August 2007

Northfield News

A Newsletter for the Friends and Clients of Northfield Information Services

Firmwide Risk: The Everything Everywhere Concept is Being Realized

By Dan diBartolomeo

In 1999, Northfield began the research and development of a new risk model that was intended for use with global balanced portfolios. As such, the security coverage of the model would have to span both equities and fixed income securities on a global basis in a single unified model. The model was given the rather immodest name, "*Everything, Everywhere.*" Even at this initial stage, it was understood that if the asset coverage of the model were extended, the model would make good on the boastful name and there would be the potential to use this model in the context of enterprise-wide risk management for large pension funds, asset managers, and multi-strategy hedge funds.

At the inception of commercial usage in 2002, the Northfield EE model covered approximately 135,000 securities around the world, including equities, coupon fixed income and convertible bonds. The analytical structure of the model was unique in that the credit risk aspects of fixed income are modeled as functions of our equity factors. This allows the linkages among equity risk, credit risk and convertibility to be modeled in a compact and coherent fashion. Since then, the "basic" coverage of the EE model has expanded to approximately 420,000 securities, including many market indices and commodities. For

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The Equity Risk Premium, CAPM and Minimum Variance Portfolios

By Dan diBartolomeo

Recently, there has been renewed interest among institutional asset managers to explore the issues of minimum variance equity portfolios. For our purposes, we will define MV portfolios as the least absolute volatility portfolio that is fully invested in a particular universe of equities. Such portfolios typically have much lower absolute volatility than broad stock market indices. It has been argued that while such portfolios offer lower absolute risk than market indices, the returns are not proportionately reduced, offering the opportunity for a leveraged MV portfolio to offer greater than market returns at the same level of absolute risk as the broad market.

Under Sharpe's theory of the Capital Asset Pricing Model (Journal of Finance, 1964), the excess return above the risk free rate is proportional to the risk of the security as measured by beta. The rate at which expected returns increase as we increase beta can be expressed by the slope of the Security Market Line connecting the risk free rate (beta = 0), to the expected return for the market portfolio (beta = 1). Since the relationship is linear, a portfolio of stocks with beta = .5 *should* produce the same return as a portfolio that is half invested in the market portfolio and half invested in a risk free asset (portfolio beta = 50% * 1 + 50% * 0).

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Special Points of Interest:

- **In Depth Article - Firmwide Risk**
- **Northfield Annual Conference Agenda- Key Largo, FL**
- **In Depth Article: The Equity Risk Premium**
- **Technical Support Tip: Increasing Asset Coverage**

Inside This Issue:

Recent and Upcoming Events

2007 Northfield Annual Research Conference

The Ocean Reef Club • Key Largo, FL • October 22-24, 2007

We are pleased to announce our 20th annual research conference at the Ocean Reef Club, in Key Largo, Florida. Set in the tropical "Keys" of Florida, The Ocean Reef Club will make this year's conference an exciting one!

The Ocean Reef Club

The conference will start on Sunday evening, October 21, with the "Unofficial" welcome cocktail party and dinner cruise. As is customary at Northfield events, a complete recreational and social calendar will accompany the working sessions. Monday morning will be reserved for recreational pursuits. This years attendees have a choice of golf, bone fishing, snorkeling, sailing Hobie Cats, or taking an eco-kayak tour. Monday evening will feature an elegant "black tie" gala and Tuesday evening will feature a family themed Beach Party Reception and Dinner with fun activities, Cocktails and Hors D'oeuvres.

Northfield is holding a block of rooms for the nights of Sunday, October 21st through Tuesday, October 23rd. The conference room rate is discounted at $225, for a deluxe inn room and is payable directly to the hotel. Suites and condos are available at an additional cost. The hotel does not have room availability prior to October 21st.

Please note that this year's conference is now SOLD OUT. To be placed on the waiting list, please contact Kathy Prasad, kathy@northinfo.com, 617.208.2020. Visit http://www.northinfo.com/events.cfm for the complete agenda.

Agenda

The agenda will consist of twelve 1-hour long presentations.

