Rating Change Timeliness across Rating Agencies

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I. Summary

Rating Agencies occupy a powerful position in capital markets across the world. Their credit ratings of Sovereigns, Corporates and Structured Finance deals can have a strong affect on the cost and ability to borrow for many organisations. Previous studies have quantified the effect of rating changes on the price of bonds in the secondary market. Event studies have shown a marked influence on price, particularly when a credit downgrade is announced. This effect is even more pronounced when the rating downgrade crosses the Investment/Speculative rating boundary.

However, the timeliness of ratings across agencies is still an unanswered question. Making the assumption that a rating change brings new information to the market, does one rating agency consistently make rating changes earlier?

This paper will compare the timeliness of rating changes across the major rating agencies in three major capital markets: the United States, Canada and Australia.

II. Introduction and Motivations

The concept of rating the creditworthiness of companies and individuals has been around for many years. In the 1860s, Henry Varnum Poor began publishing financial information about railroad and canal companies. By the late 1800's, R. G. Dun & Co had a network of representatives that reported on merchants and companies around the USA.

John Moody provided the first corporate rating for a railway bond in 1909, followed by Standard Statistics in 1916 and Poor's publishing in 1919. Standard Statistics and Poors merged in 1941 to form Standard & Poor's. Fitch rated its first deal in 1924.

Coverage of Municipal Bonds followed in the 1940s, Sovereign Ratings became common in the 1980s and 1990s, and rating of Structured Finance deals also began in the 1980s with residential mortgage backed securities.

The US Securities and Exchange Commission (SEC) created a regulatory category of "Nationally Recognized Statistical Rating Agency" or NRSRO in 1975, and accredited these three major bond rating agencies. In the following decade, 4 new agencies were accredited, but by 1992, mergers led to only three major names remaining: Standard & Poor's, Moody's and Fitch.

More recently, in 2003, the SEC accredited Dominion Bond Rating Service (DBRS) and A.M. Best with the NRSRO designation, so that the US market currently features 5 NRSROs.

The corporate rating industry also exists in a number of other countries, particularly Australia, Canada and the UK, and it is growing in many other locations throughout Europe and Asia. The large US based rating firms tend to dominate the markets (for example, S&P bought the largest rating agency in Australia, and recently took a majority interest in the largest in India).

Following the recent corporate collapses of companies like Enron and WorldCom, there has been renewed discussion as to the effectiveness of ratings agencies. There are a number of different ways that their effectiveness can be judged – with the most obvious metric being an examination of occurrence of default for companies that have been assessed at a particular rating level.

Rating agencies state that their analysis is based on all available public information, and they cannot be expected to accurately identify a corporate fraud. This somewhat mitigates the argument that they missed some of the recent corporate failures.

So the next reasonable question is how effective are the rating agencies in predicting corporate distress due to normal economic conditions and competition?

There are a number of different dimensions that can be tested. Rating agencies define a hierarchy of rating levels or “notches”, and although there is some variation between agencies in nomenclature, the philosophy is identical – the highest rated bonds (generally notated “AAA”) should have a very low chance of default, and this chance can be expected to increase as we move down the rating levels through B, C and eventually down to D (default) status. The better rating levels are known as Investment Grade, and the lower levels are known as Non-investment or Speculative grade.

There are two parts to risk of a bond. First, what is the risk that a bond will have a “credit event” such as default, and second, if such an event occurs, what percentage of the principal and accrued interest will be recovered? It is reasonable to assume that risk of default increases and recover rates fall as we move down through the rating level hierarchy. Highest level ratings indicate the best quality borrowers, with stable earnings, a strong capacity to repay loans, and often a history of similar successful repayments. A lower quality rating may indicate a company that has high debt with relatively minimal spare cash flow for contingencies, or a cyclic company or one with volatile earnings. A lower rating generally indicates greater risk.

Studies have been completed both in the academic world and within the agencies that looked at the effect of rating upgrades and downgrades on both the particular bond issues rated and the issuing corporation or sovereign entity.

Of particular interest is the effect of a rating downgrade. Such a downgrade is an indication that the bond may be at greater risk of loss or impairment than previously supposed.

From the Capital Asset Pricing Model (CAPM), if we assume that the pool of fixed income investors is rational, then they will demand greater reward for a higher risk bond.

A rating upgrade, by comparison, is a weaker leading indicator. The risk of the bond may be less than previously expected, but investors tend to react less to a potential gain than the equivalent potential loss. Furthermore, in the case of an upgrade to a bond, the potential payoff to an investor is capped at par, while downside losses can reach 100%.

The theory of efficient markets states that prices of securities should reflect all public knowledge (assuming the semi-strong theory). Rating agencies claim that their ratings are based only upon public knowledge. Thus if we have a secondary market for a bond, and it is downgraded, then we may or may not see a decrease in the market price of the bond (and a corresponding increase in yield). This depends on whether the rating downgrade is truly a new piece of news, or merely a summary of already public information.

In recent years, agencies like Standard & Poor's have become more transparent with their rating intentions, and they now publish warnings about bonds that are on "positive" or "negative" outlook ahead of most actual rating migrations. These warnings are known as putting a rating on "Credit Watch".

With ratings determined from public information and the distribution of credit watch warnings, we would thus expect that when a rating migration actually occurs, it should have already been priced into the bond by the market, and there should be little movement in bond price. Studies have actually found that the rating migration contains new information for the market, and there is a definite movement in bond prices after downgrades (although little if any changes due to an upgrade). Thus the effect of a rating change upon price has been comprehensively studied.

One question currently unanswered is regarding the timeliness of the different rating agencies. Is one agency generally quicker than others at upgrading or downgrading bonds? Does one agency have better insight into particular industries?

This paper investigates the timeliness of rating migrations across rating agencies. While it does not look at the accuracy of rating changes in terms of subsequent price changes, it does look at when rating migrations occurred for bonds that are rated by more than one rating agency.

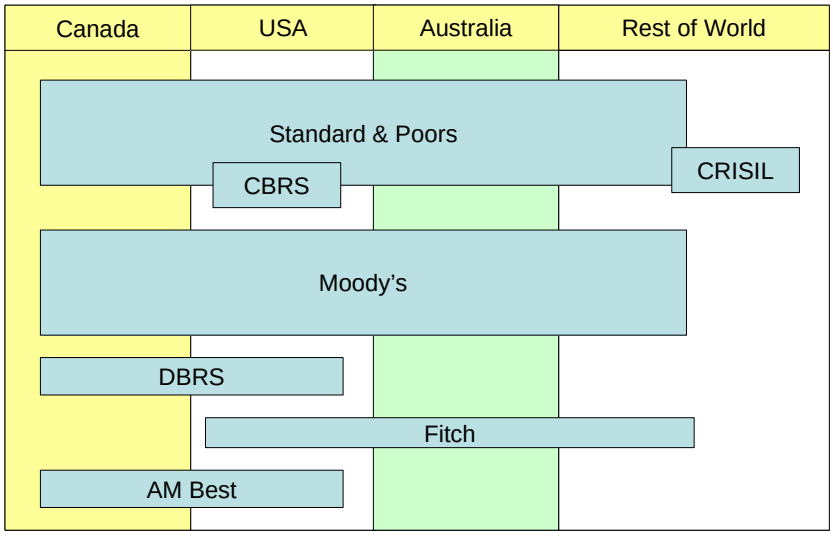
The universe for this study will be corporate bonds. Structured finance data was difficult to obtain, and similar studies to this have already been performed in the sovereign rating space. Bonds in three markets will be examined, as described in Table 1. The three markets were chosen as they are relatively liquid markets with more than one sizable rating agency in operation. Data was obtained from Bloomberg (more detail on this later in the paper).

Table 1: Dataset

Location	**USA**	**USA**	**Canada**	**Australia**
Dataset	S&P 500	All Corporates	All Corporates	All Corporates
Date Range	1980 – 2005	2004-2005	1980-2005	1980-2005
Rating Agencies	Fitch Moody's S&P	A.M.Best DBRS Fitch Moody's S&P	CBRS DBRS Moody's S&P	Fitch Moody's S&P

The selected agencies have a large number of published rating migrations within the particular location (large means within one order of magnitude of the largest agencies in that location).

Diagram 1: Geographic spread of rating agencies



III. The Rating Agencies

The big three US rating agencies have recently been joined by two other smaller NRSROs. Table 2 provides some information about each of the rating agencies.

Table 2: Rating Agency Information

Agency	Size / Locations	Owner	Other brands	Affiliations
Standard & Poor's	6,300 people, 20 countries	McGraw Hill (Public US Company) since 1966.	CBRS (Canadian Bond Rating Service) CRISIL (India) 2005	
Moody's	2,900 people, 22 countries	Public US Company since 2001, previously part of Dun & Bradstreet	Operates economy.com & Moody's KMV	
Fitch Ratings	Not known	Subsidiary of Fimalac (France) since 1997	IBCA (London) 1997 Duffs & Phelps 2000 Thomson BankWatch 2000	Clasificadora de Riesgo Humphreys Limitada (Chile) ICRA Ltd (India) Moody's Interfax (Russia) Korea Investor Service, Inc. Middle East Ratings & Investor Services (MERIS – Egypt) Midroog Limited (Israel).
Dominion Bond Rating Service (DBRS)	117 Analysts listed on Website.	Privately owned, founded 1976. based in Toronto, now expanding into the US.		
A. M. Best	Founded 1899, Offices in USA, UK and Hong Kong.	Private Company		

IV. Ratings Categories[1]

Each of the rating agencies uses a set of different corporate credit "ratings". While the wording of definitions varies across agency, they each follow a similar philosophy, with around 26 possible rating levels (or "notches") for a long-term credit. Additionally, the rating agencies sometimes offer guidance about expected future rating migrations – for example, they may indicate that a rating is at risk, and may be soon downgraded.

The rating agencies offer a number of different types of ratings, including:

- Long term ratings
- Short term ratings
- Outlooks

This paper looks at long term ratings and migrations in these ratings. Short term ratings are labelled in a different manner and will be outside the scope of this paper. In order to discuss the ratings for individual rating agencies, we first need to define the ratings levels for each agency.

[1] From Wikipedia and Rating Agency websites. See References for details

V. S&P Long Term Credit Ratings:

S&P rates companies on a scale from AAA to D. Intermediate ratings are offered at each level between AA and B (i.e., BBB+, BBB and BBB-). For some companies, S&P may also offer guidance (termed a "credit watch") as to whether it is likely to be upgraded (positive), downgraded (negative) or uncertain (neutral)

Table 3: S&P Ratings

Investment Grade	
AAA	the best quality companies, reliable and stable
AA	quality companies, a bit higher risk than AAA
A	economic situation can affect finance
BBB	medium class companies, which are satisfactory at the moment
Non-Investment Grade	
BB	more prone to changes in the economy
B	financial situation varies noticeably
CCC	currently vulnerable and dependent on favorable economic conditions to meet its commitments
CC	highly vulnerable, very speculative bonds
C	highly vulnerable, perhaps in bankruptcy or in arrears but still continuing to pay out on obligations
CI	past due on interest
R	under regulatory supervision due to its financial situation
SD	has selectively defaulted on some obligations
D	has defaulted on obligations and S&P believes that it will generally default on most or all obligations
NR	not rated

Note that **CBRS** and **DBRS** use a very similar scale to S&P, although DBRS has ‘H’ and ‘L’ in place of ‘+’ and ‘–’.

VI. Moody's Long Term Obligation Ratings

Moody's long-term obligation ratings are opinions of the relative credit risk of fixed-income obligations with an original maturity of one or more years. They address the possibility that a financial obligation will not be honored as promised. Such ratings reflect both the likelihood of default and any financial loss suffered in the event of default.

