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FINANCE 788: Research Essay

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Abstract

Acknowledgements

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Declaration of Contribution

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2.1 History of Asset Pricing Theory

2.1.1 Optimisation Methodologies

Convexity is an important concept in optimisation

2.1.2 Machine Learning in Financial Contexts

A couple of recent publications highlight the increased application of machine learning algorithms in financial contexts. Li, Mai, Shen, and Yan, 2020 Gu et al (2020) explore the comparative use of machine learning in empirical asset pricing.

3 Research Intent

Insert Research Intent

4 Theory

4.1 Return predictability

Return predictability underlies asset pricing theory. **Insert**

4.2 Modelling, loss, and optimisation

We summarize the theory surrounding predictive modelling, loss functions, and optimisation algorithms. These functions train models by comparing predictions to realized observations using optimisation algorithms to minimize the loss function. We examine a linear model as our predictive model (1). Mean square error (2) and Gradient Descent (GD) are basic examples of a loss function and optimisation algorithm, respectively.

$$\hat{y} = mx_i + b \tag{1}$$

$$f(y, (mx_i + b)) = \frac{1}{n}\sum_{i=1}^{n}(y_i - (mx_i + b))^2 \tag{2}$$

Firstly, gradient descent takes the partial derivatives of the loss function, with the respect to the parameters in our predictive model. In our example, equations 3 and 4 are the partial derivatives for the mean square error loss function.

$$\frac{\partial f(y, (mx_i + b)}{\partial m} = \frac{1}{n}\sum_{i=1}^{n} -2x_i(y_i - (mx_i + b))^2 \tag{3}$$

$$\frac{\partial f(y, (mx_i + b)}{\partial b} = \frac{1}{n}\sum_{i=1}^{n} -2(y_i - (mx_i + b))^2 \tag{4}$$

Secondly, the algorithm explores epochs, using a learning rate to update parameters to move in the opposite directions of the partial derivatives until settling in a local minima. This extrema is the optimisation of the loss function, quantifying the accuracy of the predicative model. Ordinary Least Squares (OLS) regressions is an extension of the linear model prevalent in asset pricing.

4.3 Ordinary Least Squares (OLS)

The OLS regression is the most prominent statistical model in asset pricing theory. Rosenfeld n.d. contributes an OLS summary. The composition of the true OLS model includes four components. Firstly, $\mathbf{X}$, an n x k matrix of k independent variables for n observations. Secondly, $\mathbf{y}$, an n x 1 vector

of observation on the dependent variable. Thirdly, ϵ, an n x 1 vector of unexplained error. Lastly, θ, a k x 1 vector of parameters to be estimated.

$$y = X\theta + \epsilon \tag{5}$$

4.3.1 Criteria for estimation

The criteria to obtain the parameter estimate ($\hat{\theta}$) relies on the minimisation of the sum of squared residuals (6). We highlight the observed residuals (e) are distinct from unexplained disturbances (ϵ). Equation 7 derives residuals by taking the difference between observations based on parameter estimates.

$$\sum e_i^2 \tag{6}$$

$$e = y - X\hat{\theta} \tag{7}$$

Expanding the quadratic $e^T e$ after substituting in equation 7 leads to the alternative expression of the sum of squared residuals in equation 8. Minimizing the sum of square residuals requires taking the partial derivative of equation 8 with respect to the estimated parameters (equation) using matrix differentiation (9). It is imperative X has full rank where all vectors in the matrix are linearly independent, validating both the presence of a positive definite matrix and minimum.

$$e^T e = y^T y - 2\hat{\theta}^T X^T y + \hat{\theta}^T X^T \hat{\theta} X \tag{8}$$

$$\frac{\partial e^T e}{\partial \hat{\theta}} = -2X^T y + 2X^T X\hat{\theta} = 0 \tag{9}$$

We find the expression for the Ordinary Least Squares (OLS) estimator (13) after rearranging equation 9 to normal form, utilizing inverse matrices to form identity matrices, and simplifying.

$$2X^T X\hat{\theta} = 2X^T y \tag{10}$$

$$(X^T X)^{-1}(X^T X)\hat{\theta} = (X^T X)^{-1} X^T y \tag{11}$$

$$I\hat{\theta} = (X^T X)^{-1} X^T y \tag{12}$$

$$\hat{\theta} = (X^T X)^{-1}(X^T y) \tag{13}$$

$$\tag{14}$$

Therefore, we can use the OLS estimator to make predictions with OLS (15).

$$\hat{y} = X^T \hat{\theta}$$

4.3.2 Properties of OLS Estimators

There are six key properties in addition to the satisfaction in minimizing the summation of squared residuals.