Hedge Fund Replication - A Fund of Hedge Fund's Perspective
Martin Lee, Investcorp Investment Advisors

Comprehensive Risk and Performance Attribution
Barry Feldman, Prism Analytic

Liquidity and Investment Styles
Jeff Brown, Highstreet Asset Management

Optimal Trading Strategies with Optimal Horizon
Eddie Qian, PanAgora Asset Management

Who, if Anyone, Reacts to Accrual Information?
Joshua Livnat, New York University

Envisioning the Future of the Housing Market
Jonathan Reiss, Analytical Synthesis, LLC

If You Had Everything Computationally…*Where would you put it, financially*
David Leinweber, Leinweber & Co

Capacity Analysis: Applying the Fundamental Law of Active Management
Angelo Lobosco, State Street Global Advisors

Dynamic Portfolio Optimisation
James Sefton, Imperial College, London.

I'm Not Dead Yet - A Traditional Asset Management Response To Hedge Fund Mania
Keith Quinton, Fidelity Management & Research

Market Returns without Downside Risk or The Difference Between Beta and the Equity Premium
Max Arai, Acadian Asset Management Co.

Short Term Risk from Long Term Models
Dan diBartolomeo and Anish Shah, Northfield

Northfield Asia Seminar Series – Research on Investment Management and Risk

Tokyo • Hong Kong • Sydney • November 30, December 4 and 7, 2007

Northfield will be hosting three one day seminars in Tokyo, Hong Kong and Sydney. The purpose of the seminars is to showcase our research on various topics in investment and risk management to our growing list of Australian and Far East clients and prospects. The Tokyo seminar will take place on November 30th at the Mandarin Oriental. The Hong Kong seminar will be on December 4th at the Hong Kong Mandarin Oriental. The Sydney seminar will take place on December 7th at the Observatory Hotel.

Further details will be posted to **http://www.northinfo.com/events.cfm** as the venues and agenda become finalized.

Northfield European Seminar Wrap-up

Victoria Park Plaza • London • June 21, 2007

The Northfield Spring 2007 Investment Seminar was held in London at the Victoria Park Plaza on June 16, 2007. The purpose of the seminar was to highlight recent advances in analytical techniques for the investment industry to our growing number of European clients and prospects. The seminar was sold out with over 75 attendees.

The presenters included Dan diBartolomeo, Daniel Mostovoy, and Anish Shah of Northfield. James Sefton of Imperial College and Giuliano De-Rossi of UBS also gave presentations. The topics included; "Alpha Scaling Revisited," "Improving Returns-Based Style Analysis." "Who Should You Listen To? A Sector Decomposition of Surprise Stock Returns," "Portfolio Optimisation-A Regression Approach to Portfolio Construction," "Distinguishing Between Being Unlucky and Unskillful," and A Market Impact Model that Works."

The seminar concluded with a well deserved post seminar reception. There was no cost to attend, however, donations to the Prince's Trust were strongly encouraged. The Prince's trust is a very worthwhile organization that makes a huge positive difference to the lives of many thousands of young people. Visit **http://www.princes-trust.org.uk** to learn more. Seminar attendees donated over £9,002 to the organization. The seminar proceedings have been posted to **http://www.northinfo.com/papersearch.cfm.**

Newport Summer Seminar Wrap-up

Tennis Hall of Fame • Newport, RI • June 8, 2007

Northfield's annual summer seminar took place at the International Tennis Hall of Fame, in Newport, RI on June 8th. The seminar presented recent research and technical advances to an audience of Northfield clients and friends.

The agenda consisted of 6 presentations including: "Fat Tails, Tall Tales, Puppy Dog Tails," "Improving Returns-Based Style Analysis," "How Large is the Equity Premium Today?," "Implied Risk Acceptance Parameters (RAPs) in the Execution of Institutional Equity Trades," "Alpha Scaling Revisited," and "Distinguishing Between Being Unlucky and Unskillful."

