accounts with Citi, which is a Tier 1 bank with a limit of $250M. If Citi is downgraded to Tier 2 status for four consecutive weeks and needs to change tiers, the new Tier 2 limit would be $65M. Managers would most likely need to request an exception to the policy because the $65M would not be a realistic limit for a large bank such as Citi that many units use for daily cash activity.

Figure 4.18 Email distribution details on weekly criteria

		=Watch - Tier shift movement. No action necessary, just on watch.					
		=Warning - Has been on current tier for 3 consecutive weeks					
		=Review - Has come into review, action must be taken or exception					
Other Banks (Int'l)	Real-Tier (test to)	Real-Limit (test to)	Real-Time Tier	Real-Time Limit	Difference	Real-Move or Watch	How many weeks on Watch
Credit Agricole Sa	2	65,000,000	1	250,000,000	Review	Watch	1 Week
Societe Generale	2	65,000,000	1	250,000,000	Review	Watch	1 Week

CHAPTER V: SUMMARY AND CONCLUSION

The objective of the thesis, as it is defined in Chapter 1 is to determine a framework of measuring institutional risk and country risk that minimizes liquidity and operational risk. The revision of The Company's investment policy was to ensure that adequate investment capacity is provided on a long-term basis to meet the worldwide growth objectives of the business. There are many critical factors influencing the outcome of the investment guidelines policy for The Company. These include:

- Being able to manage global limits from a central Treasury location

- Market metrics/indicators to evaluate risk

- Quantitative analysis versus qualitative analysis

- Objective analysis with room for subjective review

- Limited employees, budgets and time constraints

- Communication from central Treasury on policies and implementation of investments and cash placements to all of The Company's units

- Meeting liquidity needs while managing counterparty risk

The models developed use market risk indicators assigned through numerical data to estimate counterparty risk of financial institutions and countries that The Company places cash within. There is no perfect way to predict if or when a financial institution will default on its obligations to investors, but through the models and methodologies developed, The Company can better predict when counterparty failure may be present.

Enhancing the risk controls should remain an ongoing process. Companies should re-evaluate the application of corporate cash in response to market pressure. By revisiting

the investment policy, companies can ensure risk thresholds sufficiently reflect the current

market environments and have the appropriate tolerance levels. These models allow The

Company to develop an investment strategy for managing global cash and the associated

financial risks. Treasurers, and those managing cash transactions and investments, need to

have a clear understanding of the fundamental objectives of investment: maintaining

principal, ensuring liquidity, and maximizing yield. Fundamentally all investment decisions

are about managing the risk.

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Source: Moody's (2011).

Bond Rating Definitions

There are three principal ratings services – Moody's, Standard & Poor's and Fitch. Here is how each of them defines their ratings for long-term corporate debt:

Moody's
Aaa Obligations rated Aaa are judged to be of the highest quality, with minimal credit risk.
Aa Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A Obligations rated A are considered upper-medium grade and are subject to low credit risk.
Baa Obligations rated Baa are subject to moderate credit risk. They are considered medium grade and as such may possess certain speculative characteristics.
Ba Obligations rated Ba are judged to have speculative elements and are subject to substantial credit risk.
B Obligations rated B are considered speculative and are subject to high credit risk.
Caa Obligations rated Caa are judged to be of poor standing and are subject to very high credit risk.
Ca Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect of recovery of principal and interest.
C Obligations rated C are the lowest rated class and are typically in default, with little prospect for recovery of principal or interest.

Note: Moody's adds numerical modifiers 1, 2, and 3 to each rating class from Aa through Caa. The modifier 1 indicates that the obligation ranks in the higher end of its category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates a ranking in the lower end of that category.

Standard & Poor's

AAA: An obligation rated 'AAA' has the highest rating assigned by Standard & Poor's. The obligor's capacity to meet its financial commitment on the obligation is extremely strong.

AA: An obligation rated 'AA' differs from the highest-rated obligations only to a small degree. The obligor's capacity to meet its financial commitment on the obligation is very strong.

A: An obligation rated 'A' is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. However, the obligor's capacity to meet its financial commitment on the obligation is still strong.

BBB: An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation.

BB: An obligation rated 'BB' is less vulnerable to nonpayment than other speculative issues. However, it faces major ongoing uncertainties or exposure to adverse business, financial, or economic conditions, which could lead to the obligor's inadequate capacity to meet its financial commitment on the obligation.

B: An obligation rated 'B' is more vulnerable to nonpayment than obligations rated 'BB', but the obligor currently has the capacity to meet its financial commitment on the obligation. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitment on the obligation.

CCC: An obligation rated 'CCC' is currently vulnerable to nonpayment, and is dependent upon favorable business, financial, and economic conditions for the obligor to meet its financial commitment on the obligation. In the event of adverse business, financial, or economic conditions, the obligor is not likely to have the capacity to meet its financial commitment on the obligation.