Table 4: Moody's Ratings

Investment Grade	
Aaa	Obligations rated Aaa are judged to be of the highest quality, with minimal credit risk.
Aa1, Aa2, Aa3	Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A1, A2, A3	Obligations rated A are considered upper-medium grade and are subject to low credit risk.
Baa1, Baa2, Baa3	Obligations rated Baa are subject to moderate credit risk. They are considered medium-grade and as such may possess certain speculative characteristics.
Speculative Grade	
Ba1, Ba2, Ba3	Obligations rated Ba are judged to have speculative elements and are subject to substantial credit risk.
B1, B2, B3	Obligations rated B are considered speculative and are subject to high credit risk.
Caa1, Caa2, Caa3	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 of bonds and are typically in default, with little prospect for recovery of principal or interest.
Special	
D	In Default
WR	Withdrawn Rating
NR	Not Rated
P	Provisional

VII. Fitch Long-Term Credit Ratings

Fitch's long-term credit ratings are set up along a scale almost identical to that used by S&P. Moody's also uses a similar scale, but names the categories differently. Like S&P, Fitch also uses intermediate ratings for each category between AA and B (i.e., BBB+, BBB and BBB-).

Table 5: Fitch Ratings

Investment Grade	
AAA	the best quality companies, reliable and stable
AA	quality companies, a bit higher risk than AAA
A	economic situation can affect finance
BBB	medium class companies, which are satisfactory at the moment
Non-Investment Grade (Also known at Junk)	
BB	more prone to changes in the economy
B	financial situation varies noticeably
CCC	currently vulnerable and dependent on favorable economic conditions to meet its commitments
CC	highly vulnerable, very speculative bonds
C	highly vulnerable, perhaps in bankruptcy or in arrears but still continuing to pay out on obligations
CI	past due on interest
R	under regulatory supervision due to its financial situation
SD	has selectively defaulted on some obligations
D	has defaulted on obligations and S&P believes that it will generally default on most or all obligations
NR	not rated

When comparing ratings across agencies, we will make the assumption that rating levels are readily comparable between the agencies. For long term credit ratings, each has the same number of rating levels, and when performing an analysis we will be assigning a code to each rating level as detailed in Appendix 4.

VIII. Obtaining a dataset

Data was obtained from a Bloomberg terminal, using the RATC rating changes command. Bloomberg has the following rating–related commands available:

Table 6: Bloomberg commands

Command	Use	Notes
RATE	Credit Ratings	GOVT, CORP, MTGE, M-MKT, PFD, EQUITY
RATC	Rating Changes	Historical rating changes for a given market and date range.
RCHG	Rating History	CMO – Collaterized Mortgage Obligations only
RATD	Rating Definition	Rating categories for a particular rating agency.
CSDR	Sovereign Debt Ratings	

The RATC command provided useful data for corporate ratings. It lists rating migrations across a specified date range for a given country and agency. It can be further specified by a subset of all securities (such as SPX for members of the S&P 500 in the following result set):

Diagram 2: Screen Capture from Bloomberg RATC Command

COMPANY CREDIT RATING REVISIONS RATC

Select Security List: Index: SPX Date: 1/ 1/2005 - 11/26/2005

Search Criteria: Rating Type: ALL ; Agency: S&P ; Grade: ALL Direction: ALL

Country: US;

Industry Type: All

Company Name	Date	Rating Type	Agency	Current Rating	Last Rating	Country	Industry Type
Progress Energy Inc	11/23/2005	Outlook	S&P	STABLE		US	Electric-Integrated
Progress Energy Inc	11/23/2005	ST Local Issuer Credit	S&P	A-2	A-3	US	Electric-Integrated
Progress Energy Inc	11/23/2005	ST Foreign Issuer Credit	S&P	A-2	A-3	US	Electric-Integrated
Calpine Corp	11/22/2005	LT Local Issuer Credit	S&P	B- *-	B-	US	Independ Power Producer
Calpine Corp	11/22/2005	LT Foreign Issuer Credit	S&P	B- *-	B-	US	Independ Power Producer

In this table, we can see that Progress Energy has an outlook, and upgrades for Short Term local issuer credit and foreign issuer credit. Calpine has changed from B- to B- with a negative credit watch for both Long Term local issuer credit and foreign issuer credit.

Four different datasets were analysed:

- All USA Corporations for the period 1 January 2004 to 26 November 2005
- USA Corporations belonging to the S&P 500 from 1980 to 26 November 2005,
- All Australian corporations from 1980 to 26 November 2005
- All Canadian corporations from 1980 to 26 November 2005.

Bloomberg data was very sparse before 1 January 1980, so this determined a natural start date for the datasets. The data collection date was 26 November 2005, and all datasets are current up until that date.

Getting data for all US corporate bonds would result in a huge dataset that would be hard to manipulate. For example, the year 2004 returned 16,243 records, so it was impractical to use an exhaustive list of ratings for the US market. Instead, the US data is analysed in two ways:

- first with a deep slice – all S&P members from 1980 to 26 November 2005
- second, with a wide slice – all USA corporate bonds for 2004/2005 up until 26 November 2005.

Table 7: Raw Data Available

Data Set	Date Range	Total Set Size	Set Size by Agency (Large)	(Small)	Set Size by Rating Type
USA S&P 500	01/01/1980 to 26/11/2005	17,909	**Fitch 2,686** **Moodys 7,292** **S&P 7,365**	*AMBest 69* *CBRS 45* *CRISIL 2* *DBRS 441* *R&I 9*	**Changes 12,861** *New Ratings 3,878* *Negative Outlook 153* *Positive Outlook 112* *Stable Outlook 905*
USA All Ratings	01/01/2004 to 26/11/2005	35,828	**AMBest 3,757** **DBRS 1,016** **Fitch 5,098** **Moody's 13,636** **S&P 12,246**	*Care 1* *CRISIL 1* *JCR 22* *KR 7* *Mikuni 3* *NICE 2* *R&I 37* *RAM 2*	**Changes 21,508** *New Ratings 5,538* *Negative Outlook 1,270* *Positive Outlook 777* *Stable Outlook 6,673* *Developing Outlook 62*
Australia All Ratings	01/01/1980 to 26/11/2005	6,128	**Fitch 364** **Moody's 1,921** **S&P 3,732**	*AMBest 7* *CBRS 2* *DBRS 41* *JCR 23* *MARC 1* *PEFIN 1* *R&I 36*	**Changes 4,032** *New Rating 1,721* *Developing Outlook 1* *Negative Outlook 26* *Positive Outlook 22* *Stable Outlook 325*
Canada All Ratings	01/01/1980 to 26/11/2005	14,005	**CBRS 3,248** **DBRS 2,844** **Moody's 3,404** **S&P 3,968**	*AMBest 75* *CRISIL 1* *Fitch 433* *JCR 12* *R&I 20*	**Changes 8,954** *New Rating 4.069* *Negative Outlook 124* *Positive Outlook 50* *Stable Outlook 808*

The total set size is the total number of ratings found for the particular dataset. This includes rating migrations (upgrades and downgrades), changes to credit watch, credit outlooks, rating initiations and termination of rating coverage. Furthermore, from table 7, it can be seen that the rating agencies that have substantial numbers of rating changes are a subset of all

agencies operating in each particular location. Table 8 lists the agencies that have sufficient data to allow comparisons of a large number of rating changes. The potential size of the dataset for each agency is also given.

Table 8: Chosen Data

Data Set	Date Range	Set Size (These Agencies only)	By Agency	By Rating Type
USA S&P 500	01/01/1980 to 26/11/2005	17,909	**Fitch 2,686 Moodys 7,292 S&P 7,365**	**Changes 12,861**
USA All Ratings	01/01/2004 to 26/11/2005	35,828	**AMBest 3,757 DBRS 1,016 Fitch 5,098 Moody's 13,636 S&P 12,246**	**Changes 21,508**
Australia All Ratings	01/01/1980 to 26/11/2005	6,128	**Fitch 364 Moody's 1,921 S&P 3,732**	**Changes 4,032**
Canada All Ratings	01/01/1980 to 26/11/2005	14,005	**CBRS 3,248 DBRS 2,844 Moody's 3,404 S&P 3,968**	**Changes 8,954**

IX. Analysis

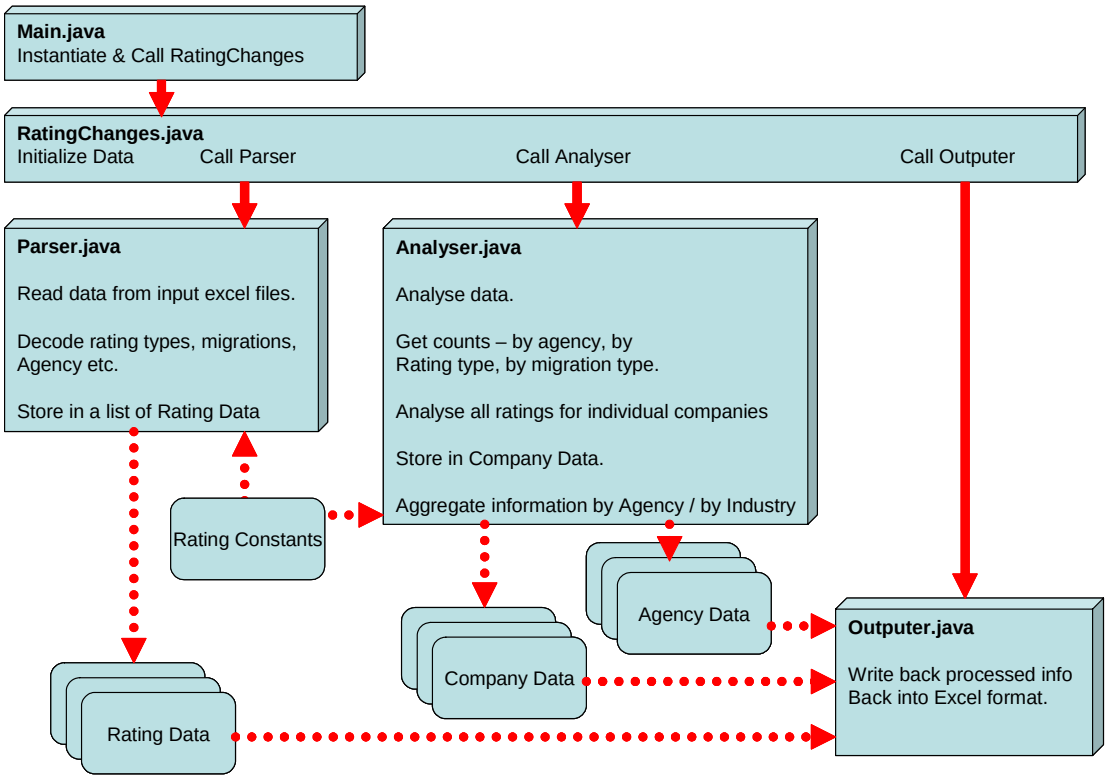
The data is naturally broken into the 4 different datasets. Each of these datasets was analysed in the same manner that will described below. Data was initially obtained from a Bloomberg terminal.

The analysis was performed using a java application custom written for this paper. The structure of the application is shown in Diagram 3.

The following steps were followed during the analysis:

- Obtain rating data from Bloomberg.
- Obtain data about rating levels and other inputs.
- Read all data into application
- Convert dates to days after start of period so dates are now an easily compared number.
- Sort into groups of ratings by individual company
- Analyse each particular company's ratings – comparing rating changes. This is the crucial step, and will be described in greater detail below.
- Aggregate results by company
- Aggregate results by industry.
- Aggregate results by dataset.