As is customary, the seminar coincided with the USA Professional Championship of Court Tennis. Following the presentations, attendees viewed a court tennis demonstration by Northfield President Dan diBartolomeo, and then a Semi-Final Match between world champion Rob Fahey of Australia and Britain's Nick Wood. Fahey won the match and went on to win the championship. Court Tennis, or "real tennis" is the medieval sport that is the progenitor of all modern racquet sports. To learn more, visit the US Court Tennis Association site at **http://www.uscourttennis.org**.

After tennis on Friday evening, everyone enjoyed a relaxing oceanfront dinner party at The Chanler, on the Cliff Walk in Newport. Complete proceedings have been posted to our website at **http://www.northinfo.com/papersearch.cfm.** Northfield does not charge attendance for this event, however, we do take donations on behalf of the Pine Street Inn, Boston's primary homeless shelter. This years participants donated a record $13,800.

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background information on the EE model, see **http://www.northinfo.com/documents/71.pdf**.

By early 2008, we expect to be able to provide risk coverage of essentially any investment asset, within a single tractable model making EE ideal for firm-wide risk applications. In addition to our basic EE coverage, we have developed a number of critical extensions of the EE model to cover other kinds of financial assets. The crucial development in this process was the creation of the EENIAC online server. EENIAC is the mechanism by which our clients access data beyond the basic EE data set. The EENIAC system has three basic functions. The first function is to allow clients to access individual security data records for our set of "extended" EE databases. Currently, there are three very comprehensive extended databases, US mortgage backed securities, a second with structured fixed income products such as CMOs, REMICs and ABS and a third covering the US municipal bond market.

The extended fixed income databases provide coverage for millions of securities. The analysis of mortgage backed, CMO and asset backed securities utilize our own prepayment models that we believe are very intuitive. Terms and conditions data on these securities is sourced from Intex. The analysis of US municipal bonds involves an innovative cluster analysis process that groups issuers such as cities and states by the similarity of their economy as measured by the shares of local employment across various sectors.

The second EENIAC function allows users to create EE model data records for private placement securities and derivatives for which Northfield would have no access to the terms and conditions of particular deals. In such cases, the users upload the terms of the derivative security in EENIAC following the format of templates provided for each type of transaction (e.g. option, swap, future, etc.) and gets an EE data record sent back to them which is then appended to their local data file. EENIAC now provides coverage for a broad range of derivative instruments including many popular structures such as credit default swaps. The third principle EENIAC function is to provide a cross-reference of security identifiers and issue/issuer relationships. For example, a user with securities identified with SEDOL numbers can obtain CUSIPS if they are using CUSIP keyed risk data.

A crucial aspect of the EE concept for plan sponsors was an ability to deal with alternative asset classes. We have created extensive systems for modeling hedge funds that use a combination of returns-based style analysis and portfolio optimization to create portfolios of marketable securities that we believe proxy the behavior of any given hedge fund for which a return history is available. These proxy portfolios are then handled as composite assets within Northfield risk applications. Hedge funds to be analyzed may be selected from the HedgeFunds.net database, or the user can supply a return history. This same facility can be used for providing a risk proxy for any mutual fund or institutional managed account for which a sufficient return history is available. More information on the method can be found at **http://www.northinfo.com/documents/237.pdf**.

Analysis of funds will be available "on demand" from EENIAC, similar to the handling of derivative securities. A simple approach to modeling private equity deals will also be made available through EENIAC.

Our most complex extension of the EE model is a module that allows for the risk modeling of directly owned real estate. The process for modeling real estate is straightforward. For each property, the user fills in a spreadsheet of required property specific information. Northfield then adds information about the local economy and real estate conditions in the local area of the property. Like a hedge fund, the risk of each real estate property is represented as a proxy portfolio of marketable securities whose risk influences mirror those of the property being analyzed. Since each property is represented as a composite asset within the EE model, the real estate risk information is fully integrated with risk assessments on other parts of an overall portfolio. Our approach to real estate is described in a research paper available at **http://www.northinfo.com/documents/191.pdf**.

