

プロジェクト概要

Russell 3000 に関する調査

目的:

C++システムを開発し、サプライズリターンに基づいて株価の動きを分析する。

データ取得、計算、可視化のためのC++システム

異常リターン(AR)、平均異常リターン(AAR)、累積異常リターン(CAAR)の計算

データ構造



Russells3000の調査

ラッセル3000インデックスは、米 国の株式市場で最も大きな3000社 のパフォーマンスを測定し、米国 の投資可能な株式市場の約96%を カバーしています。Russells3000 は、広範な市場の指標を提供する ために構成されており、新しい株 式や成長株を毎年再構成します。

Index characteristics

(As of 4/30/2024)

	Russell 3000®	Russell 3000E™
Price/Book	4.12	4.12
Dividend Yield	1.42	1.42
P/E Ex-Neg Earnings	23.08	23.07
EPS Growth - 5 Years	14.72	14.72
Number of Holdings	2,943	3,487

Market capitalization (in billions USD)

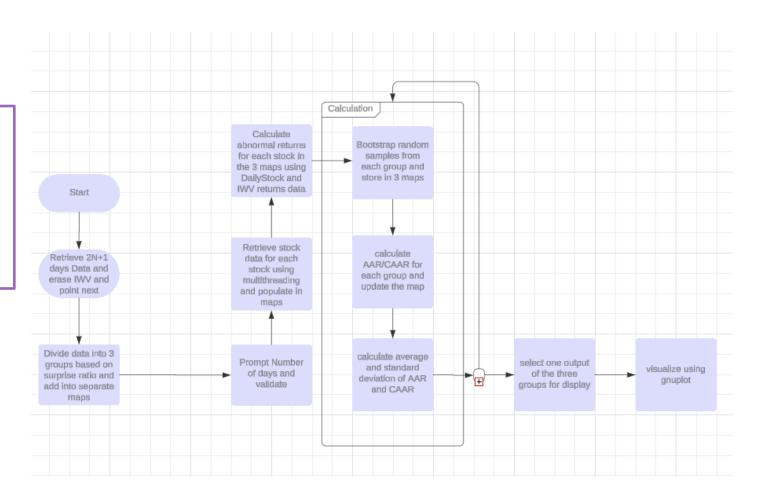
(As of 4/30/2024)

	Russell 3000®	Russell 3000E™
Average Market Cap (\$-WTD)	\$687.604	\$687.009
Median Market Cap	\$2.115	\$1.378
Largest Stock by Market Cap	\$2894.859	\$2894.859



UML

システム設計図のように、クラス間の関係を視覚化するためにUML(統一モデリング言語)を使用しました。





クラス構造の説明

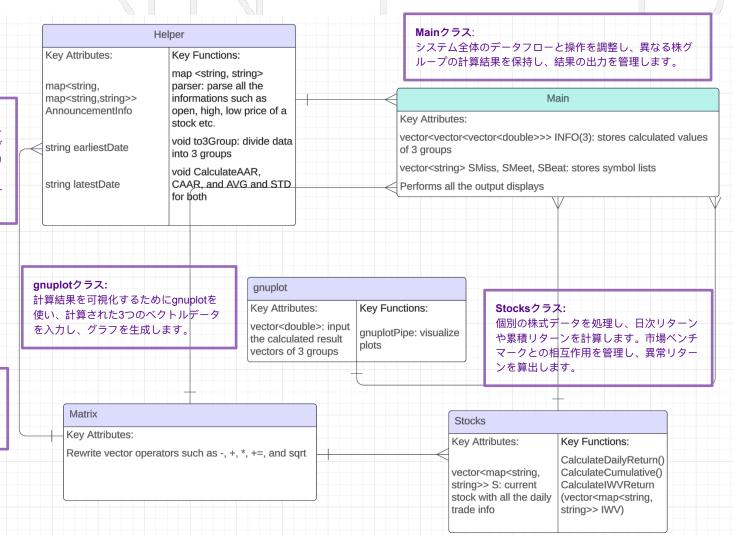
Helperクラス:

株式データの管理と解析を行うユーティリティ関数を含みます。株をグループに分割し、AAR(平均異常リターン)、CAAR(累積異常リターン)、およびそれらの標準偏差を計算します。

Matrixクラス:

ベクトルや行列の操作を強化 し、加算、減算、平方根などの 数学的な計算を行います。





計算 - 日次リターン

日次リターンの計算: $R_{it} = log(Price_t/Price_{t-1})$

調整済み終値を使用して、各株式のリターンを計算します。

Benchmark: IWV

IWVのリターン: R_{mt}

異常リターン(AR)の計算: $AR_{it}=R_{it}-R_{mt}$ ここで、RmtはベンチマークであるIWVのリターンを指します。



計算 - AAR

Average daily abnormal return for each group for 2N

reference days:
$$AARt = \frac{1}{M} \sum_{i=1}^{M} ARit$$

(M-number of stocks, 30 in this case)

Avg AARは40回のサンプリングの平均として計算:

$$\mathbf{Avg} \ \mathbf{AAR} = \frac{1}{40} \sum_{i=1}^{40} AARt_i$$



計算 - CAAR

CAARは指定されたT期間内のAARを累積して計算:

CAAR =
$$\sum_{t=-N+1}^{T}$$
 AARt, T could be -N+1, -N+2, ..., N-2, N-1, N



標準偏差の計算

AARとCAARの標準偏差を以下の式で計算します:

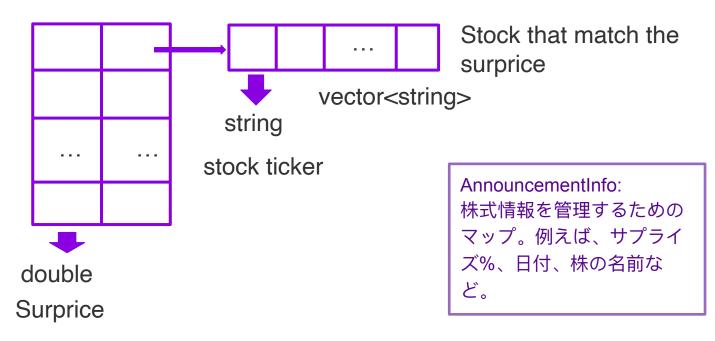
$$\mathbf{STD} = \frac{1}{\sqrt{N-1}} \sqrt{\frac{1}{N} \sum_{i=1}^{N} \mathbf{AARt}^2 - (\frac{1}{N} \sum_{i=1}^{N} \mathbf{AARt})^2}$$

$$\mathbf{STD} = \frac{1}{\sqrt{N-1}} \sqrt{\frac{1}{N} \sum_{i=1}^{N} \mathbf{CAAR}^2 - (\frac{1}{N} \sum_{i=1}^{N} \mathbf{CAAR})^2}$$

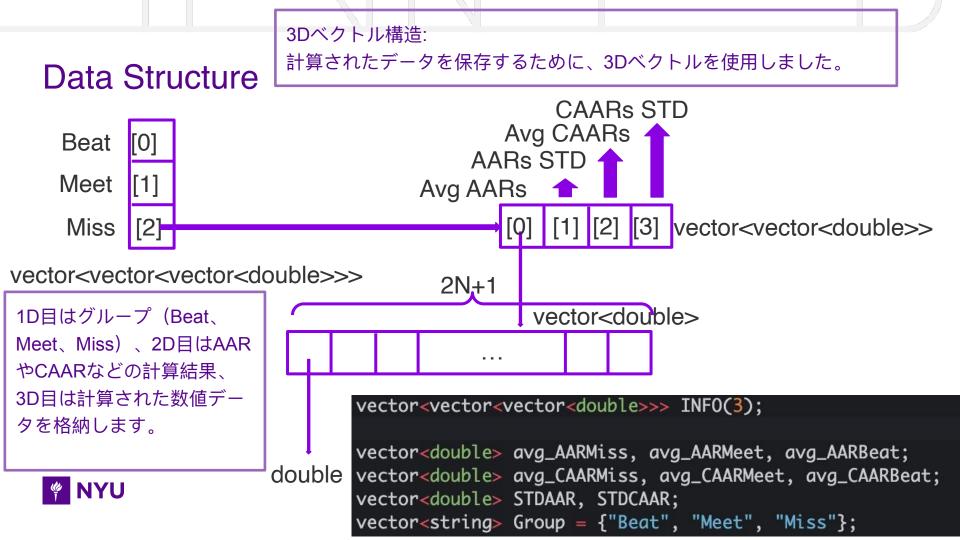


データ構造

map<double, vector<string>>> SupriseMap;