Diagram 3: Software Structure



Before analysis can begin, rating data needs to have rating levels, rating types and industries translated into numerical codes in order to compare between markets and between Rating Agencies. The translation data that was used is provided in Table 6 (rating level equivalencies) and Appendices 1 & 2 (rating types & industry assignments).

Once data was loaded into the application and stored by company, the next step was to assess which rating changes can be meaningfully compared.

The sample selection process involves only looking at ratings that occur in a period of time with joint ratings coverage. Thus we need at least two rating agencies to be covering the stock at the time of the rating action.

Rating actions that are either upgrades or downgrades were considered. The simplest example is a change in rating level (for example, from AAA to AA), but for the purpose of this paper, the addition or removal of a credit watch was also included (so we might see a rating of "AAA" move to "AAA *-" which is a introduction of a negative credit watch). A change in credit watch provides real information to the market, and it was felt that discarding credit watch information would unnecessarily shrink the dataset.

This paper will not assess initiation of ratings by an agency since this is more likely to be a function of the size of the analyst pool in the rating agency rather than a function of the agency's effectiveness in producing timely ratings. This paper will also not assess rating withdrawals by agencies.

The initial pass will look at all rating transitions. Later passes will further divide the dataset into investment grade (BBB/Baa and above) and speculative grade (BB/Ba and below) ratings, considering ratings migrations within these different data sets, and rating migrations that cause a company to transition from one of these subsets to the other. A rating downgrade that

cross the investment/speculative grade boundary are associated with larger reactions than downgrades in general, so this particular case will also be examined.

We also need to define a time window within which ratings can be said to be "concurrent". If S&P did an upgrade on 1 January 2004, Moody's upgraded on 1 March 2004, and Fitch upgraded on 1 November 2004, can it be stated that all 3 events are related?

Previous research in the sovereign area[2] used a 20 day time period. Thus they would only describe two rating actions as related if they occurred within 20 days of each other.

We feel this constraint is too restrictive. This paper is not an event study and does not look at price effects of ratings. Rather, it is only looking at the relative timeliness of ratings. We feel that ratings that are up to 92 days (approximately 3 months) may still be related to each other, and will use a window of this length. The decision to use a 3 month window is somewhat arbitrary, but we feel that rating changes that occur further apart than this are probably not responses to the same corporate news. A second pass using a 31 day window will be performed as well.

The next issue concerns a comparison between two rating events. Are we going to only compare upgrades with upgrades? What happens if S&P upgrades twice, and then Moody's later does one upgrade? Furthermore, what should we do if the rating change is not the same (i.e. S&P moves from rating level 26 to 24, and Moody's moves from 25 to 20)?

In order to resolve this issue, the rating changes will be assessed in a more simplistic manner by comparing rating changes in the same direction. Initially, we will not worry about the size of the transition or the start and end rating levels – but instead only the direction. If there are multiple rating events by one agency, we will consider the rating event closest to a rating event

[2] Emawtee Bissoondoyal-Bheenick (2004) Rating timing differences between the two leading agencies: Standard and Poor's and Moody's

by another agency – an example of this is if S&P downgraded twice, then Fitch downgrades, the second S&P rating event will be compared with the Fitch event, and if S&P downgraded once followed by two Fitch downgrades, then the S&P downgrade will be compared with the first Fitch downgrade.

Another issue is choosing which rating types should be used. There are 54 different types of rating within our 4 datasets (listed in Appendix 5). However, only long term ratings are being considered in this paper, and also require rating types with large amounts of information. Note that some rating types are only used by one rating agency, but are equivalent to other rating types for other agencies. For example, the following rating types are used by the different rating agencies for equivalent credit ratings:

Table 9: Rating Type equivalence examples

S&P	Moody's	Fitch
Financial Strength	Bank Financial Strength	Financial Strength
LT Foreign Issuer Credit LT Local Issuer Credit	Senior Unsecured Debt	Senior Unsecured Debt

We will compare rating transitions across the agencies and rating types. We will also consider credit watch changes in cases in which the rating itself did not change. Rating types that are utilized are listed in Appendix 5.

Rating migration types are defined based on the present and previous rating. There may or may not be a value for current rating and old rating. Both need to be defined for this rating entry to be a rating migration. If only one is present and the other is blank, then there is a rating initiation or withdrawal.

Table 10: Rating Migration Types – obtained from current rating versus previous rating

Previous Rating	Current Rating	Migration Type
Undefined	Defined	Rating Initiation
Defined	Undefined	Rating Withdrawal
In AAA to D	In AAA to D above Old Rating	Upgrade
In AAA to D	In AAA to D below Old Rating	Downgrade
In AAA to D	Same as Old Rating	No Change

The logical flow for comparison of ratings:

Sort all rating entries for a given company by date.

Loop through the ratings to look at each individually.

For a given rating, it is a rating change if it is one of the following:

- An upgrade
- A downgrade
- No rating change, but with a creditwatch change upwards or downwards (For example, a rating change from “AAA *+” to “AAA” is a “downgrade” from creditwatch positive to no credit watch).

Each rating migration is provided by one particular rating agency. For each rating migration, the most recent rating from each other rating agency needs to be compared, if it exists.

If the two ratings have changed in the same direction, and are close enough in time (which is defined in this study as being within 92 days for the first pass of analysis, and within 31 days for a second pass), then we will consider them related, and record this relationship. Such a pair of ratings indicates that one of the agencies has “lagged’ the other agency in performing this rating change.

As we iterate across all ratings for a company, we will keep track of the most recent rating from each agency. When looking at a valid rating change, it will be compared with each of the most recent ratings from other agencies if they exist. This rating will then be stored as the most recent rating for its particular agency.

The lead/lag between agencies is aggregated for each company, and then aggregated for each industry and for each dataset.

This study will assess the mean and median of the lead and lags, the raw number of each, and present histograms to illustrate whether particular agencies seem to consistently lead or lag compared to other agencies with their rating changes in a particular industry or data set.

X. Results

From Table 8, we have 4 datasets, namely

- USA S&P500 Members from 1980 to 2005,
- USA All Corporates from Jan 2005 to November 2005
- Canada All Corporates from 1980 to 2005
- Australia All Corporates from 1980 to 2005.

We will perform the same analysis on each dataset.

XI. Australia: All Corporates from 1 January 1980 to 26 November 2005

The complete analysis for the Australian data is included in the body of this paper; similar analysis for the other 3 datasets is included in Appendices 1-3.

Table 11: Initial Data for Australia:

	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	*75*	*276*	*308*	-	-
Total Ratings Records	*364*	*1921*	*3732*	*0*	*6017*
Other/Not useful[3]	*148*	*533*	*1409*	-	*2090*
Useful	*216*	*1388*	*2323*	-	*3927*
Initiations	89	371	609	-	1069
Upgrades	29	230	316	-	575
Downgrades	49	358	535	-	942
Withdrawals	6	97	220	-	323
No Change	*43*	*332*	643	-	*1018*
Creditwatch upgrade[4]	14	156	220	-	390
Creditwatch unchanged	10	22	47	-	79
Creditwatch downgrade	19	154	376	-	549

The count of companies is all companies that have at least one rating entry by the Rating Agency. If only the potentially Useful Rating Data are considered from the table above, we have the following information.

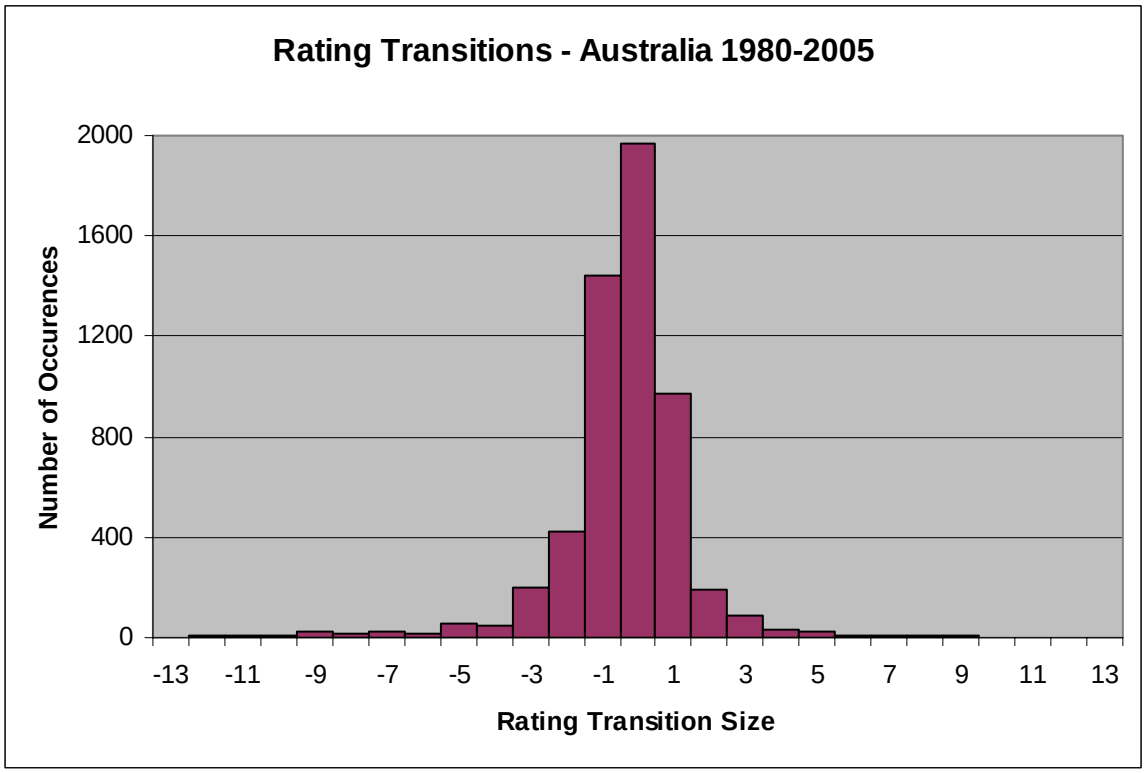
Table 12: Comparable Data for Australia.

	Fitch	Moody's	S&P	Total
Upgrades	29	230	316	1344
Downgrades	49	358	535	2279
Creditwatch upgrade	14	156	220	705
Creditwatch downgrade	19	154	376	305

[3] Other/Not useful includes "outlooks" or short term ratings. This study is only looking at long term ratings.
[4] Creditwatch upgrades and creditwatch downgrades involve a change of creditwatch level without any rating notch change (for example, from AA to AA *-). The "No Change" category is a sum of the creditwatch categories.

Upgrades and Creditwatch upgrades are both considered upward movements in a rating by an agency, and Downgrades and Creditwatch downgrades are both considered downward movements in a rating by an agency. When ratings are compared, upward movements will be compared with upward movements only, and downward movements with downward movements.

Figure 1: The size of rating transitions in Australia:



The largest grouping is a zero notch rating migration – which may still be useful data as we can have a credit watch change. The next most common events are a one notch downgrade and a one notch upgrade. Note that the range of possible rating upgrades and downgrades is from -26 (a rating change from AAA to D) to +26 (D to AAA). Extreme rating migrations like this are unlikely, and indeed our distribution shows that by far the most common events involve a 1 or two notch migration.