As the goal of "Everything, Everywhere" coverage is realized, the attention of our research and development team will shift into three new and exciting directions. The first direction will be to incorporate many analytical improvements to the fixed income side of the EE model. Throughout its long development, the focus of EE has been on balanced portfolios where the preponderance of portfolio risk arises from the equity side of the portfolio. Many of our clients have been using EE for pure fixed income portfolios, a purpose that was never intended. In order to improve the forecasting accuracy on pure fixed income portfolios, we recently made a number of technical improvements to the fixed income side of EE including revised treatment for European bonds that are collateralized by mortgages, and to the handling of credit risk on floating rate notes.

The most important improvement to fixed income analysis will be a new layer of individual issuer credit risk analysis. For corporate bonds, this analysis will be a Merton-style structural model. The key ingredient for such models is the forecast volatility of a firm's assets, a natural area of analysis given Northfield's long experience with equity risk. Northfield recently acquired a privately maintained

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historical database of US fixed income instruments to provide us with a rich compilation of data for this research. For sovereign debt and structured products, additional credit risk models based on our work with the Analytic Hierarchy Process are anticipated.

The second direction for ongoing research and development is how to address the long time-horizon risk assessments needed by plan sponsors, while also addressing the short horizon risk assessment needs of leveraged hedged funds. Rather than build two separate models for these disparate requirements, we expect to keep the existing estimation process for a single EE model that assumes a one year time horizon on risk forecasts. Different assessments of short-term risk will be done by individually adjusting each contributing factor to the EE risk estimates conditional on additional information from outside the existing EE model framework. For example, we can use implied volatility information from option markets to revise EE risk forecasts to near term market conditions. Other sources of conditioning information include the cross-section of observed security returns, and other forms of volatility estimates such as the Parkinson and Garman/Klass estimators. We anticipate that these conditioning adjustments may be carried out on a daily basis, although the estimation of the basic EE model will remain on a monthly cycle.

Another aspect of the long horizon, short horizon issue has to do with the higher moments of the return distributions such as skew and kurtosis. For most long horizon applications, the assumption that returns are statistically significantly non-normal is quite reasonable. On the other hand, short horizon returns show very fat tails, and certain financial derivative instruments such as options and credit swaps may have highly non-linear properties resulting in skewed return distributions. As a result, short horizon risk assessments are often framed in terms of VaR and Conditional VaR measures, while long horizon assessments are done in variance terms. The "downside tail" risk aspects of the VaR and CVaR measures must be taken into account as we construct our short horizon risk estimates.

The final area of future focus for our EE based firm-wide risk efforts will be the software platform on which the information is provided. Any software platform used to support the firm-wide risk assessment function must provide a number of functions. Principally, such software must be able to aggregate portfolios within a given firm in various ways for risk assessment purposes. For example, if there were unfavorable news on Firm X, which might want to understand how much exposure our total portfolio has relative to Firm X from equities, bonds and derivative instruments that may exist in a wide variety of separately managed portfolios. It must also provide flexible reporting and units of risk measures that are suitable for the horizon of the investment entity. It must also interact smoothly with our EENIAC server to minimize data maintenance effort for users. We will be working closely with our partners such as FactSet, DST and SoftPak Financial Systems to provide a variety of good implementation choices for our clients.

Northfield Staff Speaking Engagements

Northfield President Dan diBartolomeo will be speaking at the Alpha Strategies/UBS Conference at Oxford University on September 11. The topic will be "Separating the Unlucky vs. Unskillful."

On September 21, Dan will be presenting "Allocation Strategies for Pension Funds," at the Philadelphia CFA Society.

Dan will be presenting "Using Hedge Fund Replication in Risk Management" At the Financial Research Associates Hedge Fund Conference in New York on September 25.

Dan will be presenting "Trade Scheduling Algorithms," at the Columbia University Math Finance Department Seminar in New York on October 1.

On October 9, the International Association of Financial Engineers is having a "How I Became A Quant" career night event at MIT. Northfield is sponsoring the event and Dan will be one of several panelists.

At the November 8th Factset Investment Process Symposium in San Antonio, Dan will be presenting "Achieving Optimal Turnover in a Multiperiod Optimization Framework."

Northfield's Steve Gaudette will be speaking at the Performance Measurement Conference in New York on November 30. The topic will be on equity performance attribution.