計算されたAARとCAARを可視化し、gnuplotを用いて異なるグループの株価の動向を示します。

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                                                                                                                    X xterm
:"/environment/fre6883-finalproject-pointer-poincers-sylvia $ ./FinalProject
1 - Enter N to retrieve 2N+1 days of historical price data for all stocks.
2 - Pull information for one stock from one group.
3 - Show AAR, AAR-STD, CAAR and CAAR-STD for one group.
4 - Plot Avg CAAR for 3 groups.
5 - Plot STD CAAR for 3 groups.
6 - Plot Avg AAR for 3 groups.
7 - Plot STD AAR for 3 groups.
8 - Identify stocks with bad prices.
9 - Exit.
Enter your choice and press return: 1
Enter N (N must be between 60 and 90): 90
Fetching Baily Price Bata for Stocks.. (Please be patient)
Warning: Not Enough Data for CART.
Time taken to fetch and populate all the stock data: 105 seconds
Proceed Stock Abnormal Return and AAR and CAAR calculation...
Time taken to for all calculation: 4 seconds
1 - Enter N to retrieve 2N+1 days of historical price data for all stocks.
2 - Pull information for one stock from one group.
3 - Show AAR, AAR-STD, CAAR and CAAR-STD for one group,
4 - Plot Avg CAAR for 3 groups.
5 - Plot STD CAAR for 3 groups.
6 - Plot Avg AAR for 3 groups.
7 - Plot STD AAR for 3 groups,
8 - Identify stocks with bad prices.
9 - Exit.
Enter your choice and press return: 2
Enter Symbol for Detailed Information: AAPL
Ticker: AAPL
Earning Announcement Date: 2023-11-02
Earning Period Ending: Sep 2023
Earning Estimate: 1.39
Reported Earning Per Share: 1.46
Earning Suprise: 0.07
Earning Suprise Percentage: 5.04
Group: Meet
No Enough Daily Price Data: False
Stock Daily Price Dates:
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Stock Rhonors 0,003 -0,004 0,003 0,004 0,007 -0,001 0,006 -0,012 -0,004 0,002 -0,001 -0,010 0,008 0,005 -0,008	al Daily Re 0.005 0.002 0.000 0.000 0.015 0.008 0.016 -0.010 0.009 0.009 -0.006 -0.002 -0.005 -0.005 -0.001 0.001	-0,003 0,013 -0,002 0,003 0,002 0,016 0,007 0,001 -0,002 0,022 0,004 0,010 -0,003 -0,008 -0,005	-0.009 (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000)	0,004 -0, 1,004 -0, 1,002 -0, 1,007 -0, 1,011 -0, 1,002 -0, 1,000 -0,	004 0.0 003 -0.0 045 -0.0 002 0.0 030 -0.0 008 0.0 008 0.0 0012 0.0 0012 0.0 0014 -0.0 002 0.0 003 -0.0 004 -0.0 004 -0.0 009 -0.0	06 0,001 25 0,011 11 0,011 26 0,002 07 0,003 002 -0,003 005 0,001 006 0,001 17 0,000 10 -0,001 18 -0,001 18 -0,001 18 -0,001	0.002 0.002 0.002 0.002 0.000 0.004 0.003 0.004 0.003 0.004 0.003 0.004 0.003 0.004 0.003 0.004 0.003 0.004 0.003 0.004 0.003 0.004 0.003 0.004 0.003 0.003 0.004 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.	-0.010 0.004 -0.001 0.005 -0.012 -0.011 0.013 -0.008 -0.007 -0.006 -0.030 0.024 -0.015 0.003 -0.012	0,001 0,001 0,001 0,002 -0,005 -0,005 -0,005 -0,001 -0,008 -0,001 0,003 0,003 0,003 0,003 0,004 -0,010			
3 - Show AAF 4 - Plot Avs 5 - Plot STI	ormation for , AAR-STD, I CAAR for 3 CAAR for 3 AAR for 3 AAR for 3 stocks with	r one stock CAAR and CAI groups, groups. groups. groups. h bad price: ress return	from one gr AR-STD for o	roup. one group.		tocks.						
0.0518 -0.1891 -0.1896 0.0302 -0.2367 -0.0602 0.0505 -0.5245 0.1550 0.2141 0.3093 0.3206 -0.3730 0.1688 -0.2055 -0.0913 -0.1386	-0,0231 -0,2605 0,1631 -0,1155 -0,2803 -0,0811 -0,3346 0,2020 -0,4335 -0,0838 0,2343 0,3256 -0,2956 0,2551 -0,1316 -0,1294 -0,4938	-0.1291 -0.1863 0.1884 -0.1544 -0.2870 -0.1558 -0.1739 -0.0631 1.2228 -0.0873 0.2253 0.1442 -0.2822 -0.1718 -0.1658 0.0205 -0.1849	0.3220 0.0611 -0.6246 -0.3267 -0.1554 -0.3024 -0.4146 -0.0094 1.7847 0.2196 0.1386 0.1108 -0.2130 -0.1558 0.3094 0.1359 -0.1260	0.2915 0.1153 -0.6833 -0.0948 -0.3052 -0.0339 -0.1847 -0.3119 -0.0946 0.0750 0.3715 0.2138 -0.3888 -0.1541 0.1343 -0.3069 -0.1619	0.1342 -0.3072 -0.2752 -0.2752 -0.2359 -0.2971 0.0764 -0.6339 -0.1247 0.1305 -0.0598 0.4384 -0.2331 -0.2191 -0.0429 -0.3320 -0.0821	-0.2372 0.1806 -0.1691 -0.2597 -0.2126 0.0136 -0.4649 -0.0140 0.2144 0.2966 0.4353 0.1265 0.0899 -0.2384 -0.2676 0.1917	-0.0686 0.1990 0.0067 -0.1523 -0.1295 -0.2471 -0.0077 -0.1596 0.3423 0.2937 -0.1621 -0.0355 -0.2486 -0.3215 -0.0374	0.2680 -0.0412 -0.0088 -0.2795 -0.4233 -0.1388 -0.0921 -0.1138 0.0525 0.1912 -0.0020 -0.3075 0.1934 -0.3124 -0.2703	0.0741 0.1025 0.10305 0.1471 -0.1980 -0.3606 -0.4319 0.2891 0.0359 0.1331 0.5036 0.1289 -0.0917 -0.3714 0.3321	-0,0312 0,0224 -0,0336 -0,0049 -0,3874 -0,0555 -0,3502 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,2762 -0,4743 -0,1403 -0,1403 -0,4742		
AARs STD for 0,4070 0,4351 0,4993 0,3689 0,3283 0,4398 0,4641 0,5759 0,4507 0,3832 0,4957	Group BEAT 0,3859 0,5288 0,6554 0,4996 0,3818 0,4707 0,5124 0,3985 0,5291 0,4255 0,5047	0,4594 0,4693 0,6137 0,3051 0,4055 0,4420 0,4946 0,4598 1,0451 0,5406 0,7325	0.6970 0.4302 0.8476 0.6626 0.4664 0.4064 0.5305 0.2904 1.7610 0.3804 0.5580	0.5041 0.4549 1.5948 0.4665 0.4361 0.3983 0.5932 0.4628 0.7528 0.3954 0.5571	0,4150 0,5113 1,1620 0,4766 0,5476 0,4214 0,3796 0,3356 0,3353 0,4182 0,4394	0,5792 0,3720 0,7521 0,2581 0,3987 0,3811 0,5620 0,4221 0,5512 0,4316 0,5571	0,5239 0,5970 0,5970 0,5369 0,4059 0,3760 0,5320 0,6722 0,4358 1,1239 0,5239 0,6291	0,4204 0,3957 0,4498 0,3905 0,3457 0,3415 0,6421 0,4741 0,5345 0,4214 0,4878	0,4269 0,3998 0,4455 0,3595 0,4019 0,5125 0,8312 0,6913 0,4896 0,4554 0,4802	0,3826 0,4545 0,3239 0,3716 0,3643 0,4486 0,3912 0,4677 0,4908 0,5334 0,4345		