If we then look at only the ratings that involve an upgrade or downgrade, we get the following set of data:

Table 13: Number of Ratings Transitions in Australia by Type:

	Fitch	Moody's	S&P	TOTAL
I / Upgrade	29	211	286	526
I / Downgrade	43	295	430	768
I / CW upgrade	14	121	170	305
I / CW downgrade	19	125	332	476
S / Upgrade	0	12	13	25
S / Downgrade	4	44	65	113
S / CW upgrade	0	35	50	85
S / CW downgrade	0	29	44	73
I → S Downgrade	2	19	40	61
S → I Upgrade	0	7	17	24

I = Investment Grade (BBB or better) CW Upgrade = credit watch was increased

S = Speculative Grade CW Downgrade = credit watch was decreased.

Rating migrations by different agencies were compared using a 92 day window and a 31 day window. The window determines the maximum number of days that can separate two different rating migrations that are still considered related. Thus the 92 day window implies that a Fitch rating upgrade 3 months after an S&P rating upgrade are related and should be compared. The 31 day window implies that only rating migrations by different agencies that occurred within 1 month should be compared. The 92 day window may be more comprehensive, allowing

comparison of a greater number of rating changes, but it also has the potential risk that rating changes close to three months apart would heavily influence the mean lead or lag.

In table 14, we also note that a negative value for the Mean / Median means that the Rating Agency on the left is leading the Rating Agency at the top. A positive value means that the Agency at the left is lagging the Rating Agency at the top

Table 14: Number of Leading / Lagging rating migrations versus other rating Agencies in Australia:

		Moody's				**S & P**			
		Upgrade		*Downgrade*		*Upgrade*		*Downgrade*	
	Fitch	*92 day*	*31 day*	*92 day*	*31 day*	*92 day*	*31 day*	*92 day*	*31 day*
#Leading		6	4	5	3	11	5	7	5
#Same		0	0	5	5	0	0	2	2
#Lagging		3	1	11	5	5	4	13	5
Mean		-11	-22	8	0	-31	-5	18	-2
Median		-28	-14	1	0	-6	-14	5	0
	Moody's								
#Leading						24	6	58	32
#Same						7	7	15	15
#Lagging						21	12	69	26
Mean						-2	9	6	-1
Median						0	0	0	0

The rating agency at left are compared with the rating agency at the top. For the first intersection: Fitch vs Moody's, the values are leading=6, same=0, lagging=3, mean=-11, median=-28 for the 92 day window.

This means that Fitch leads Moody's in 6 ratings, and lags Moody's in 3 ratings. The mean time between related ratings from Fitch and Moody's is -11 days, and the median time between ratings for Fitch and Moody's is -28 days. It can be stated that Fitch leads Moody's for

timeliness of ratings in Australia, both from the number of leading versus lagging rating changes, and also from the mean and median difference between ratings from these agencies.

The table is a matrix, and it can be transposed. Thus, from this table it can also be seen that Moody's lags Fitch by a median of -28 days using 92 day data.

This comparative timing information was aggregated into an indicator of how many other Agencies each particular Agency leads or lags. The number of leading ratings versus number of lagging ratings is one indicator. The mean is useful as well. The Median is related to number of leading and lagging ratings (for example, if there are more leading ratings, then the median should be a leading number). Then scoring 1 point for a clear lead, 0.5 points for a mixed message between count of rating changes and mean, and 0 for a clear lag, we get the following table:

Table 15: Summary of Leading versus Lagging in Australia

Agency	Upgrade Lead/Lag	Downgrade Lead / Lag
Fitch	2 / 0	0 / 2
Moody's	0.5 / 1.5	1.5 / 0.5
S&P	0.5 / 1.5	1.5 / 0.5
Timeliness Order:	**Fitch Moody's S&P**	**S&P Moody's Fitch**

This suggests S&P and Moody's appears the timeliest in Australia for downgrades, but the least timely for upgrades. This implies that S&P and Moody's are more conservative or cautious in their ratings than is Fitch in Australia.

One other dimension was analysed – the timeliness of Rating Agencies on an industry by industry basis. Table 16 details an industry breakout of rating comparisons. The industry groups are defined in Appendix 6.

Table 16: Summary of Leading and Lagging Rating Agencies for Upgrades and Downgrades by Industry in Australia

	Upgrades				Gap Size	Total	Downgrades				Gap	Total
Category	First	Second	Third	4th	(days)	# Ratings	First	Second	Third	4th	Size	# Ratings
#N/A												
Advertising												
Aerospace												
Agriculture												
Beverages							Moody's	S&P			81	1
Chemical												
Clothing												
Commercial	Moody's	S&P			29	3	Moody's	S&P			12	9
Commodity	Moody's	S&P			36	2	S&P	Moody's			16	13
Construction	Fitch	S&P			3	2	Fitch	Moody's	S&P		27	5
Education												
Entertainment & Rec												
Finance	Fitch	S&P	Moody's		13	39	S&P	Moody's	Fitch		12	78
Food	S&P	Moody's			77	2	S&P	Moody's			27	5
Government	Moody's	S&P			2	4	Fitch	S&P			52	14
Healthcare							S&P	Moody's			25	10
Insurance	Fitch	Moody's			28	1	S&P	Fitch			42	1
Manufacturing							S&P	Moody's			12	9
Media	Moody's	Fitch			31	1	S&P	Moody's			24	5
Real Estate							Moody's	S&P			21	3
Retail	S&P	Fitch			45	2	S&P	Moody's			51	2
Services												
Technology												
Telecom							S&P	Moody's	Fitch		2	10
Transport							Moody's	S&P			2	7
Utility	Fitch	S&P	Moody's		32	18	S&P	Fitch			53	3

The breakout by Industry confirms the results of the summary in table 15. Within the Australian market, S&P and Moody's appear faster in downgrades in most industries, and Fitch is faster to upgrade ratings in many industries. This table also allows an analysis of where most of the ratings changes have occurred. For Australia, most of the action has been in the Finance industry, with lower but substantial changes in the Utility, Commodity and Government areas.

XII. Conclusions

The following table is a summary of results across the different datasets:

Table 17: Summary of Agency Timeliness

	Australia	Canada	USA S&P500	USA Broad
Order of timeliness for upgrades <faster> to <slower>	Fitch Moody's S&P	S&P Fitch DBRS Moody's CBRS	Fitch S&P Moody's	Fitch S&P Moody's DBRS
Order of timeliness for downgrades <faster> to <slower>	S&P Moody's Fitch	DBRS Fitch CBRS Moody's S&P	S&P Fitch Moody's	S&P Fitch DBRS Moody's

Timeliness of ratings can be interpreted in both a positive and a negative way. A rating agency that is faster to change ratings may be doing so from an operational or a philosophical point of view. They may have extra resources and the ability to complete risk assessment before their competitors. They may also have a different assessment of risk, and decide that the correct rating level has changed prior to competitors.

Corporate credit ratings attempt to be an accurate forecast of future risk for a bond. If a rating agency repeatedly upgrades and downgrades a particular bond, then market participants will have less confidence in the performance of that bond and the ability of the Rating Agency to accurately forecast risk. Many corporations operate within a multi-year industry cycle, and rating

agencies also must take these larger cycles into account when providing a rating, and try to avoid rating changes simply to match the cycle of an industry.

This paper has found that Standard and Poor's tends to be the most cautious of the Rating Agencies, with the fastest downgrades of corporate bonds, and average timing for upgrades. The one notable exception to this rule is in the Canadian Market when Standard and Poor's appears to be more accepting of risk and slower to downgrade. Across the 4 datasets Moody's is the slowest to downgrade bonds, but is also slow to upgrade as well. Fitch is generally quite aggressive with both upgrades and downgrades.

This paper has found that rating agencies are not consistent in their relative timeliness in different markets. While each rating agency has guidelines and Ratings Criteria to help standardize rating quality and consistency, it is apparent that this infrastructure does not ensure the same relative performance in different markets. The differences can most likely be attributed to differing staff knowledge and expertise in the various locations, poor internal dialog between the regional offices of a Rating Agency, and also variation due to different legal environments.

While this paper's results can be explained by Rating Agency philosophy and operational ability, these results can also be used in a predictive way. Due to the expected relative timing of rating changes, an S&P downgrade is more likely than other rating changes to result in a subsequent downgrade by a second rating agency. Also, a rating upgrade by Fitch is most likely to be followed by an upgrade by another Rating Agency. Moody's rating changes have less of a predictive effect, as they more commonly occur after other agencies have already moved their rating. It is outside the scope of this paper to examine the correlation between rating migrations by different agencies, but quantifying the increase in the likelihood of a rating change by one agency when another agency has announced a rating change is a worthy extension to this paper.

Appendix 1: Analysis of Canadian Data:

All Corporates from 1 January 1980 to 26 November 2005

There are 5 Rating Agencies operating in Canada that have published a sufficient quantity of rating changes for analysis in this paper.

Table 18: Initial Data for Canada

	CBRS	DBRS	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	475	600	74	453	466	-	-
Total Ratings Records	3248	2844	324	3968	3184	437	14005
Other/Not useful	1382	1439	0	1085	0	-	4343
Useful	1866	1405	324	2883	3184	-	9662
Initiations	438	572	112	836	898	-	2856
Upgrades	410	109	37	429	359	-	1344
Downgrades	433	261	76	684	825	-	2279
Withdrawals	474	143	13	337	245	-	1212
No Change	111	320	86	597	857	-	1971
Creditwatch upgrade	21	75	38	243	328	-	705
Creditwatch unchanged	73	119	8	31	74	-	961
Creditwatch downgrade	17	126	40	323	455	-	305

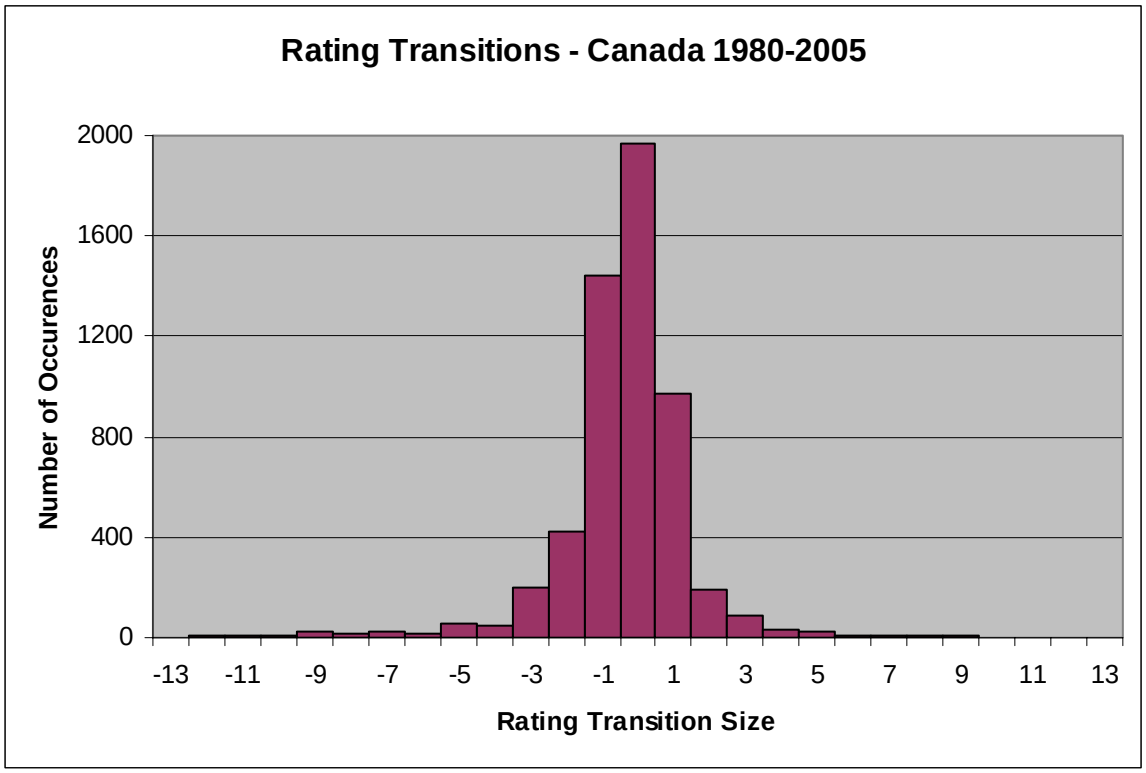
This rough data set provides the following set of rating changes that can be compared with those from other rating agencies:

Table 19: Comparable data for Canada

	CBRS	DBRS	Fitch	Moody's	S&P	Total
Upgrades	410	109	37	429	359	1344
Downgrades	433	261	76	684	825	2279
Creditwatch upgrade	21	75	38	243	328	705
Creditwatch downgrade	17	126	40	323	455	305

A summary of all rating transitions looks as follows:

Figure 2: The size of rating transitions in Canada:



The largest grouping is a zero rating notch migration. One notch downgrades and upgrades are the next most common events.