1. The residuals are uncorrelated with the observed values of X i.e., $X^T e = 0$.
2. The sum of the residuals is zero i.e., $\sum e_i = 0$.
3. The sample mean of the residuals is zero i.e., $\bar{e} = \frac{\sum e_i}{n} = 0$.
4. The regression hyperplane passes through the means of observed values i.e., $\frac{e}{=} \frac{y - X\theta}{n} = 0$. Since $\bar{e} = 0$ assumed, it is implied $\bar{y} = \bar{x}\bar{\theta}$.
5. The residuals are uncorrelated with the predicted y i.e., $\hat{y} = X\hat{\theta}$, $\hat{y}^T e = (X\hat{\beta})^T e = b^T X^T e = 0$
6. The mean of $\hat{y}$ for the sample will equal the mean of the y.

4.3.3 The Gauss-Markov Theorem

However, OLS makes Gauss-Markov assumptions about the true model to make inferences regarding β from $\hat{\beta}$. The intention of the Gauss-Markov Theorem, conditional on the below assumptions, states the

OLS estimator is the best linear, unbiased, and efficient estimator:

$$y = x\beta + \epsilon \tag{15}$$
$$E[\epsilon|X] = 0 \tag{16}$$
$$E(\epsilon\epsilon^T|X) = \Omega = \sigma^2 I \tag{17}$$
$$\epsilon|X \ N[0, \sigma^T I] \text{ (hypothesis testing)} \tag{18}$$

- X is an n x k matrix of full rank
- X must be generated randomly, or fixed, by a mechanism uncorrelated to disturbances.

Equation 16 implies $E(y) = X\beta$ as no observations of the independent variables convey any information about the expected values of the disturbances. Equation 17 captures homoskedasticity and no autocorrelation assumptions. Additionally, The theory underlying Ordinary Least Squares informs the common practice in minimising of the sum of least squares when evaluating prediction performance. The mathematical tractability, in accordance with the aforementioned assumption, frame our thinking surrounding the derivation of custom loss functions.

4.3.4 Weaknesses in OLS: Return Predictability

Include examples on the minimisation of sum of the square errors does not contribute to maximising returns

4.4 Portfolio Formation: Hedge Portfolios

Our formation of hedge portfolios rely on monotonic functions. These functions both preserve or reverse a given ordered set. We rank the cross-sections of portfolio returns using variations in monotonic functions to assign weights and form hedge portfolios.

$$R(y_{i,t}) \tag{19}$$

The ranking function (R($y_{i,t}$)) and thresholds (u,v) form subsets of long and short portfolios.

$$L = \{y_{i,t}|R(y_{i,t}) \geq u\} \tag{20}$$
$$S = \{y_{i,t}|R(y_{i,t}) \leq v\} \tag{21}$$
$$0 < u < 1 \tag{22}$$
$$0 < v < 1 \tag{23}$$
$$u > v \tag{24}$$

These truth sets inform the construction of time-series hedge portfolios. The first set of time-series hedge portfolio equations assumes equal weighting in long and short portfolios through dividing each subset (L,S) by their cardinality.

$$H_t = \frac{1}{|L|}\sum_{i\epsilon L} y_{i,t} - \frac{1}{|S|}\sum_{i\epsilon S} y_{i,t} \tag{25}$$
$$\tag{26}$$

Our aim is to re-configure the loss function to maximise returns. Permutations for ranking functions exist (figure 1).