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-0,2055 -0,0913 -0,1386	-0.1316 -0.1294 -0.4938	-0.1658 0.0205 -0.1849	0.3094 0.1359 -0.1260	0,1343 -0,3069 -0,1619	-0.3920 -0.0821	-0.2676 0.1917	-0.3215 -0.0374	-0,3124 -0,2703	0.3321 -0.2126	-0.1403 -0.4742
ARRS STD for 0, 4070 0, 4351 0, 4393 0, 3689 0, 3283 0, 4364 0, 4507 0, 4850 0, 4507 0, 5151 0, 3582 0, 4364 0, 4363 0, 4363 0, 4363 0, 4363 0, 5860 0, 5769	Group BEAT 0.3859 0.5288 0.5288 0.6554 0.4996 0.3818 0.4707 0.5124 0.3985 0.5291 0.4255 0.5047 0.3784 0.4116 0.4919 0.4850	0.4594 0.4693 0.6137 0.3051 0.4055 0.4420 0.4598 1.0451 0.5406 0.7325 0.3774 0.5797 0.4505 0.6478 0.5003 0.4520	0,6970 0,4302 0,8476 0,6626 0,4664 0,5305 0,2904 1,7610 0,3804 0,5580 0,4311 0,3910 0,4934 0,6592 0,5554 0,4274	0,5041 0,4549 1,5948 0,4665 0,4361 0,3983 0,5932 0,4628 0,7528 0,3954 0,3954 0,5571 0,4767 0,4523 0,5015 0,5072 0,5472 0,4563	0,4150 0,5113 1,1620 0,4766 0,5476 0,4214 0,3796 0,3356 0,5313 0,4182 0,4394 0,4527 0,5621 0,3884 0,5626 0,5132	0,5792 0,3720 0,7521 0,2581 0,3811 0,5620 0,4221 0,5512 0,4316 0,5571 0,4018 0,3803 0,4529 0,6343 0,6529	0,5239 0,5369 0,4059 0,4059 0,3760 0,5320 0,6722 0,4358 1,1239 0,5239 0,5239 0,5209 0,3791 0,4220 0,8314 0,5465	0,4204 0,3957 0,4498 0,3905 0,3457 0,3415 0,6421 0,4741 0,5345 0,4214 0,4878 0,5270 0,4169 0,6029 0,5670 0,3796	0,4269 0,3398 0,4455 0,3595 0,4019 0,5125 0,8313 0,4896 0,4554 0,4802 1,2500 0,5409 0,6463 0,4789	0.3826 0.4545 0.3223 0.3716 0.3643 0.4466 0.3912 0.4677 0.4908 0.5234 0.4345 0.5226 0.4791 0.4043 0.6563 0.5476
Avg CARRs for 0,051,6 0,4829 0,1881 -1,1876 -2,9009 -5,63588 -6,8756 -10,4884 -10,6724 -7,4290 -6,3877 -2,9822 -3,1755 -5,0702 -6,1102 -7,1572 -8,4606	r Group BEAT 0,0285 0,2224 0,3511 -1,3031 -3,1812 -5,7190 -7,2102 -10,2864 -11,1059 -7,5128 -6,1544 -2,6596 -3,4711 -4,8150 -7,2685 -8,9544	-0,1005 0,0361 0,5395 -1,4575 -3,4682 -5,8738 -7,3841 -10,3494 -9,8831 -7,6001 -5,9291 -2,5124 -3,7533 -4,9869 -6,4077 -7,2660 -9,1393	0.2214 0.0972 -0.0851 -1.7842 -3.6246 -6.1761 -7.7887 -10.3589 -8.0884 -7.3805 -5.7906 -2.4016 -3.9664 -5.1437 -6.0983 -7.1301 -9.2653	0,5129 0,2125 -0,7684 -1,8790 -3,9298 -6,2160 -7,9834 -10,6708 -8,1930 -7,3055 -5,4190 -2,1878 -4,3551 -5,2978 -5,9640 -7,4370 -9,4272	0,6471 -0,0947 -1,0436 -2,1150 -4,2269 -6,1396 -8,6173 -10,7955 -7,3653 -4,9807 -2,4209 -4,5742 -5,3407 -6,3560 -7,5191	0,4099 0,0859 -1,2126 -2,3747 -4,4395 -6,1260 -9,0822 -10,8095 -7,8481 -7,0686 -4,5454 -2,5474 -4,4844 -5,5791 -6,6236 -7,3274	0,3413 0,2849 -1,2059 -2,5270 -4,5680 -6,3732 -9,0698 -10,9474 -8,0078 -6,7263 -4,2517 -2,7095 -4,5199 -5,8277 -6,9451 -7,3648	0,6092 0,2438 -1,2147 -2,8064 -4,9912 -6,5100 -9,1819 -11,0612 -7,9553 -6,5352 -4,2538 -2,7176 -4,8274 -5,6343 -7,2576 -7,6352	0,6833 0,3463 -1,1842 -2,6593 -5,1892 -6,8705 -9,6137 -10,7720 -7,9193 -6,4021 -3,7502 -2,5887 -4,9191 -6,0057 -6,9255 -7,8478	0,6520 0,3687 -1,217 -2,6642 -5,5767 -6,9261 -9,9639 -10,8274 -7,6431 -6,6431 -6,6431 -6,6379 -3,3028 -2,8025 -5,2388 -6,9048 -7,0658 -6,5220
CAPRs STD Fo 0,4070 1,2204 1,8876 3,3050 3,7286 4,1554 4,5563 5,3050 6,3361 6,3330 6,6016 6,5738 6,8213 7,3026 7,6630	r Group BEAT 0,5630 1,3912 2,0217 3,7996 4,0299 4,5714 5,3130 4,9976 6,3375 6,5295 6,5842 6,8629 7,2451 7,6166	0.5542 1.4509 2.0951 3.4023 3.8146 4.1112 4.6741 5.2688 4.9555 6.3654 6.5549 6.6124 6.8370 6.8719 7.3058 7.6734	0.8736 1.6318 2.3293 3.4015 3.8442 4.1814 4.7007 5.2889 5.7648 6.3814 6.5216 6.6727 6.7934 7.0652 7.4928 7.7651	1.0568 1.6934 2.8625 3.3809 4.0626 4.2154 4.7197 5.4259 6.3649 6.4805 6.4939 7.0246 7.4554 7.7898	1.1351 1.6404 3.0243 3.4263 4.1541 4.3088 4.7267 5.3656 6.3784 6.4262 6.7010 6.6916 7.1023 7.4347 7.7613	1.1593 1.6042 3.0169 3.4777 4.0958 4.3067 4.9046 5.4253 5.8690 6.2938 6.4001 6.6413 6.7618 7.1889 7.3796 7.6905	1.0412 1.6565 3.2677 3.6191 4.0284 4.3354 4.9818 5.3751 6.2697 6.3321 6.4948 6.6370 6.6719 7.2217 7.3096 7.6258	1.1757 1.6767 3.2631 3.6615 4.0469 4.3789 4.9426 5.3384 6.5120 6.5022 6.6584 6.7939 7.2419 7.4398 7.6898	1.0977 1.7321 3.3076 3.6254 4.0710 4.5620 5.2664 5.1276 6.3418 6.5509 6.5687 6.7162 7.3194 7.4807 7.6208	1.1624 1.7949 3.3395 3.7173 4.0996 4.5276 5.2933 5.0823 6.3246 6.3951 6.6097 6.5433 6.8239 7.3305 7.73713