Table 20: Number of Ratings Transitions by Type in Canada:

	CBRS	DBRS	Fitch	Moody's	S&P	Total
I / Upgrade	313	90	34	222	182	841
I / Downgrade	330	159	64	295	393	1241
I / CW upgrade	13	61	34	132	182	421
I / CW downgrade	11	98	37	186	317	652
S / Upgrade	55	17	1	166	139	378
S / Downgrade	55	73	7	326	352	813
S / CW upgrade	9	14	4	111	146	284
S / CW downgrade	3	28	3	137	138	309
I → S Downgrade	48	29	5	63	80	225
S → I Upgrade	42	2	2	41	38	125

A summary of the number of ratings that lead or lag those from other companies is listed in table 21. Note that this was done for both a 92 day and a 31 day "window".

Table 21: Lead or Lag versus other rating Agencies in Canada:

		DBRS				**Fitch**				**Moody's**				**S & P**			
		Upgrade		*Down*		*Upgrade*		*Down*		*Upgrade*		*Down*		*Upgrade*		*Down*	
	CBRS	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*
#Leading		1	0	9	6	0	0	0	0	14	1	31	16	6	2	30	15
#Same		0	0	0	0	0	0	0	0	2	2	5	5	1	1	2	2
#Lagging		2	1	9	7	3	0	3	0	13	9	23	8	6	3	15	10
Mean		16	16	0	2	43	0	67	0	-11	10	2	-3	-11	0	-17	-5
Median		16	16	1	4	43	0	74	0	0	15	-7	-7	0	0	-19	-13
	DBRS																
#Leading						4	4	11	6	26	13	81	53	6	4	90	54
#Same						3	3	6	6	0	0	15	15	2	2	34	34
#Lagging						5	3	15	9	13	6	54	25	13	7	58	23
Mean						2	-5	4	3	-20	-6	-1	-4	16	1	-2	-2
Median						0	0	0	0	-26	-1	-1	-2	10	0	0	0
	Fitch																
#Leading										5	2	15	13	2	0	18	10
#Same										1	1	1	1	3	3	1	1
#Lagging										2	0	23	12	5	3	16	12
Mean										-4	-10	11	-1	8	9	-3	0
Median										-14	-3	3	0	0	0	-1	0
	Moody's																
#Leading														37	15	132	74
#Same														3	6	58	56
#Lagging														53	31	151	86
Mean														0	4	0	1
Median														2	1	0	0

Looking at aggregating timing for each agency's for upgrades (lead/lag versus other agencies for average of median and mean):

Table 22: Summary of leading versus lagging in Canada

Agency	Upgrade Lead/Lag	Downgrade Lead/Lag
CBRS	1/3	2/2
DBRS	2.5/1.5	3/1
Fitch	2.5/1.5	2.5/1.1
Moody's	1/3	1.5/2.5
S&P	3.5/0.5	0.5/3.5
Timeliness Order:	**S&P Fitch DBRS Moody's CBRS**	**DBRS Fitch CBRS Moody's S&P**

Table 23: Summary of Leading and Lagging Rating Agencies for Upgrades and Downgrades by industry in Canada:

	Upgrades				Gap Size	Total	Downgrades				Gap	Total
Category	First	Second	Third	4th	(days)	# Ratings	First	Second	Third	4th	Size	# Ratings
#N/A												
Advertising												
Aerospace												
Agriculture							CBRS	DBRS	S&P		25	4
Beverages							S&P	Moody's	CBRS		27	4
Chemical	S&P	Fitch	Moody's		19	2	Fitch	Moody's	S&P	DBRS	22	11
Clothing												
Commercial							CBRS	Moody's	S&P	DBRS	12	50
Commodity	S&P	DBRS	Moody's	CBRS	17	41	S&P	Moody's	DBRS	CBRS	19	80
Construction	Moody's	CBRS	S&P		15	12	S&P	DBRS	Moody's	CBRS	19	18
Education												
Entertainment & Rec	S&P	Moody's			60	1	S&P	Moody's			1	4
Finance	Fitch	Moody's	S&P	Fitch	12	20	Moody's	S&P	Fitch	DBRS	11	44
Food							S&P	Moody's			11	3
Government	CBRS	DBRS	Moody's	S&P	35	19	Moody's	CBRS	S&P		18	14
Healthcare	S&P	Moody's			2	2						
Insurance	Fitch	S&P			0	3	DBRS	Fitch	Moody's	S&P	8	39
Manufacturing	S&P	CBRS	DBRS	Moody's	10	17	DBRS	S&P	Moody's	CBRS	8	125
Media	S&P	DBRS	CBRS	Moody's	17	39	Moody's	S&P			17	35
Real Estate	S&P	DBRS			22	6	Moody's	CBRS	DBRS		47	4
Retail	Moody's	S&P			28	2	S&P	DBRS	Moody's		9	17
Services												
Technology	S&P	Moody's			28	4	S&P	CBRS	DBRS	Moody's	13	7
Telecom	S&P	DBRS	Fitch	Moody's	12	43	Fitch	CBRS	DBRS	Moody's	4	195
Transport	CBRS	DBRS	S&P	Moody's	55	5	CBRS	Fitch	DBRS	S&P	7	140
Utility	CBRS	Moody's	DBRS		31	4	CBRS	S&P	Moody's		35	15

Appendix 2: Analysis of USA Data

S&P 500 Constituents from 1 January 1980 to 26 November 2005

Table 24: Initial Data for US S&P

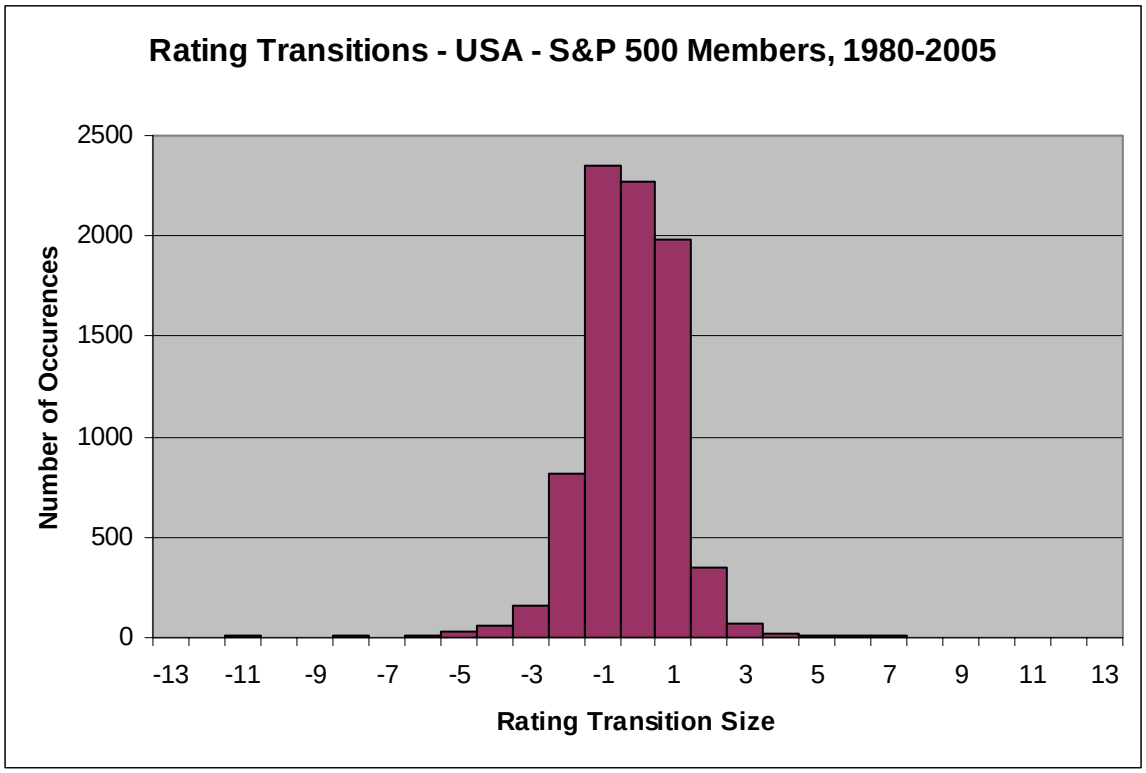
	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	320	434	444	-	-
Total Ratings Records	2686	7292	7365	566	17909
Other/Not useful				-	
Useful	1887	5973	4926	-	13038
Initiations	647	1369	789	139	2944
Upgrades	281	1082	1080	10	2453
Downgrades	528	1457	1428	35	3448
Withdrawals	78	429	94	15	616
No Change	353	1636	1535	53	3577
Creditwatch upgrade	136	658	526	6	1326
Creditwatch unchanged	20	23	34	15	92
Creditwatch downgrade	197	955	975	32	2159

Table 25: Comparable Data for US S&P:

	Fitch	Moody's	S&P	Total
Upgrades	281	1082	1080	2443
Downgrades	528	1457	1428	3413
Creditwatch upgrade	136	658	526	1320
Creditwatch downgrade	197	955	975	2127

A summary of all rating transitions looks as follows:

Figure 3: The size of rating transitions for USA S&P:



The largest grouping is for a one rating notch downgrade. A zero notch migration and a one notch upgrade are the next most common events.

Table 26: Number of Ratings Transitions by Type for US S&P:

	Fitch	Moody's	S&P	Total
I / Upgrade	175	598	721	1502
I / Downgrade	350	981	1110	2469
I / CW upgrade	79	380	377	839
I / CW downgrade	165	713	847	1752
S / Upgrade	66	338	207	613
S / Downgrade	116	275	174	568
S / CW upgrade	57	278	149	487
S / CW downgrade	32	242	128	407
I → S Downgrade	62	201	144	411
S → I Upgrade	40	146	152	338

A summary of the number of ratings that lead or lag those from other companies is listed in table 27. Note that this was done for both a 92 day and a 31 day "window".