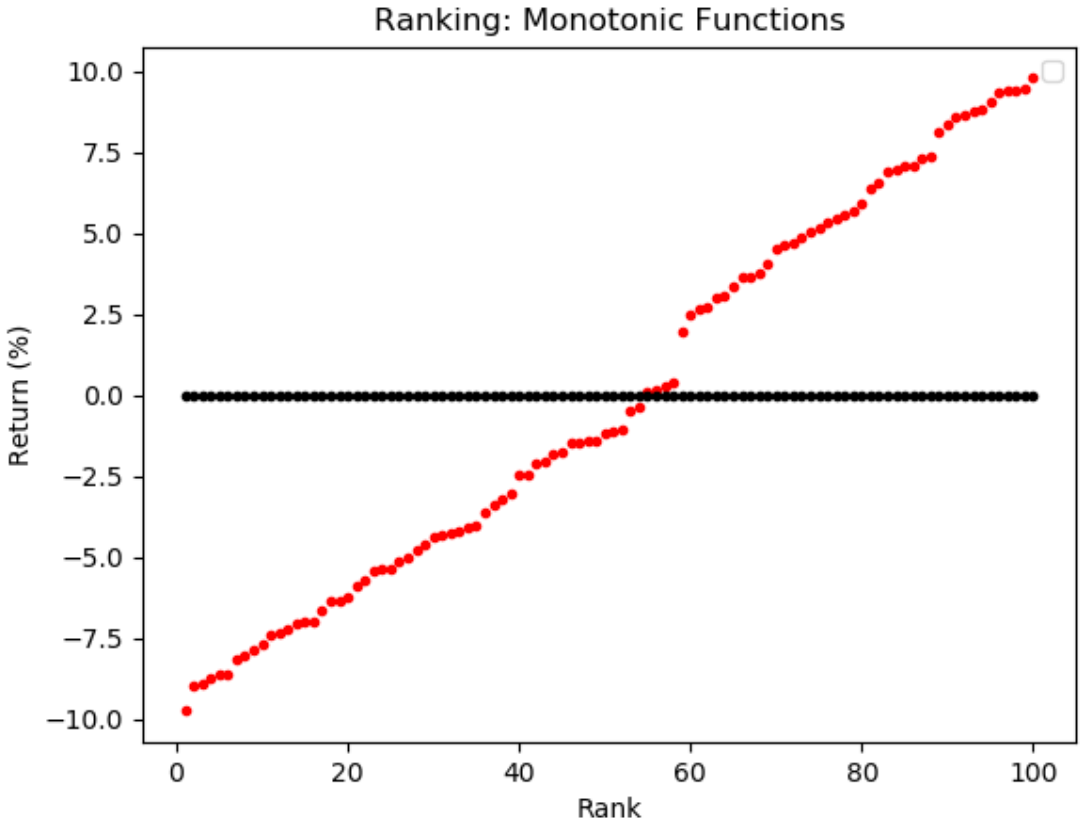

Figure 1: Monotonic ranking functions

First, we explore a ranking function with weights directly proportional to returns (27) to derive the below loss function (30).

$$R(\hat{y}) = W \tag{27}$$

$$W := \frac{\hat{y}}{\vec{1}\hat{y}} \tag{28}$$

$$\hat{y} = X^T\hat{\theta} \tag{29}$$

$$f_{\hat{\theta}}(X) = (\frac{X^T\hat{\theta}}{\vec{1}X^T\hat{\theta}})^\top X^T\hat{\theta} \tag{30}$$

$$\tag{31}$$

Section 4.2 explains the theory on predicative modelling, loss functions and optimisation algorithms. The ability to find partial derivatives (32) and argmax (4.4) inform the practicality of this ranking function.

$$\frac{\partial f_{\hat{\theta}}(X)}{\partial\hat{\theta}} = \frac{\partial((\frac{X^T\hat{\theta}}{\vec{1}X^T\hat{\theta}})^\top X^T\hat{\theta})}{\partial\hat{\theta}} \tag{32}$$

$$\underset{\hat{\theta}}{\text{argmax}} : (\frac{X^T\hat{\theta}}{\vec{1}X^T\hat{\theta}})^\top X^T\hat{\theta} \tag{33}$$

The argmax () requires to use partial derivative with respect to $\hat{\theta}$

$$\frac{\partial(f_{\hat{\theta}}(X))}{\partial\hat{\theta}} = \frac{1}{(\hat{\theta}^\top X\vec{1})} XX^\top\hat{\theta} \tag{34}$$

$$+ \frac{1}{\vec{1}X^\top\hat{\theta}} XX^\top\hat{\theta} \tag{35}$$

$$- \frac{1}{(\hat{\theta}^\top X\vec{1})^2} \hat{\theta}^\top XX^\top\hat{\theta}X\vec{1} \tag{36}$$

Subsequently, this enables the derivation of objective functions ex-post transaction costs.