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7 - Plot STD										
8 - Identify 9 - Exit.	stocks with	bad prices								
Enter your ch										
Enter Group (Miss) for I	etailed Inf	ormation: N	leet					
Avg AARs for 0,0048	-0.0353	-0.1124	0.0007	0.1555	0.0921	-0.0393	-0.0121	0.0809	-0.0451	-0.0629
-0.1586	0.0113	0.0287	0,1287	-0.0136	0.0286	0.0282	0.0408	0,1087	0.0634	0.0425
-0,1226	-0.0612	-0.1240	0.3046	-0.4059	-0.3580	0.0767	-0.0924	0,1618	-0,1021	0.0892
0.0567	-0.0044	-0.0043	-0.0505	-0.0070	-0.1952	-0.0633	-0.1037	0.0428	0.0079	-0.3320
-0,1776 -0,1212	-0,2628 0,0022	-0.0256 -0.0697	0.0544 -0.0932	-0.4311 0.0221	-0,2914 -0,0918	-0,2153 0,0570	-0,1807 -0,0979	-0.0990 -0.1049	-0,1686 -0,1291	-0,2898 0,0250
0.0500	-0.4190	-0.0578	-0.0490	-0.4445	-0.0725	-0.2467	-0.1225	-0.1874	-0.1231	-0.2516
-0,1880	-0.0209	-0.1099	-0.0296	-0.0411	-0.0077	0.0909	-0,1122	-0.0694	0.1553	-0.0746
-0,0298	0,0196	0,1335	-0.0521	-0,2548	-0,1418	0,1870	-0,0121	0,1773	-0,1150	0.0934
-0.0514 0.4843	-0.1930 0.2020	0.1056 -0.2521	0.0264 -0.0066	0.1926	0.0644	-0.0731 0.5205	0.1453	-0.0075 0.3906	0.0780	0.2562 0.0899
0.4843	0.2020	0.1650	0.2356	0.1761	0.4223	-0.1299	0.1102	0.2214	0.0902	0.0002
-0,1988	-0,2000	-0.2104	-0,2520	-0.2957	-0.3309	-0.0796	-0,2652	-0.1596	-0.1607	-0.3489
0.0084	-0.0733	-0.1831	-0.0049	-0.1818	-0.1068	-0.0640	-0.3970	0.0681	-0.1899	0.0278
0.1317 -0.0815	-0.2309 -0.1066	0.1377	-0.2948	-0.3132 -0.1169	-0.0906	-0,2220	-0.0931	-0.0858	0.0162	0.2186
-0.0815	-0.1066	0.0593	0.0144 -0.0111	-0.1169	-0,2922	-0.0772	-0.0807	0.0519	-0.1822	-0.1840
0,1404	0,1421	0,0174	0.0111	V+2103						
AARs STD for	Group MEET	27.7		10000000						
0.2743	0.3929	0.3657 0.3119	0.3196	0.3084	0.2154	0.3433 0.2477	0.3729	0.4055	0.3001	0.3122 0.3369
0.4408	0.4027	0.2961	0.4610	0.6959	0.7630	0.3629	0.3670	0.4026	0.4109	0.3851
0,3665	0.2479	0.3054	0,2643	0.3744	0,2531	0.2561	0,2543	0,2847	0.3237	0,2586
0.2581	0,2190	0.2944	0.3577	0.6406	0.4002	0.3838	0.3170	0.3456	0.4540	0.3608
0.3534	0.3434	0.2713	0.5345 0.4525	0.3519	0.3392 0.5992	0.3387 0.3744	0.3465	0.3052	0.2373	0.4288 0.3923
0.3351	0.3166	0.3951	0.4525	0.8505	0.3379	0.3731	0.3314	0.4001	0.4245	0.3198
0,3850	0.3459	0.7847	1,2837	0.4105	0.3472	0.4012	0.4586	0.3137	0.3818	0.4156
0.3767	0.3464	0.3213	0.3754	0,4163	0.3480	0.2651	0.2594	0.3479	0.3494	0.3608
0.3455 0.5169	0.2707	0.5325 0.3871	0.2825 0.3512	0.6185	0.4192	0.3709 0.4296	0.3501	0.3912	0.6069 0.3554	0.5862 0.4318
0.4438	0.3107	0.3142	0.3299	0.3529	0.2723	0.4236	0.4599	0.3336	0.4098	0.3754
0.4784	0.3800	0.3467	0.3499	0,4189	0.2775	0.3581	0.4350	0,5422	0.4128	0.4588
0.5980	0.5092	0.4982	0.6655	0.4188	0.4075	0.3701	0.4071	0.5546	0.3541	0.4841
0.5400	0.3901 0.3997	0.5022 0.3382	0.4187	0.4498	0.5257	0.4812	0.3012	0.3803	0.3563	0.3689
0,3620	0.5557	0,5502	0.5505	0,3632						
Avg CAARs for										
0,0048	-0.0304	-0.1429	-0.1421	0.0133	0.1054	0.0661	0.0540	0.1349	0.0897	0.0268
-0.1318 0.2129	-0.1205 0.1518	-0.0918 0.0278	0.0369 0.3323	0.0233 -0.0736	0.0519 -0.4316	0.0800 -0.3549	0,1208 -0,4473	0,2295 -0,2856	0,2930 -0,3877	0.3355 -0.2985
-0.2418	-0.2463	-0.2506	-0.3011	-0.3082	-0.5033	-0.5667	-0.6703	-0.6275	-0.6196	-0.9516
-1,1292	-1.3920	-1.4176	-1.3633	-1.7943	-2.0858	-2.3010	-2,4818	-2,5808	-2.7494	-3.0391
-3,1603	-3,1581	-3,2278	-3,3210	-3,2989	-3,3907	-3,3337	-3,4316	-3,5365	-3,6656	-3,6406
-3.5906 -5.8512	-4.0095 -5.8720	-4.0673 -5.9820	-4.1163 -6.0115	-4.5608 -6.0526	-4.6333 -6.0604	-4,8799 -5,9695	-5,0024 -6,0816	-5.1898 -6.1511	-5.4115 -5.9958	-5.6632 -6.0704
-6,1002	-6.0806	-5.9471	-5.9992	-6,2541	-6.3959	-6.2088	-6,2209	-6.0436	-6.1586	-6.0652
-6,1165	-6,3095	-6,2039	-6,1775	-5,9849	-5,9205	-5,9937	-5,8483	-5,8558	-5,7778	-5,5216
-5.0373	-4.8353	-5.0874	-5.0940	-4,9231	-4,5007	-3,9802	-3,8700	-3,4794	-3,3893	-3.2993
-2.9753 -1.9599	-2.6876 -2.1599	-2.5226 -2.3703	-2.2870 -2.6222	-2,1109 -2,9180	-2.0605 -3.2489	-2,1904 -3,3285	-2.0571 -3.5938	-1.8357 -3.7533	-1.7613 -3.9140	-1.7612 -4.2628
-4.2545	-4.3277	-4.5108	-4.5158	-4,6976	-4.8044	-4.8684	-5,2654	-5,1973	-5.3872	-5.3594
-5,2277	-5,4585	-5.3209	-5.6156	-5,9288	-6.0194	-6,2414	-6.3345	-6,4203	-6,4041	-6.1855
-6,2670	-6.3736	-6,3143	-6,2999	-6.4167	-6,7089	-6.7861	-6,8668	-6,8150	-6,9972	-7.1812
-7.3216	-7.4643	-7.4470	-7.4580	-7.6745						