Table 27: Lead or Lag versus other rating Agencies for US S&P:

		Moody's				**S & P**			
		Upgrade		*Downgrade*		*Upgrade*		*Downgrade*	
	Fitch	*92 day*	*31 day*	*92 day*	*31 day*	*92 day*	*31 day*	*92 day*	*31 day*
#Leading		63	36	256	145	42	20	198	113
#Same		4	2	56	53	14	14	85	81
#Lagging		54	26	216	119	32	20	216	135
Mean		-5	-4	-1	-1	-3	0	0	0
Median		-1	-1	0	0	0	0	0	0
	Moody's								
#Leading						146	91	443	247
#Same						14	14	130	136
#Lagging						168	93	538	352
Mean						5	0	0	1
Median						2	0	0	0

Looking at aggregating timing for each agency's for upgrades (lead/lag versus other agencies for average of median and mean):

Table 28: Summary of Leading versus Lagging Upgrades for US S&P

Agency	**Upgrade Lead/Lag**	**Downgrade Lead / Lag**
Fitch	2/0	1/1
Moody's	0/2	0/2
S&P	1/1	2/0
Timeliness Order:	**Fitch S&P Moody's**	**S&P Fitch Moody's**

Table 29: Summary of Upgrades and downgrades and the order of Rating Agency timeliness by industry for US S&P

Category	Upgrades				Gap Size	Total	Downgrades				Gap	Total
	First	Second	Third	4th	(days)	# Ratings	First	Second	Third	4th	Size	# Ratings
#N/A												
Advertising	S&P	Fitch	Moody's		5	14	Moody's	Fitch	S&P		5	61
Aerospace	Moody's	S&P			14	2	Moody's	S&P			4	26
Agriculture	Moody's	S&P			26	2	Moody's	S&P			12	3
Beverages	Moody's	Fitch	S&P		11	3	S&P	Moody's			1	9
Chemical	Moody's	S&P			3	3	Fitch	S&P	Moody's		20	39
Clothing							Moody's	S&P			26	7
Commercial	Moody's	S&P			25	5	Moody's	S&P			4	4
Commodity	Fitch	S&P	Moody's		20	70	S&P	Fitch	Moody's		1	177
Construction	Fitch	Moody's	S&P		36	6	S&P	Moody's			39	6
Education												
Entertainment & Rec							Moody's	S&P	Fitch		15	8
Finance	Moody's	S&P	Fitch		11	68	Fitch	Moody's	S&P		5	83
Food	Moody's	S&P			4	17	Fitch	Moody's	S&P		3	58
Government												
Healthcare	S&P	Moody's	Fitch		9	69	Fitch	S&P	Moodys		5	168
Insurance							Fitch	Moody's	S&P		7	125
Manufacturing	Fitch	S&P	Moody's		8	37	Fitch	S&P	Moody's		5	290
Media	S&P	Moody's	Fitch		12	35	Fitch	Moody's	S&P		12	59
Real Estate	Moody's	S&P	Fitch		22	9	S&P	Moody's	Fitch		48	19
Retail	Fitch	S&P	Moody's		20	55	Fitch	S&P	Moody's		12	75
Services	S&P	Moody's	Fitch		3	11	Moody's	S&P	Fitch		13	66
Technology	S&P	Moody's	Fitch		26	45	S&P	Fitch	Moody's		9	155
Telecom	Fitch	S&P	Moody's		13	28	Moody's	Fitch	S&P		2	203
Transport	S&P	Fitch	Moody's		26	19	Fitch	S&P	Moody's		4	206
Utility	S&P	Fitch	Moody's		13	49	S&P	Fitch	Moody's		3	271

Appendix 3: Analysis of USA Data:

All Corporates from 1 January 2005 to 26 November 2005

Table 30: Initial Data for US All Corporates

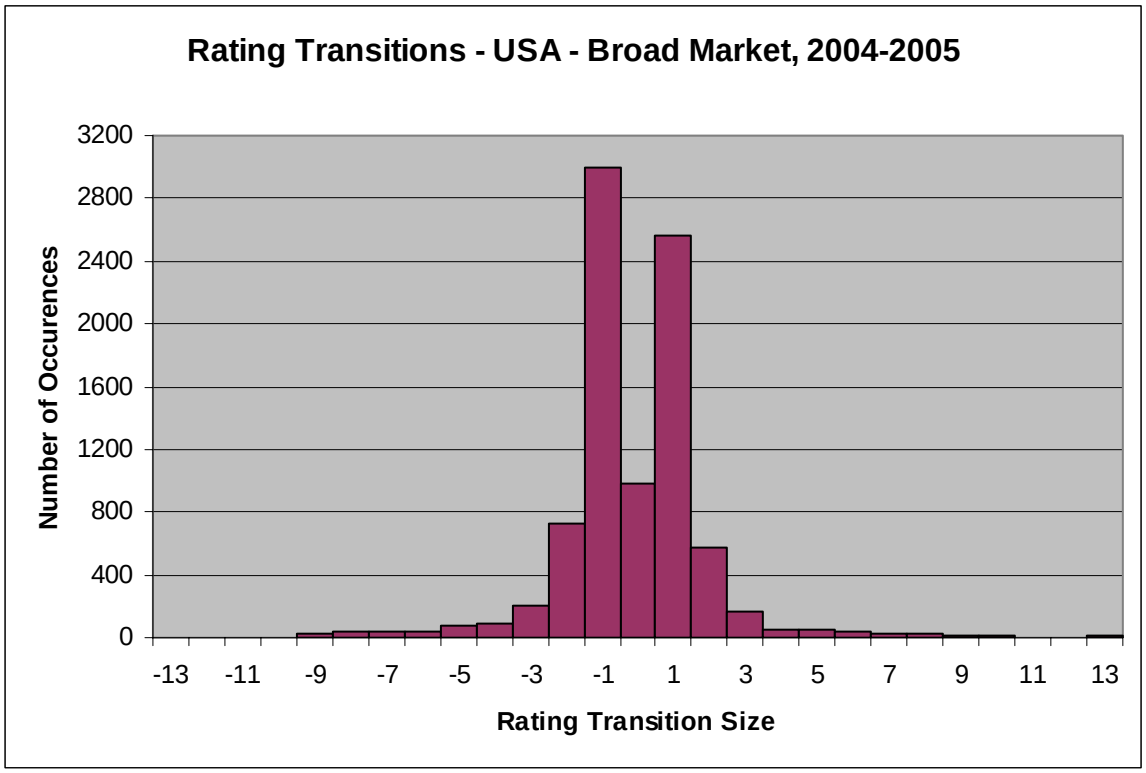
	DBRS	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	321	2100	3663	3515	-	-
Total Ratings Records	1016	5098	13636	12246	3832	35828
Other/Not useful	504	2092	3311	3809	-	13548
Useful	512	3006	10325	8437	-	22280
Initiations	353	545	1674	1043	-	3615
Upgrades	20	634	1646	1219	-	3519
Downgrades	36	550	1790	1854	-	4230
Withdrawals	6	289	2104	820	-	3219
No Change	97	988	3111	3501	-	7697
Creditwatch upgrade	12	490	1654	1526	-	3682
Creditwatch unchanged	41	38	85	194	-	358
Creditwatch downgrade	44	460	1372	1781	-	3657

Table 31: Comparable data for US All Corporates

	DBRS	Fitch	Moody's	S&P	Total
Upgrades	20	634	1646	1043	3343
Downgrades	36	550	1790	1854	4230
Creditwatch upgrade	12	490	1654	1526	3682
Creditwatch downgrade	44	460	1372	1781	3657

A summary of all rating transitions looks as follows:

Figure 4: The size of rating transitions in US for all Corporates:



The largest grouping is a one notch downgrade. A one notch upgrade is the next most common transition.

Table 32: Number of Ratings Transitions by Type for All US Corporates:

	DBRS	Fitch	Moody's	S&P	Total
I / Upgrade	12	328	455	446	1241
I / Downgrade	26	328	387	582	1323
I / CW upgrade	6	295	604	673	1578
I / CW downgrade	37	349	623	1022	2031
S / Upgrade	6	224	1036	645	1911
S / Downgrade	6	172	1277	1145	2600
S / CW upgrade	6	195	1050	853	2104
S / CW downgrade	7	111	749	759	1626
I → S Downgrade	4	50	126	128	307
S → I Upgrade	2	82	155	128	367

A summary of the number of ratings that lead or lag those from other companies is listed in table 33. Note that this was done for both a 92 day and a 31 day "window".

Table 33: Lead or Lag versus other rating Agencies for All US Corporates:

		Fitch				**Moody's**				**S & P**			
		Upgrade		*Downgrade*		*Upgrade*		*Downgrade*		*Upgrade*		*Downgrade*	
	DBRS	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*	*92d*	*31d*
#Leading		6	6	13	8	0	0	39	35	12	8	12	8
#Same		0	0	5	5	0	0	6	6	2	2	2	2
#Lagging		9	9	18	12	8	8	21	13	21	2	21	12
Mean		-2	-2	8	-1	8	8	-5	-8	10	-4	11	0
Median		1	1	9	0	9	9	-7	-15	-5	-5	11	4
	Fitch												
#Leading						144	100	169	100	82	60	143	77
#Same						21	21	61	61	38	38	73	70
#Lagging						140	82	173	84	57	42	167	107
Mean						-1	-1	0	-1	-3	-2	-1	0
Median						0	0	0	0	0	0	0	0
	Moody's												
#Leading										211	127	445	229
#Same										51	51	160	148
#Lagging										274	182	603	391
Mean										1	1	0	1
Median										1	1	0	1

Looking at aggregating timing for each agency's for upgrades (lead/lag versus other agencies for average of median and mean):

Table 34: Summary of Leading versus Lagging Upgrades for All US Corporates

Agency	**Upgrade Lead/Lag**	**Downgrade Lead / Lag**
DBRS	0.5 / 2.5	1 / 2
Fitch	3 / 0	1.5 / 1.5
Moody's	1 / 2	0.5 / 2.5
S&P	1.5 / 1.5	3 / 0
Timeliness Order:	**Fitch S&P Moody's DBRS**	**S&P Fitch DBRS Moody's**

Table 35: Summary of Upgrades and downgrades and the order of Rating Agency timeliness by industry for all US Corporates

Category	Upgrades				Gap Size	Total	Downgrades				Gap	Total
	First	Second	Third	4th	(days)	# Ratings	First	Second	Third	4th	Size	# Ratings
#N/A												
Advertising							S&P	Moody's			5	10
Aerospace	Fitch	S&P	Moody's		12	8	Fitch	S&P	Moody's		35	8
Agriculture												
Beverages	Moody's	Fitch			13	1						
Chemical	Moody's	S&P	Fitch		3	34	S&P	Fitch	Moody's		3	58
Clothing	S&P	Moody's	Fitch		22	8	Moody's	S&P			6	22
Commercial	S&P	Moody's	Fitch		15	18	S&P	Moody's	Fitch		7	40
Commodity	Moody's	Fitch	S&P		3	106	Fitch	Moody's	S&P		7	83
Construction	Fitch	Moody's	S&P		17	14	S&P	Moody's			1	16
Education												
Entertainment & Rec	Moody's	Fitch	S&P		9	13	S&P	Moody's	Fitch		16	37
Finance	Moody's	Fitch	S&P	DBRS	5	227	Moody's	S&P	Fitch	DBRS	9	147
Food	S&P	Moody's	Fitch		24	23	DBRS	S&P	Fitch	Moody's	7	60
Government												
Healthcare	S&P	Fitch	Moody's		21	39	Fitch	S&P	Moody's		4	116
Insurance	Fitch	Moody's	S&P		13	34	Fitch	S&P	Moody's	DBRS	4	77
Manufacturing	Fitch	S&P	Moody's		11	36	Fitch	DBRS	S&P	Moody's	7	265
Media	Fitch	Moody's	S&P		13	15	DBRS	S&P	Fitch	Moody's	24	81
Real Estate	Fitch	Moody's	S&P		8	23	Moody's	S&P	Fitch		14	29
Retail	Fitch	Moody's	S&P		23	41	S&P	Fitch	Moody's		2	155
Services	S&P	Moody's	Fitch		4	20	S&P	Moody's	Fitch		5	78
Technology	S&P	Moody's	Fitch		17	23	Fitch	Moody's	S&P		7	16
Telecom	Fitch	Moody's	DBRS	S&P	7	128	S&P	Fitch	Moody's	DBRS	9	111
Transport	S&P	Fitch	Moody's		9	34	S&P	Moody's	DBRS	Fitch	4	436
Utility	S&P	Fitch	Moody's		6	164	Moody's	S&P	Fitch		6	112