Northfield Partner Update

Quantitative Analytics, a Thomson company, recently signed an agreement with Northfield to integrate the Northfield Open Optimizer and risk models into the Thomson Market QA platform. Thomson Market QA integrates a powerful function language with historical and daily-updated fundamental and pricing data, offering high performance and flexibility for financial data retrieval and analysis. This partnership demonstrates our continuing effort to make Northfield content available through alternative delivery platforms highly regarded by our clients so that they may choose the presentation and utilization of Northfield that works best within their investment process. Thomson Market QA with the Northfield Optimizer and risk models will be available to clients in the first quarter of 2008. Please contact Chris Hanson, christopher.hanson@thomson.com at Quantitative Analytics for more information.

(Equity Risk Premium, continued from page 1)

A number of studies in the past have found that the low volatility portfolios seem to have greater returns than would be expected under CAPM. If this is true, then MV portfolios should maximize the apparent advantage of low volatility investing. Much of both sides of the arguments around CAPM are covered in Grinold (Financial Analyst Journal, 1993). One early study that supports the benefits of MV portfolios was Haugen and Baker (Journal of Portfolio Management, 1991).

There are number of reasons that have been put forward as to why the return difference between low risk equities and riskless assets seems to be disproportionately larger than the return difference between low risk equities and high risk equities. One explanation for at least part of this effect is that the simplest form of the CAPM model assumes that investors can both lend and borrow money at the risk free rate. In the real world, interest rates for borrowing are higher than we can earn by investing in a riskless asset such as a Treasury bill. This would mean that the return on low risk securities should be higher than predicted by CAPM to offset the higher cost of borrowing to leverage a low risk portfolio to market equivalent risk.

Another CAPM related rationale is that equity investors are long term investors, so the correct representation of the risk free rate isn't a T Bill (which has reinvestment risk), its something like a 5 to 10 year zero coupon Treasury (STRIP). The higher yield for the risk free rate would produce a big equity premium over Treasury bills, but with a flatter security market line. A third argument asserts that the CAPM holds just fine, but equity indices are not a proper representation of the market portfolio, which ought include things like corporate and government bonds, REITS, etc. If the true market portfolio is lower in volatility than our equity indices, the security market line should be much flatter, again predicting better than expected returns for low risk equities.

A related but different explanation is that low volatility equity investing is usually associated with value strategies. Value strategies tend to have a left skewed return distribution (see http://www.northinfo.com/documents/132.pdf), so investors demand a higher than CAPM expected return to compensate for the tail risk. The intuition for the skew is that momentum strategies (anti-value) are comparable to the process of Constant Proportion Portfolio Insurance (buy on the way up, sell on the way down). CPPI produces payoffs that would replicate being long a put, so anti-momentum strategies (i.e. value) have to be like being short a put, hence the left skew.

The comparable concept of leveraging low risk portfolios has also been well explored in the bond market. For example, see Lochoff (Journal of Portfolio Management, 1998), which had been previously presented at the Northfield annual conference in Santa Barbara that year. Basically this paper argues that you can just buy short-term bonds and leverage them up to the total risk level of long term bonds to get a better return. In the US, the yield curve is usually steepest at the short end so the marginal yield increase per unit of risk is greatest. If you think of equities as being the present value of future earnings, one could make the same argument in terms of low volatility stocks (near in cash flows) versus high volatility stocks (cash flows in the distant future).

A completely different argument in favor of low absolute volatility portfolios can be found in a paper by Roll (Journal of Portfolio Management, 1992). This paper suggests that investors who focus solely on benchmark relative volatility (i.e. tracking error) fail to differentiate between two strategies that have equivalent tracking error but offer different levels of absolute risk. Obviously, if we can get the same return and tracking error risk but lower absolute risk from one strategy than another, the lower absolute risk strategy is preferable. One way to think about this would be to expand our usual objective function to two risk terms as in Chow (Financial Analyst Journal, 1995):

$$U = R - Sb^2/Tb - S^2/T$$

where

R is return
S is absolute volatility (i.e. tracking error to cash)
Sb is tracking error to a benchmark index
T is absolute risk tolerance
Tb is benchmark relative risk tolerance

Depending on the relative values of T and Tb, the investor can express preferences about relative and absolute risk. If T is infinite we have the traditional benchmark relative problem. If Tb is infinite, we have the traditional total risk problem.