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CARRS STIT FOR Group 0,2743 0,4 1,4278 1.3 1,4278 1.3 1,4511 1.4511 1.5 1,4511 1.4511 1.5 1,4511	979 0,7026 834 1,4734 836 1,2883 8363 1,4495 841 1,6114 6511 2,1944 9089 3,0070 898 3,1531 8084 3,1583 8084 3,1583 8084 3,2890 4,0002 8789 4,0002 8789 4,0002 8789 4,1579 8789 4,2469	0.8197 1.4215 1.2289 1.3630 1.6765 2.2647 2.3811 3.0027 3.2940 3.1742 3.0421 3.0421 3.9574 3.9678 4.0897 4.1894	0,9399 1,4921 1,2839 1,4192 1,8245 2,3526 2,3401 2,9577 3,2745 3,0833 3,2745 3,0833 3,6188 4,1035 4,2025 4,3394	1,0167 1,5247 1,2807 1,4537 1,8061 2,3497 2,5642 2,9312 3,2510 3,1329 3,2510 3,1329 3,5855 4,0357 4,3137	1,0261 1,5072 1,3879 1,4662 1,8179 2,3495 2,6340 2,8628 3,1031 3,0653 3,2550 3,2783 3,6538 4,0417 4,2945	1,1714 1,4992 1,5356 1,5343 1,8907 2,4530 2,7106 2,8775 3,0800 3,0671 3,2739 3,4306 3,6131 3,6131 4,3380	1,2542 1,4313 1,4322 1,5513 1,9762 2,4448 2,7511 2,9800 3,0856 3,0615 3,4286 3,6768 4,1451 4,3728	1,3358 1,3098 1,4094 1,5262 2,1508 2,4794 2,7563 3,0915 3,0915 3,7588 4,1101 4,3517	1.3974 1.2737 1.4618 1.5500 2.1294 2.5172 2.7429 2.9847 3.1794 3.1014 3.5767 3.8975 4.0647 4.1437 4.4294
1 - Enter N to retr 2 - Pull informatio 3 - Show ARR, ARR-S 4 - Plot Avg CARR f 5 - Plot STI CARR f 6 - Plot Avg ARR fo 7 - Plot STI ARR fo 8 - Identify stocks 9 - Exit. Enter gour choice a Enter Group (Beat, Avg ARRs for Group	n for one stock TID, CARR and CAF OUT 3 groups. OUT 3 groups. OUT 3 groups. OUT 3 groups. With bad prices and press return: Meet Miss) for I	from one gr AR-STD for o	oup. ne group.		tocks.				
Hoy Hell's from Forburg 0.0135 0.10.0851 -0.0851 0.10.0851 -0.0851 0.10.2831 -0.2831 0.20.1467 -0.3 -0.0372 -0.4 -0.1021 -0.2 -0.1616 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0.2 -0.2515 -0	118 -0.0711 322 -0.2670 026 -0.0693 103 -0.2861 10442 -0.1390 728 -0.3794 1442 -0.1390 198 -0.1694 198 -1.6195 041 0.1508 050 -0.1512 090 0.2448 073 -0.4041 101 -0.2163 053 -0.1758 076 -0.1758	0.1738 -0.0127 -0.6113 -0.2060 -0.1773 -0.0474 -0.3848 -0.1662 -2.8017 0.0206 -0.0255 0.3273 -0.4006 -0.1806 -0.1806 -0.2222 0.0677 -0.4728	0,1761 0,1664 -0,2113 -0,1055 -0,2459 -0,2530 -0,5978 -0,0372 -0,1863 0,0073 0,1959 0,3222 -0,5802 -0,3831 -0,1019 -0,1242 0,0942	0,2671 -0,3702 -0,7359 -0,2724 -0,2069 -0,0888 -0,2893 -0,4551 -0,0400 0,1909 0,5972 -0,0095 -0,4933 -0,0726 -0,4972 -0,5967	-0.0756 0.0441 -0.1412 -0.2600 -0.2946 0.2751 -0.3903 0.0496 0.4391 0.2891 0.0088 0.0602 -0.1481 -0.3476 -0.2329 -0.7089	-0,2471 -0,3971 -0,0354 -0,1441 -0,3542 -0,3433 -0,2930 -0,3473 0,0252 0,6859 0,3463 -0,2476 -0,2692 -0,3376 -0,1630 0,0019	0,2378 0,0461 0,0537 -0,1722 -0,2784 -0,1340 -0,1169 0,1047 -0,0442 0,1050 0,5940 0,0617 -0,1946 -0,2183 -0,2409 0,0128	0.1889 0.1561 -0.1831 -0.0700 -0.2085 -0.3250 -0.4778 0.1034 -0.1239 0.4323 0.8869 -0.2272 -0.2636 -0.1657 0.1443 -0.1533	0.0806 -0.2162 0.0493 -0.2762 -0.4295 -0.4295 -0.3256 -0.13511 0.5236 -0.13517 0.5236 -0.2727 -0.4391 -0.4044 -0.1595 -0.2419
AARS STD for Group 0.5130 0.4 0.5130 0.8 0.5459 0.4 0.4024 0.3 0.4940 0.4 0.6371 0.4 0.4449 0.5 1.1045 0.4 0.5594 0.5 0.5934 0.5	621 0,5140 580 0,5830 631 0,5816 153 0,5212 538 0,3934 785 0,5232 736 0,4853 594 0,4860 554 1,0884 545 0,5242	0.4677 0.5295 0.9250 0.3885 0.3549 0.3519 0.4232 0.5339 2.0442 0.4524 0.4030	0,4126 0,4742 1,1518 0,2992 0,3897 0,4418 0,5113 0,4042 0,6006 0,5581 0,4810	0,6989 0,6556 1,0619 0,2962 0,3763 0,3706 0,5783 0,6931 0,7215 0,4423 0,8406	0.5715 0.4787 0.7075 0.3962 0.4111 0.6775 0.5869 0.4655 0.7669 0.4561 0.8931	0.7170 1.4790 0.5416 0.4461 0.4042 0.3822 0.8591 0.4572 0.6426 0.5048 0.5494	0,4585 0,4764 0,3947 0,4490 0,5475 0,5198 0,4389 0,5126 1,2076 0,5358 1,2611	0,3453 0,4195 0,4311 0,5086 0,4603 0,3945 0,5330 0,5589 0,4926 0,5927 0,4437	0.5083 0.4992 0.3798 0.4931 0.4180 0.4189 0.4585 0.4773 0.5137 0.5934 0.4171