CC: An obligation rated 'CC' is currently highly vulnerable to nonpayment.

C: A 'C' rating is assigned to obligations that are currently highly vulnerable to nonpayment, obligations that have payment arrearages allowed by the terms of the documents, or obligations of an issuer that is the subject of a bankruptcy petition or similar action which have not experienced a payment default.

Note: Standard & Poor's may add the modifiers "+" or "-" to a rating to denote relative status within major rating categories.

Fitch

AAA: Highest credit quality.
'AAA' ratings denote the lowest expectation of credit risk. They are assigned only in cases of exceptionally strong capacity for payment of financial commitments. This capacity is highly unlikely to be adversely affected by foreseeable events.

AA: Very high credit quality.
'AA' ratings denote expectations of very low credit risk. They indicate very strong capacity for payment of financial commitments. This capacity is not significantly vulnerable to foreseeable events.

A: High credit quality.

'A' ratings denote expectations of low credit risk. The capacity for payment of financial commitments is considered strong. This capacity may, nevertheless, be more vulnerable to adverse business or economic conditions than is the case for higher ratings.

BBB: Good credit quality.

'BBB' ratings indicate that expectations of credit risk are currently low. The capacity for payment of financial commitments is considered adequate but adverse business or economic conditions are more likely to impair this capacity.

BB: Speculative.

'BB' ratings indicate an elevated vulnerability to credit risk, particularly in the event of adverse changes in business or economic conditions over time; however, business or financial alternatives may be available to allow financial commitments to be met.

B: Highly speculative.

'B' ratings indicate that material credit risk is present.

CCC: Substantial credit risk.

'CCC' ratings indicate that substantial credit risk is present.
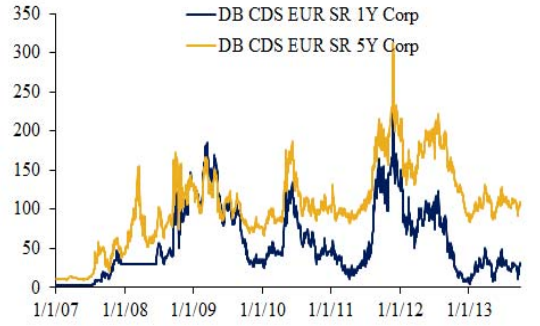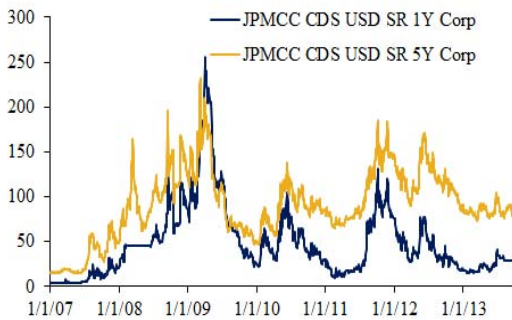
CC: Very high levels of credit risk.

'CC' ratings indicate very high levels of credit risk.
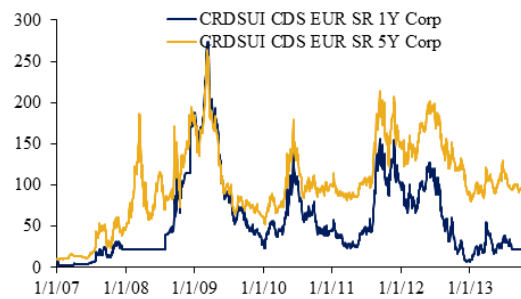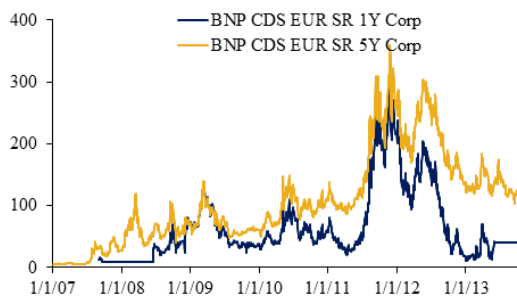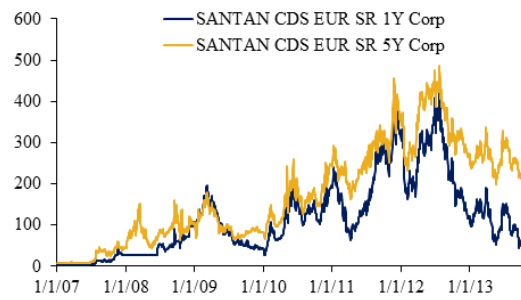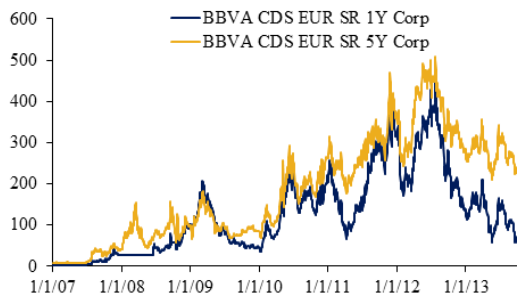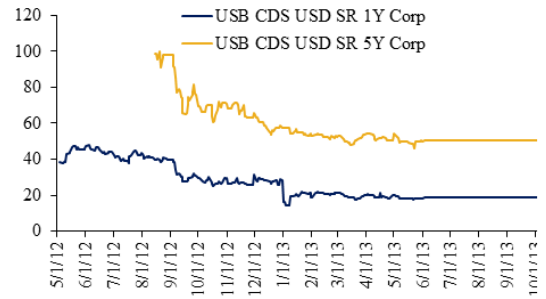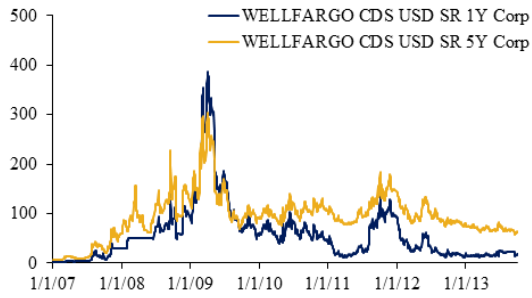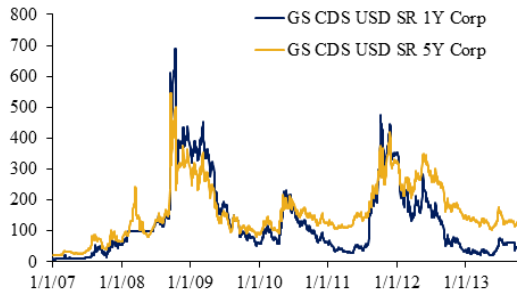
C: Exceptionally high levels of credit risk.