4.5 Optimisation of Hedge Portfolios

Table 1 provides a simple

Variable	Description	$MSE(y, \hat{y})$	$HP(y, \hat{y})$
θ	Est/Train	$\hat{\theta}_{MSE}$	$\hat{\theta}_{HP}$
λ	Validation	$\hat{\lambda}_{MSE}$	$\hat{\lambda}_{HP}$

Table 1: Objective (MSE: Mean Square Error, HP: Hedge Portfolio)

5 Data

Expand: Dataset implies, use this dataset (Jensen, Kelly, and Pedersen, 2021) Hou et al., (2020) use an extensive data library to assess 452 anomalies across anomalies literature. Their analysis informs which abnormalities drive the cross section of expected returns. Most abnormalities fail under current standards of empirical finance when using a single hurdle test of absolute t-stat greater or equal to 1.96. Firstly, the paper finds economic fundamentals take precedence over trading frictions in explanatory power, statistical and economic significance. Secondly, micro-caps account for anomalies disproportionately, leading to NYSE breakpoints, value-weighted returns in both portfolio sorts and cross-sectional regressions with weighted least squares. Lastly, arguments in improving anomalies literature credibility follow a closer alignment to economic theory as the field persists to be statistical in nature. Overall, capital market efficiency is higher than expected. Jensen et al., 2021 use the above dataset to explore hierarchial bayesian models of alphas emphasising the joint behaviours of factors, and provide an alternative multiple testing adjustment, more powerful than common methods. Jensen et al., adapt the global dataset to focus only on one-month holding periods for all factors, only include most recent accounting data (quarterly or annually) and add 15 new factors. The exhaustive nature and accessibility of the global dataset makes it well-suited for exploring optimisation functions in neural-network construction.

5.1 Summary Statistics

6 Methodology

Adapt for the context of this research essay

6.1 Project organisation

GOCPI adopted Data Science best practice, as described by Wilson et al Wilson et al., 2016. Although these practices are mostly reserved for data science projects, their principles are suitable for product development and version control. All data and results were saved regularly and reproducible. The retention of data in all forms received high levels of attention. Project files were synched continuously to Google Drive Google LLC, 2020. Git Linus Torvalds, 2020 was used to manage version control for GOCPI's source code, data, documentation and results. Git stores a complete history of versions using Git hashes. These hashes are strings unique to each state of the publicly available GOCPI repository[1]. Git hashes enabled the discretisation of GOCPI's development over time, enabling the accessibility and recollection of all previous states given a unique git hash. This functionality enabled reproducibility, error correction and the ability to revert to previous models.

6.1.1 Version Control

Git, hosted by GitHub, provided a comprehensive set of version control technologies. These technologies provided a range of benefits. Firstly, Git is excellent at providing and supporting collaborative functionalities. The master version of a project is accessible for all who have access to the repository. Each contributor could create custom copies of branches through pull requests on the master branch. Contributors could commit changes to custom branches and push these changes to the master branch through push requests. The product manager could review these push requests, approving suitable requests to integrate changes to the master branch. Collaborative efforts were possible with commit messages describing the contributions from each contributor. This project had one contributor. Git ensured the histories of code, work and authors are stored. The descriptive nature of the commit log ensured an accurate journal is kept.

6.1.2 Folder Structure

GOCPI maintained the file folder structure recommended in Wilson et al Wilson et al., 2016. Project organisation was paramount as the modelling of energy systems involves integrating a range of optimisation models, data files and documents. Wilson et al's recommendations were appropriate as data science projects require similar organisational rigor. Subsequently, file management and structure was

[1] https://github.com/CMCD1996/GOCPI

most efficient and comprehensive. **GOCPI** is the root directory of this project and contains several sub directories: bin, data, doc, src and results. The **bin** sub directory contained external scripts and compiled programmes related to the GOCPI project. The **data** sub directory contained all raw data associated with the project. This data included energy statistics, energy balance datasets, partitioned geographies, standardised optimisation models and TIMES modelling frameworks. The **doc** sub directory stored GOCPI's user guides, academic resources, research reports and project deliverables. The **results** sub directory contained the output from optimisation simulations and processed data to display on dashboards and websites to inform investment and policy decisions. The **src** sub directory stores the source code for preparing raw data, partitioning sets of geographies with varying granularities and the GOCPI python package available to download using PyPI[2] and install using pip[3]. All files were continuously backed up using Google Drive.