Appendix 4: Rating Equivalences

The different rating agencies each have their own series of credit rating levels. However, for long term corporate bond ratings, each uses a similar scale with 26 steps. In this study, we will use the following translation between ratings by different agencies:

Table 36: Rating Equivalences

Code	CBRS	DBRS	Fitch	Moody's	S&P
26	AAA	AAA	AAA	Aaa	AAA
25	AA+	AAH	AA+	Aa1	AA+
24	AA	AA	AA	Aa2	AA
23	AA-	AAL	AA-	Aa3	AA-
22	A+	AH	A+	A1	A+
21	A	A	A	A2	A
20	A-	AL	A-	A3	A-
19	BBB+	BBBH	BBB+	Baa1	BBB+
18	BBB	BBB	BBB	Baa2	BBB
17	BBB-	BBBL	BBB-	Baa3	BBB-
16	BB+	BBH	BB+	Ba1	BB+
15	BB	BB	BB	Ba2	BB
14	BB-	BBL	BB-	Ba3	BB-
13	B+	BH	B+	B1	B+
12	B	B	B	B2	B
11	B-	BL	B-	B3	B-
10	CCC+	CCCH	CCC+	Caa1	CCC+
9	CCC	CCC	CCC	Caa2	CCC
8	CCC-	CCCL	CCC-	Caa3	CCC-
7	CC+	CCH	CC+	Ca	CC+
6	CC	CC	CC	Ca	CC
5	CC-	CCL	CC-	Ca	CC-
4	C+	CH	C+	C	C+
3	C	C	C	C	C
2	C-	CL	C-	C	C-
1	D	D	D	D	D
0	NR	NR	NR	NR	NR
0	WR	WR	WR	WR	WR

Appendix 5: Rating Types

The data from Bloomberg included a number of different types of rating. For this particular study, we chose to only look at long term credit ratings. We also required meaningful amounts of data – at least two agencies and a statistically significant number of data points.

Table 37: Rating Types

Code	Name	Sufficient Data	CBRS	DBRS	Fitch	Moody's	S&P	We Will Use
1	Asset Backed Short Term	·	✓	✓	✓	✓	✓	
2	Bank Financial Strength	✓	·	·	·	✓	·	✓
3	Bank Loan Debt	·	·	·	✓	✓	·	
4	CC LT Foreign Bank Depst	·	·	·	·	✓	·	
5	CC LT Foreign Curr Debt	·	·	·	·	✓	·	
6	CC ST Foreign Curr Debt	·	·	·	·	·	·	
7	Claims Paying ability	·	·	✓	·	·	·	
8	Commercial Paper	·	·	·	·	·	·	
9	Corporate Credit	✓	✓	✓	·	·	·	✓
10	Cummulative Preferred	✓	✓	✓	·	✓	·	✓
11	Equity Linked	·	✓	✓	✓	✓	·	
12	FC Curr Issuer Rating	✓	·	·	·	✓	·	
13	Financial Strength	·	·	·	✓	·	✓	
14	Finl Strength Outlook	·	·	·	·	·	·	
15	Foreign Currency LT Debt	·	·	✓	✓	✓	✓	
16	Foreign Currency ST Debt	·	·	·	✓	✓	✓	
17	Foreign LT Bank Deposits	·	·	·	·	·	·	
18	Government Issues	✓	✓	·	·	·	·	
19	Insurance Finl Strength	·	·	·	·	✓	·	
20	Insurance Paying Ability	·	·	·	·	·	·	
21	Investment Strength	✓	✓	·	·	·	·	✓
22	Issuer Rating	✓	·	·	·	✓	·	✓
23	JR Subordinated Debt	·	✓	✓	✓	✓	·	
24	LC Curr Issuer Rating	·	·	·	·	✓	·	
25	Local Currency LT Debt	·	·	✓	✓	✓	✓	
26	Local Currency ST Debt	·	·	·	·	✓	✓	
27	Local LT Bank Deposits	·	·	·	·	✓	·	
28	Long Term	✓	·	·	✓	·	·	✓
29	Long Term Bank Deposits	·	✓	✓	✓	✓	·	
30	Long Term Counterparty	✓	✓	·	·	✓	·	✓
31	Long Term Issuer Credit	·	·	·	·	·	·	
32	Long Term Outlook	✓	·	·	·	·	✓	
33	LT Credit Outlook	·	·	·	·	·	✓	
34	LT Foreign Crncy Outlook	✓	·	·	·	·	✓	
35	LT Foreign Issuer Credit	·	·	·	·	·	✓	
36	LT Local Crncy Outlook	✓	·	·	·	·	✓	
37	LT Local Issuer Credit	·	·	·	·	·	✓	

38	Mortgage Debt	·		·	·	·	·	·	
39	Non-Cumm. Preferred	✓		✓	✓	✓	✓	·	✓
40	Outlook	·		·	✓	✓	✓	✓	
41	Preference Stock	·		·	✓	·	✓	·	
42	Preferred	✓		✓	✓	·	·	·	✓
43	Preferred Stock	·		✓	✓	✓	✓	·	
44	Senior Debt	✓		·	·	·	·	·	✓
45	Senior Implied Issuer	✓		·	·	·	✓	·	✓
46	Senior Secured Debt	✓		✓	✓	✓	✓	✓	✓
47	Senior Subordinate	✓		✓	✓	✓	✓	·	✓
48	Senior Unsecured Debt	✓		✓	✓	✓	✓	·	✓
49	Short Term	·		✓	✓	✓	✓	·	
50	Short Term Issuer Credit	·		·	·	·	·	✓	
51	Short Term Outlook	·		·	·	·	·	·	
52	ST Foreign Issuer Credit	✓		·	·	·	·	✓	
53	ST Local Issuer Credit	✓		·	·	·	·	✓	
54	Subordinated Debt	·		✓	✓	✓	✓	·	

Appendix 6: Industry Assignments

To aggregate by industry, the following industry classifications were used. This industry allocation scheme was performed to achieve the aim of aggregating into a small number of distinct industry types. It does not exactly follow the North American Industry Classification System (NAICS) that is the standard one used for classifying industries within Canada, Mexico and the United States. There are two reasons for this: First, the data also includes Australia, and second, the aim was to achieve a small number of industry groups, and a custom grouping that follows the same philosophy as NAICS can arrive at the desired number of industry groupings.

Table 38: Industry groups

Code	Name	Category
1	Advertising Agencies	Advertising
1	Advertising Services	Advertising
2	Aerospace/Defense	Aerospace
2	Aerospace/Defense-Equip	Aerospace
3	Agricultural Operations	Agriculture
3	Pastoral&Agricultural	Agriculture
4	Beverages-Non-alcoholic	Beverages
4	Beverages-Wine/Spirits	Beverages
4	Brewery	Beverages
5	Agricultural Chemicals	Chemical
5	Chemicals-Diversified	Chemical
5	Chemicals-Fibers	Chemical
5	Chemicals-Other	Chemical
5	Chemicals-Plastics	Chemical
5	Chemicals-Specialty	Chemical
5	Coatings/Paint	Chemical
6	Apparel Manufacturers	Clothing
6	Athletic Footwear	Clothing
6	Athletic Equipment	Clothing
6	Intimate Apparel	Clothing
6	Footwear&Related Apparel	Clothing
7	B2B/E-Commerce	Commercial
7	Commercial Services	Commercial
7	Distribution/Wholesale	Commercial
7	Divers Oper/Commer Serv	Commercial
7	Diversified Operations	Commercial
7	Funeral Serv&Rel Items	Commercial
7	Import/Export	Commercial
7	Office Supplies&Forms	Commercial
7	Printing-Commercial	Commercial
7	Rental Auto/Equipment	Commercial
7	Storage/Warehousing	Commercial
8	Coal	Commodity
8	Diversified Minerals	Commodity
8	Fisheries	Commodity
8	Forestry	Commodity
8	Gold Mining	Commodity
8	Invest Comp - Resources	Commodity
8	Metal-Aluminum	Commodity
8	Metal-Copper	Commodity
8	Metal-Diversified	Commodity
8	Metal-Iron	Commodity
8	Mining Services	Commodity
8	Non-Ferrous Metals	Commodity
8	Oil Comp-Explor&Prodtn	Commodity
8	Oil Comp-Integrated	Commodity
8	Oil Field Mach&Equip	Commodity
8	Oil Refining&Marketing	Commodity
8	Oil&Gas Drilling	Commodity
8	Oil-Field Services	Commodity
8	Pipelines	Commodity
8	Platinum	Commodity
8	Precious Metals	Commodity
8	Quarrying	Commodity
8	Steel-Producers	Commodity
8	Sugar	Commodity
8	Wool	Commodity
9	Airport Develop/Maint	Construction
9	Bldg Prod-Air&Heating	Construction
9	Bldg Prod-Cement/Aggreg	Construction
9	Bldg Prod-Doors&Windows	Construction
9	Bldg Prod-Light Fixtures	Construction
9	Bldg Prod-Wood	Construction
9	Bldg&Construct Prod-Misc	Construction
9	Bldg-Mobil Home/Mfd Hous	Construction
9	Bldg-Residential/Commer	Construction
9	Building&Construct-Misc	Construction
9	Building-Heavy Construct	Construction
9	Building-Maint&Service	Construction
10	Schools-Day Care	Education
11	Casino Hotels	Entertainment & Rec
11	Casino Services	Entertainment & Rec
11	Cruise Lines	Entertainment & Rec
11	Gambling (Non-Hotel)	Entertainment & Rec
11	Golf	Entertainment & Rec
11	Leisure&Rec Products	Entertainment & Rec
11	Music	Entertainment & Rec
11	Night Clubs	Entertainment & Rec
11	Professional Sports	Entertainment & Rec
11	Racetracks	Entertainment & Rec
11	Recreational Centers	Entertainment & Rec
11	Resorts/Theme Parks	Entertainment & Rec
11	Theaters	Entertainment & Rec
12	Building Societies	Finance
12	Closed-end Funds	Finance
12	Commer Banks Non-US	Finance
12	Commer Banks-Central US	Finance
12	Commer Banks-Eastern US	Finance
12	Commer Banks-Southern US	Finance
12	Commer Banks-Western US	Finance
12	Commercial Serv-Finance	Finance
12	Cooperative Banks	Finance
12	Diversified Finan Serv	Finance
12	Export/Import Bank	Finance
12	Fiduciary Banks	Finance