'C' indicates exceptionally high levels of credit risk.

Note: Fitch may add the modifiers "+" or "-" to a rating to denote relative status within major rating categories.

APPENDIX C: Q1 2014 WEEKLY REVIEWS RESULTS OF INSTITITION TIER CHANGES.

went down a score	
went up a score	

10/28/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1 W	2 Shift	2 W	3 W	4 W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons	1	1	1	1						
Credit Agricole Sa	1	3	2	2						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	3	2	2						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	1	1.5	1						
Dresdner Bank Ag	1	3	2	2						

11/4/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2 W	3 W	4 W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1		Watch				
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1		Watch				
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	1	1.5	1						
Dresdner Bank Ag	1	3	2	2						

11/11/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1 W	2 Shift	2W	3 W	4 W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1				Watch		
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1				Watch		
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	1	1.5	1						
Dresdner Bank Ag	1	3	2	2						

11/18/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1 W	2 Shift	2 W	3W	4 W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1					Warning	
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1					Warning	
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	1	1.5	1						
Dresdner Bank Ag	1	3	2	2						

11/25/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2 W	3 W	4W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						Review
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						Review
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	1	1.5	1						
Dresdner Bank Ag	1	2	1.5	1		Watch				

12/2/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1 W	2 Shift	2W	3 W	4 W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	1	1.5	1						
Dresdner Bank Ag	1	2	1.5	1				Watch		

12/9/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2W	3W	4W
Royal Bank Of Canada	1	1	1	1						
Hsbc Holdings Plc-Spons .	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	2	2	2				Watch		
Dresdner Bank Ag	1	2	1.5	1						Warning

12/16/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2W	3W	4W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons .	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	2	2	2				Watch		
Dresdner Bank Ag	1	2	1.5	1						Review

12/23/2013

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2W	3W	4W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons .	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	2	2	2					Warning	
Dresdner Bank Ag	1	2	1.5	1						

1/2/2014

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2W	3W	4W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons .	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	2	2	2						Review
Dresdner Bank Ag	1	2	1.5	1						

1/7/2014

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2W	3W	4W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons .	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	2	2	2						
Dresdner Bank Ag	1	2	1.5	1						

1/13/2014

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1W	2 Shift	2W	3W	4W
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons .	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	2	2	2						
Dresdner Bank Ag	1	2	1.5	1						

Bank Name	Rating	CDS	SCORE	TIER	Grade Change	1 W	2 Shift	2 W	3 W	4 W
					1/20/2014					
Royal Bank Of Canada	1	2	1.5	1						
Hsbc Holdings Plc-Spons	1	1	1	1						
Credit Agricole Sa	1	2	1.5	1						
Wells Fargo & Co	1	1	1	1						
Societe Generale	1	2	1.5	1						
Jpmorgan Chase & Co	1	1	1	1						
Us Bancorp	1	1	1	1						
Bayerische Landesbank	2	2	2	2						
Dresdner Bank Ag	1	2	1.5	1						