A final rationale for MV equity portfolios arises from papers by Barro (NBER, 2005) and Gabaix (MIT, Princeton, NBER, 2007). These papers argue that investors really don't care very much about the day to day ups and downs in equity markets because in the long run, the cumulative return is large relative to the intra-period volatility. Instead, investors think of risk just in terms of extreme negative events such as the 1929 stock market crash. Under this line of reasoning, investors should earn a significantly higher return for being in stocks rather than bonds or cash, but the incremental return associated with higher risk stocks as compared to low risk stocks should be modest.

Technical Support Tip: Increasing Asset Coverage

By Mike Knezevich

Multiple asset class analysis has become increasingly important in the investment industry. Northfield is keeping in step with this increased importance by offering more asset classes and exponentially increasing security coverage.

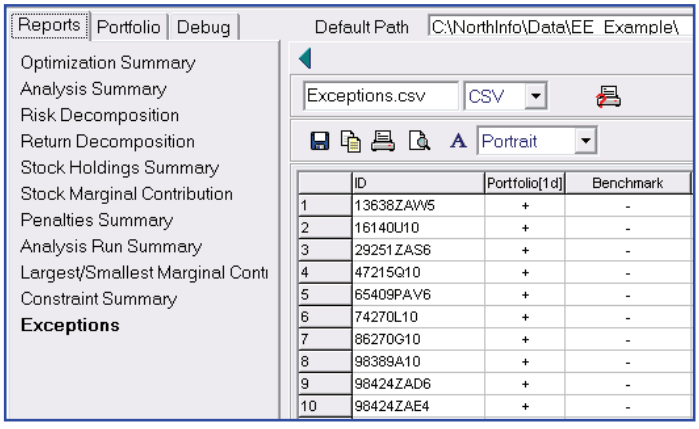
When using the EE model there are steps and tools provided to help increase asset coverage. First, when analyzing multi asset class portfolios, certain identifiers are suggested for different asset classes. For best coverage use these identifiers with these asset classes:

1) For US equities use 8 digit CUSIPS.
2) For non-US equities use a 7 digit SEDOL.
3) For US bonds use 9 digit CUSIPS.
4) For non-US bonds use an ISIN.

The file format follows the Northfield conventional holding file format where all identifiers will be in the first column. Despite a well formatted holding file with all the appropriate identifiers, not all assets will be recognized in the database.

Example: Although EENIAC serves many purposes, this example focuses on the EENIAC functionality as a cross identifier search tool.

Importing a global multi-asset class portfolio, a user discovers 10 asset exceptions from their portfolio.



Using EENIAC the user can check exceptions against Northfields database across different identifiers. For example a portfolio holding Canadian company Telus Corp being identified with the CUSIP 87971M10 would be rejected since Northfield's data file uses Telus' SEDOL 2381093. Using the EENIAC functionality, this exception can be rectified following these steps.

1) Create an exception file to be used in EENIAC.

a. In Excel use the key word "except", the identifier being rejected and the identifier type being used. In this example the identifier being used is CUSIP

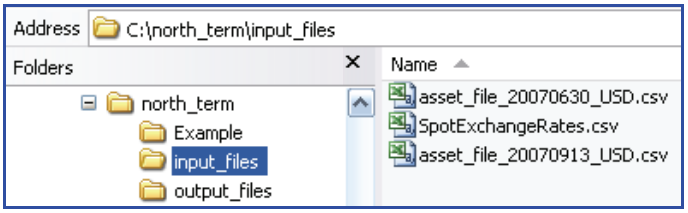
	A	B	C
1	except	13638ZAW5	cusip
2	except	16140U10	cusip
3	except	29251ZAS6	cusip
4	except	47215Q10	cusip
5	except	65409PAV6	cusip
6	except	74270L10	cusip
7	except	86270G10	cusip
8	except	87971M10	cusip
9	except	98389A10	cusip
10	except	98424ZAD6	cusip
11	except	98424ZAE4	cusip

b. The file must be saved in csv format with the name asset_file_YYYYMMDD_ISO.csv which is hard-coded in the system:

i. YYYYMMDD is the current date 20070913 is used to retrieve the latest data.
ii. ISO is the ISO currency code, USD is used for the US dollar.