12	Finance-Auto Loans	Finance
12	Finance-Commercial	Finance
12	Finance-Consumer Loans	Finance
12	Finance-Credit Card	Finance
12	Finance-Invest Bnkr/Brkr	Finance
12	Finance-Investment Fund	Finance
12	Finance-Leasing Compan	Finance
12	Finance-Mtge Loan/Banker	Finance
12	Finance-Other Services	Finance
12	Internet Financial Svcs	Finance
12	Invest Mgmnt/Advis Serv	Finance
12	Investment Companies	Finance
12	Money Center Banks	Finance
12	Mortgage Banks	Finance
12	Regional Bank	Finance
12	Regional Banks-Non US	Finance
12	S&L/Thrifts-Central US	Finance
12	S&L/Thrifts-Eastern US	Finance
12	S&L/Thrifts-Southern US	Finance
12	S&L/Thrifts-Western US	Finance
12	Special Purpose Banks	Finance
12	Special Purpose Entity	Finance
12	Specified Purpose Acquis	Finance
12	Super-Regional Banks-US	Finance
12	Supranational Bank	Finance
12	Venture Capital	Finance
13	Food-Baking	Food
13	Food-Canned	Food
13	Food-Catering	Food
13	Food-Confectionery	Food
13	Food-Dairy Products	Food
13	Food-Meat Products	Food
13	Food-Misc/Diversified	Food
13	Food-Retail	Food
13	Food-Wholesale/Distrib	Food
13	Poultry	Food
14	Municipal-City	Government
14	Municipal-County	Government
14	Municipal-Education	Government
14	Municipal-Local Auth	Government
14	Public Thoroughfares	Government
14	Regional Agencies	Government
14	Regional Authority	Government
14	Schools	Government
14	Sovereign	Government
14	Sovereign Agency	Government
15	Cosmetics&Toiletries	Healthcare
15	Dental Supplies&Equip	Healthcare
15	Diagnostic Kits	Healthcare
15	Dialysis Centers	Healthcare
15	Disposable Medical Prod	Healthcare
15	Drug Delivery Systems	Healthcare
15	Health Care Cost Contain	Healthcare
15	Hospital Beds/Equipment	Healthcare
15	Feminine Health Care Prd	Healthcare
15	Medical Instruments	Healthcare
15	Medical Labs&Testing Srv	Healthcare
15	Medical Products	Healthcare
15	Medical-Biomedical/Gene	Healthcare
15	Medical-Drugs	Healthcare
15	Medical-Generic Drugs	Healthcare
15	Medical-HMO	Healthcare
15	Medical-Hospitals	Healthcare
15	Medical-Nursing Homes	Healthcare
15	Medical-Outptnt/Home Med	Healthcare
15	Medical-Whsle Drug Dist	Healthcare
15	MRI/Medical Diag Imaging	Healthcare
15	Optical Supplies	Healthcare
15	Pharmacy Services	Healthcare
15	Phys Practice Mgmnt	Healthcare
15	Phys Therapy/Rehab Cntrs	Healthcare
15	Respiratory Products	Healthcare
15	Retirement/Aged Care	Healthcare
15	Therapeutics	Healthcare
15	Veterinary Diagnostics	Healthcare
15	Vitamins&Nutrition Prod	Healthcare
16	Financial Guarantee Ins	Insurance
16	Insurance Brokers	Insurance
16	Life/Health Insurance	Insurance
16	Multi-line Insurance	Insurance
16	Mutual Insurance	Insurance
16	Property/Casualty Ins	Insurance
16	Reinsurance	Insurance
17	Advanced Materials/Prd	Manufacturing
17	Appliances	Manufacturing
17	Audio/Video Products	Manufacturing
17	Batteries/Battery Sys	Manufacturing
17	Ceramic Products	Manufacturing
17	Consumer Products-Misc	Manufacturing
17	Containers-Metal/Glass	Manufacturing
17	Containers-Paper/Plastic	Manufacturing
17	Diagnostic Equipment	Manufacturing
17	Diversified Manufact Op	Manufacturing
17	Electronic Connectors	Manufacturing
17	Engines-Internal Combust	Manufacturing
17	Filtration/Separat Prod	Manufacturing
17	Garden Products	Manufacturing
17	Home Furnishings	Manufacturing
17	Home Decoration Products	Manufacturing
17	Housewares	Manufacturing

17	Industrial Gases	Manufacturing
17	Mach Tools&Rel Products	Manufacturing
17	Machinery-Constr&Mining	Manufacturing
17	Machinery-Electrical	Manufacturing
17	Machinery-Farm	Manufacturing
17	Machinery-General Indust	Manufacturing
17	Machinery-Machinery Handl	Manufacturing
17	Machinery-Material Handl	Manufacturing
17	Machinery-Pumps	Manufacturing
17	Metal Processors&Fabrica	Manufacturing
17	Metal Products-Fasteners	Manufacturing
17	Miscellaneous Manufactur	Manufacturing
17	Office Furnishings-Orig	Manufacturing
17	Optical Recognition Equi	Manufacturing
17	Paper&Related Products	Manufacturing
17	Photo Equipment&Supplies	Manufacturing
17	Rubber/Plastic Products	Manufacturing
17	Rubber-Tires	Manufacturing
17	Soap&Cleaning Prepar	Manufacturing
17	Shipbuilding	Manufacturing
17	Steel Pipe&Tube	Manufacturing
17	Steel-Specialty	Manufacturing
17	Textile-Apparel	Manufacturing
17	Textile-Home Furnishings	Manufacturing
17	Textile-Products	Manufacturing
17	Tobacco	Manufacturing
17	Tools-Hand Held	Manufacturing
17	Toys	Manufacturing
17	Wire&Cable Products	Manufacturing
18	Broadcast Serv/Program	Media
18	Cable TV	Media
18	Industr Audio&Video Prod	Media
18	Internet Content-Info/Ne	Media
18	Motion Pictures&Services	Media
18	Multimedia	Media
18	Publishing-Books	Media
18	Publishing-Newspapers	Media
18	Publishing-Periodicals	Media
18	Radio	Media
18	Television	Media
19	Hotels&Motels	Real Estate
19	Property Trust	Real Estate
19	Real Estate Mgmnt/Servic	Real Estate
19	Real Estate Oper/Develop	Real Estate
19	REITS-Apartments	Real Estate
19	REITS-Diversified	Real Estate
19	REITS-Health Care	Real Estate
19	REITS-Hotels	Real Estate
19	REITS-Manufactured Homes	Real Estate
19	REITS-Mortgage	Real Estate
19	REITS-Office Property	Real Estate
19	REITS-Regional Malls	Real Estate
19	REITS-Shopping Centers	Real Estate
19	REITS-Single Tenant	Real Estate
19	REITS-Storage	Real Estate
19	REITS-Warehouse/Industr	Real Estate
20	Retail-Apparel/Shoe	Retail
20	Retail-Arts&Crafts	Retail
20	Retail-Auto Parts	Retail
20	Retail-Automobile	Retail
20	Retail-Bedding	Retail
20	Retail-Bookstore	Retail
20	Retail-Building Products	Retail
20	Retail-Catalog Shopping	Retail
20	Retail-Computer Equip	Retail
20	Retail-Consumer Electron	Retail
20	Retail-Convenience Store	Retail
20	Retail-Discount	Retail
20	Retail-Drug Store	Retail
20	Retail-Fabric Store	Retail
20	Retail-Home Furnishings	Retail
20	Retail-Jewelry	Retail
20	Retail-Leisure Products	Retail
20	Retail-Mail Order	Retail
20	Retail-Major Dept Store	Retail
20	Retail-Misc/Diversified	Retail
20	Retail-Music Store	Retail
20	Retail-Office Supplies	Retail
20	Retail-Pet Food&Supplies	Retail
20	Retail-Petroleum Prod	Retail
20	Retail-Propane Distrib	Retail
20	Retail-Regnl Dept Store	Retail
20	Retail-Restaurants	Retail
20	Retail-Sporting Goods	Retail
20	Retail-Toy Store	Retail
20	Retail-Video Rental	Retail
20	Retail-Vision Serv Cntr	Retail
20	Retail-Vitamins/Nutr Sup	Retail
21	Advertising Sales	Services
21	Auction House/Art Dealer	Services
21	Collectibles	Services
21	Computer Services	Services
21	Consulting Services	Services
21	Direct Marketing	Services
21	E-Marketing/Info	Services
21	Engineering/R&D Services	Services
21	E-Services/Consulting	Services
21	Human Resources	Services
21	Internet Security	Services
21	Lottery Services	Services

21	Marine Services	Services
21	Multilevel Dir Selling	Services
21	Non-Profit Charity	Services
21	Private Corrections	Services
21	Protection-Safety	Services
21	Security Services	Services
21	Seismic Data Collection	Services
21	Traffic Management Sys	Services
21	Travel Services	Services
22	Agricultural Biotech	Technology
22	Applications Software	Technology
22	Circuit Boards	Technology
22	Communications Software	Technology
22	Computer Aided Design	Technology
22	Computer Software	Technology
22	Computers	Technology
22	Computers-Integrated Sys	Technology
22	Computers-Memory Devices	Technology
22	Computers-Peripher Equip	Technology
22	Data Processing/Mgmt	Technology
22	Decision Support Softwar	Technology
22	Drug Detection Systems	Technology
22	E-Commerce/Products	Technology
22	E-Commerce/Services	Technology
22	Educational Software	Technology
22	Electric Products-Misc	Technology
22	Electronic Compo-Misc	Technology
22	Electronic Compo-Semicon	Technology
22	Electronic Measur Instr	Technology
22	Electronics-Military	Technology
22	Enterprise Software/Serv	Technology
22	Entertainment Software	Technology
22	Industrial Automat/Robot	Technology
22	Instruments-Controls	Technology
22	Instruments-Scientific	Technology
22	Internet Applic Sftwr	Technology
22	Internet Infrastr Sftwr	Technology
22	Medical Information Sys	Technology
22	Networking Products	Technology
22	Office Automation&Equip	Technology
22	Research&Development	Technology
22	Semicon Compo-Intg Circu	Technology
22	Semiconductor Equipment	Technology
22	Transactional Software	Technology
22	Web Portals/ISP	Technology
22	X-Ray Equipment	Technology
23	Cellular Telecom	Telecom
23	Satellite Telecom	Telecom
23	Telecom Eq Fiber Optics	Telecom
23	Telecom Services	Telecom
23	Telecommunication Equip	Telecom
23	Telephone-Integrated	Telecom
23	Wireless Equipment	Telecom
24	Airlines	Transport
24	Auto Repair Centers	Transport
24	Auto/Trk Prts&Equip-Orig	Transport
24	Auto/Trk Prts&Equip-Repl	Transport
24	Auto-Cars/Light Trucks	Transport
24	Auto-Med&Heavy Duty Trks	Transport
24	Electronic Parts Distrib	Transport
24	Motorcycle/Motor Scooter	Transport
24	Transport-Air Freight	Transport
24	Transport-Equip&Leasng	Transport
24	Transport-Marine	Transport
24	Transport-Rail	Transport
24	Transport-Services	Transport
24	Transport-Truck	Transport
24	Whsing&Harbor Trans Serv	Transport
0	Inactive/Unknown	Unknown
0	N.A.	Unknown
0	N/A	Unknown
25	Air Pollution Control Eq	Utility
25	Alternative Waste Tech	Utility
25	Electric-Distribution	Utility
25	Electric-Generation	Utility
25	Electric-Integrated	Utility
25	Electric-Transmission	Utility
25	Energy-Alternate Sources	Utility
25	Gas-Distribution	Utility
25	Gas-Transportation	Utility
25	Hazardous Waste Disposal	Utility
25	Independ Power Producer	Utility
25	Non-hazardous Waste Disp	Utility
25	Pollution Control	Utility
25	Power Conv/Supply Equip	Utility
25	Recycling	Utility
25	Remediation Services	Utility
25	Utilities	Utility
25	Water	Utility
25	Water Treatment Systems	Utility

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Standard & Poor's

Moody's

Fitch Ratings

Websites: www.standardandpoors.com

www.moodys.com

www.fitchratings.com

www.dbrs.com

www.ambest.com

Software Credits:

All code was custom written for this project, with the help of the following standard libraries:

Java 1.5.0_06	Standard Java language from Sun Microsystems
Netbeans IDE 5.0	Sun's Java Integrated Development Environment
JExcelApi (JXL)	Java interface library to Excel, allowing reading and writing from Excel spreadsheets. Used under LGPL (Lesser General Public License)