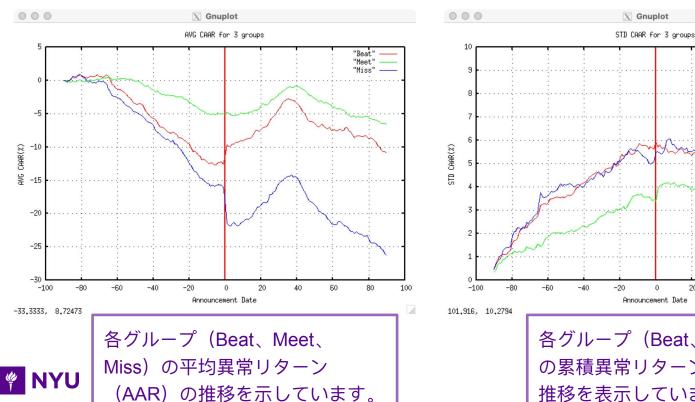


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	000										X xterm
	-0,1791 -0,4296 -0,1081	-0.3639 0.0678 -0.6571	-0.1758 -0.1073 -0.0414	-0,2222 0,0677 -0,4728	-0,1019 -0,1242 0,0942	-0.4972 -0.5967	-0,2329 -0,7089	-0.1630 0.0019	-0,2409 0,0128	0.1443 -0.1533	-0.1595 -0.2419
	AARs STD for 0,4012 0,5130 0,3344 0,5459 0,4024 0,4540 0,6371 0,4449 1,1045 0,5594 0,5283 0,5283 0,4072 1,0585 0,6850 0,6847	Group MISS 0.4621 0.4590 0.8631 0.4153 0.3538 0.4795 0.4736 0.5594 0.4554 0.5543 0.5211 0.4836 0.3648 0.3311 0.6158 1.0036 0.9624	0,5140 0,6830 0,5816 0,5212 0,3334 0,5232 0,4850 1,0884 0,5242 0,5017 0,3869 0,6733 0,5958 0,6598 0,6598	0.4677 0.5295 0.9250 0.3885 0.3549 0.3519 0.4232 0.5399 2.0442 0.4030 0.4180 0.5109 0.4967 0.7972 0.6278 0.5056	0,4126 0,4742 1,1518 0,2992 0,3897 0,4418 0,5113 0,4042 0,6006 0,5581 0,4810 0,5079 0,4313 0,5975 0,5720 0,5292 0,9043	0.6989 0.6556 1.0619 0.2962 0.3763 0.3706 0.5783 0.6331 0.7215 0.4423 0.8406 0.4748 0.6164 0.6488 0.6727 0.6636	0.5715 0.4787 0.7075 0.3362 0.4111 0.6775 0.5869 0.4655 0.7669 0.4551 0.6021 0.5739 0.6181 0.7406 1.7857	0,7170 1,4790 0,5416 0,4461 0,4042 0,3822 0,8591 0,4572 0,6426 0,5048 0,5494 0,4820 0,5689 0,4795 0,6791 0,6032	0.4585 0.4764 0.3947 0.4450 0.51475 0.5138 0.4389 0.5126 1.2076 0.5358 1.2611 0.5867 0.4774 0.7704	0.3453 0.4195 0.4311 0.5086 0.4603 0.3945 0.5350 0.5589 0.4926 0.5927 0.4437 0.4211 0.4912 0.7915 0.5594	0,5093 0,4992 0,3758 0,4931 0,4180 0,4180 0,4753 0,6137 0,5934 0,4773 0,5137 0,5137 0,5140 0,4021 0,5265 0,5265 0,5265
	Avg CARRs for 0,0195 0,7768 -0,0955 -2,4123 -4,5983 -7,2930 -8,9648 -12,8225 -14,2799 -18,2485 -15,8981 -12,3374 -15,8929 -17,5996 -20,0421 -21,3324	Group MISS 0.1313 0.7439 -0.2881 -2.6232 -4.8806 -7.4371 -9.4376 -13.0423 -14.4997 -18.2526 -15.4121 -12.1083 -12.5318 -15.9030 -17.9635 -19.9743 -22.5895	0,0602 0,4769 -0,3574 -2,9093 -5,1237 -7,5762 -9,8169 -13,2117 -16,1193 -18,1018 -15,5633 -11,8636 -12,9722 -16,1194 -18,1393 -20,0816 -22,6310	0,2340 0,4641 -0,9687 -3,1153 -5,3010 -7,6236 -10,2018 -13,3779 -18,9210 -18,9210 -11,5362 -13,3728 -16,3000 -18,3615 -20,0139 -23,1037	0,4101 0,6306 -1,1799 -3,2208 -5,5469 -7,8765 -10,7996 -13,4151 -19,1073 -18,0740 -15,3929 -11,2140 -13,9530 -16,6831 -18,4633 -20,1381 -23,0096	0,6772 0,2604 -1,9158 -3,4932 -5,7539 -7,9653 -11,0889 -13,8702 -19,1473 -17,8831 -14,7857 -11,2235 -14,4463 -16,7557 -18,9605 -20,7348	0,6016 0,3045 -2,0570 -3,7532 -6,0485 -7,6902 -11,4792 -13,8206 -18,7083 -17,5940 -14,7869 -11,1633 -14,5944 -17,1033 -19,1934 -21,4437	0,3545 -0,0926 -2,0924 -3,8974 -6,4027 -8,0335 -11,7722 -14,1679 -18,6831 -16,9080 -14,4405 -11,4108 -14,8836 -17,4409 -19,3564 -21,4418	0,5923 -0,0465 -2,0387 -4,0696 -6,6811 -8,1675 -11,8890 -14,0632 -18,7273 -16,8031 -13,8455 -11,3491 -15,0581 -17,6592 -19,5973 -21,4291	0,7812 0,1096 -2,2218 -4,1395 -6,8896 -12,3668 13,9599 -18,8512 -16,3708 -12,9597 -11,5763 -15,3217 -17,8248 -19,4530 -21,5824	0,8618 -0,1066 -2,1748 -4,4095 -7,3132 -8,7346 -12,7204 -14,1183 -18,5000 -16,2611 -12,4350 -11,508 -17,4205 -19,6125 -19,6125 -21,6245
% NYU	CAARS STD for 0,4012 1,5342 2,7993 3,1168 3,2710 3,8200 4,0288 4,3874 4,7751 4,6100 4,1601 4,5218 4,6680 5,6678 5,9887 5,9462 6,4677	Group MISS 0,5889 1,6137 2,9870 3,0941 3,2569 3,6385 3,8953 4,4942 4,6351 4,5019 4,0884 4,627 4,8157 5,6033 5,9102 5,4926 6,7594	0.6184 1.8635 3.0034 3.2663 3.1723 3.7073 4.0858 4.5564 4.5295 4.5366 4.1427 4.6296 4.9641 5.6892 5.8091 5.7064 6.8209	0,7056 2,0083 3,2668 3,2980 3,1830 3,7664 4,4521 4,8639 4,5137 4,1820 4,6343 4,9880 5,7045 5,6711 5,6807 6,8737	0.7544 2.1472 3.4670 3.3456 3.1256 3.7930 3.9639 4.4552 4.9442 4.5632 4.2377 4.6601 5.0379 5.7751 6.6013	1.0606 2.3134 3.3179 3.2214 4.2525 3.7231 4.0238 4.4852 4.7571 4.4888 4.3624 4.6241 5.1599 5.7707 5.5751 5.5844	1.3009 2.3729 3.2493 3.1464 3.2785 3.6350 4.0854 4.7275 4.7278 4.7208 4.7208 4.7208 5.3234 5.8814 5.4883 5.8256	1.2219 2.5198 3.3137 3.1170 3.2743 3.7624 4.3088 4.4259 4.6716 4.4218 4.4656 4.5843 5.3568 5.8578 5.5506 5.9540	1.3457 2.4820 3.3001 3.1120 3.5359 3.8121 4.2471 4.3710 4.5276 4.4035 4.6742 4.6742 4.6742 5.7753 5.4937 5.9427	1.3532 2.6496 3.2423 3.1597 3.5655 3.8957 4.2375 4.4366 4.5211 4.3165 4.6326 5.57444 5.7428 5.5110 6.2716	1, 4695 2,6768 3,2059 3,2278 3,5347 4,3335 4,4973 4,4373 4,4973 4,5320 4,5320 5,5206 5,5208

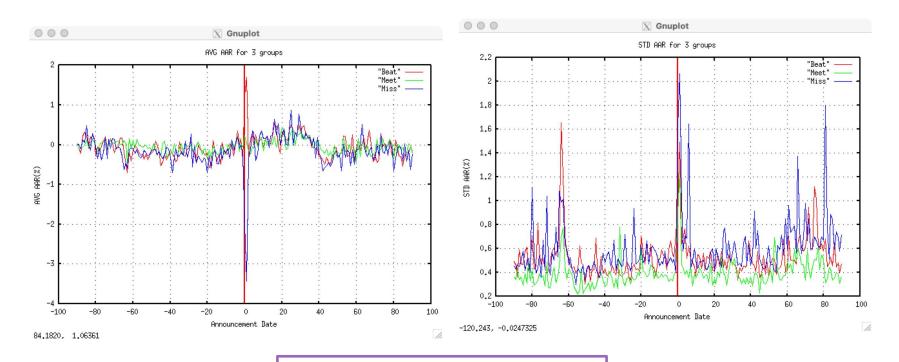


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各グループ (Beat、Meet、Miss) の累積異常リターン (CAAR) の 推移を表示しています。







AARおよびCAARの標準偏差を計算 した結果をグラフで示しています。