Asset_file_20070913_USD.csv

c. Save the file in the north_term\input_files directory.



2. Uploading the file into EENIAC

a. Open command prompt
b. Change the active directory to north_term
c. Call the upload function, supplying your username and password (obtained from Northfield) referencing the file containing the exceptions:

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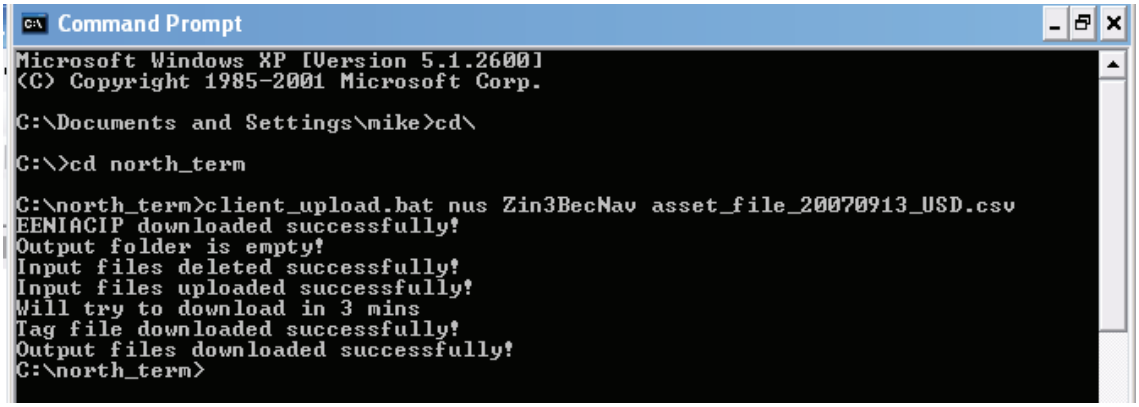
client_upload.bat username password asset_file_ 20070913_USD.csv

Or

```
C:\north_term>client_upload.bat username password asset_file_20070913_USD.csv
```

d. The above steps should resemble the dialogue box below:



3) Updating the Data File

a. The resulting data file (see right), EXCEPT.csv, will be downloaded to the output_file directory: Exceptions found in Northfield's database are included in the EXCEPT file in formatting resembling the familiar monthly data files supplied with a download (ee20070730c.csv).

b. EENIAC was able to identify Telus. By cross referencing the user's CUSIP with the appropriate SEDOL in the Northfield database all the appropriate risk data is supplied.

	A	B
1	98389A10	XANTREX TECHNOLOGY INC COM
2	74270L10	PRISZM INCOME FUND UNIT
3	86270G10	STRATAGOLD CORP COM
4	16140U10	CHARTWELL SENIOR HSG REAL E TR UNIT
5	47215Q10	JEAN COUTU GROUP PJC INC CL A SUB VTG
6	87971M10	TELUS CORP COM
7	65409PAV	NIF-T; 4.37%; 2/23/2009
8	98424ZAE	YPG HOLDINGS INC.; 6.25%; 2/15/2036
9	98424ZAD	YPG HOLDINGS INC.; 5.25%; 2/15/2016
10	13638ZAV	CANADIAN NATURAL RESOURCES LTD; 4.5%;
11	29251ZAS	ENBRIDGE INC; 5%; 8/9/2016

4) Accessing the Data

a. Accessing this data in the application is as simple as just appending the existing data file (ee20070730.csv) with the assets from the EXCEPT.csv file.

For further inquiries, contact Technical Support in Boston: **support@northinfo.com** or call 617.208.2080. European clients can contact: **support@northinfo-europe.com** or call +44-(0)-20-7801-6260. In Asia, contact Nick Wade, **nick@northinfo.com**.

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