6.1.3 Python

Python 3.7 was the primary coding language for the GOCPI project. GOCPI's objective is to enable any user to design and model their own energy system to inform investment and policy decisions. The intention is to empower users to discuss energy investment and policy decisions made by public and private parties. Additionally, GOCPI intends to reduce misinformation regarding energy policies and help assess the feasibility of meeting the International Energy Agency's Sustainable Development Scenario Agency, 2019. Python is omnipresent, widespread in software development. Python's language design makes the language highly productive and simple to use. Python can hand off computationally straining tasks to C/C++ and has first-class integration capabilities with these two languages. The language also has a very active and supportive community Medium, n.d. In addition, Python is the most popular coding language on the planet defined by the PYPL PopularitY of Programming Language Index. As at August 2020, Python had 31.59% of all language tutorial search instances on Google PYPL, n.d. Python has many useful packages for creating the GOCPI package such as NumPy, Scikit-learn, os, csv and Pandas. Programming is quick due to Python's dynamic nature. The language is also open-source with no cost. Subsequently, Python was the best language to ensure the GOCPI model is accessible for many users to use and extend.

6.1.4 Package Management

The Anaconda package management platform for Python Anaconda, Inc., 2020 was the chosen coding environment. Anaconda is a well defined, free platform with known versions of python packages such as matplotlib, numpy and pip. The use of this environment ensured both reproducibility and consistency across infrastructure. Although this project required no collaboration, the use of Anaconda will inform future developers on how to manage collaborative processes, especially for packages which are less well-maintained. Anaconda allows you to create custom environments which was necessary for creating scalable linear optimization problems to express energy systems. Pip is Python's default package manager and is included in the Anaconda package. Pip was used to install and update packages for python not available on Anaconda such as twine and the custom GOCPI package developed for this project.

6.1.5 Excel

It is important users are comfortable with using the GOCPI model. Energy modelling can be quite complex. The modelling process must be transparent to inform users how to build their own models. Excel is ubiquitous across academic and professional communities. Excel's omnipotence makes the software well-suited for describing the components of the GNU Mathprog energy system model. The **GOCPI OseMOSYS Structure.xlsx** file describes the sets, paramaters, constraints and objective function of a scalable energy system model. The User may toggle statement sets, parameters and constraints to adjust the complexity of the model. The model file was imported to a text file. However, data related to these energy systems was stored using Python dictionaries, lists and NumPy arrays. This Python formulation was later transcribed to a text file. Excel is best for two dimensional variables or data stored in Codd-Boyce relational databases Arenas, 2009. The majority of parameters in energy systems were three or more dimensions. Therefore, Excel was not suitable to store these parameters. Python dictionaries, lists and NumPy arrays were preferred alternatives.

[2] https://pypi.org/
[3] https://pypi.org/project/pip/

6.1.6 IBM ILOG CPLEX Optimization

The OseMOSYS methodology (see **??**) translates energy systems into linear programming problems. A solver was required to optimise these user-defined energy systems. The IBM ILOG Optimization Studio International Business Machines Corporation, 2020, more commonly known as CPLEX, was chosen to be this solver. CPLEX solves very large linear programming problems using the Barrier Interior-point method Potra and Wright, 2000 or primal/dual variants of the Simplex Method Bronson and Costa, 2009. GOCPI's user-defined energy systems could be scaled up to model very large systems, creating large linear programming problems.

The IBM ILOG CPLEX Optimization Studio has an interface with the Python language based on a C programming interface. Subsequently, Python APIs were available to run the CPLEX solver when installed either locally or on a cloud service. The python packages are **cplex** and **docplex**. The cplex package contains classes for accessing CPLEX for the Python programming language. The Cplex class is the most important class in this package as provides methods for creating, modifying, querying, or solving optimisation problems. Docplex also enables the formulation of new linear programmes where one creates the model, defines the decision variables, sets the constraints and expresses the objective function. The user uses docplex to solve the linear programme on a local solver. Alternatively, the model can be solved on a private cloud using Decision Optimisation on Cloud service through the provision of a service url and personal API key. The CPLEX Python APIs were most attractive as provided the user with a powerful commercial solver in an accessible format.

There is a caveat to the use of the CPLEX solver. The IBM ILOG CPLEX Optimization Studio is commercial by nature and requires a license to use. Fortunately IBM have the IBM Academic Initiative IBM, n.d.-a, granting students access to commercial software for free. This commercial nature creates accessibility issues for users who are not enrolled at an academic institution or can afford to pay for the software. Accessibility issues caused by the need for commercial solvers must be addressed to enable the distribution of the GOCPI product.

6.1.7 IBM Watson Machine Learning Service

The IBM CPLEX Optimisation Cplex python API is suitable for smaller models that can be solved locally. As the model increases in complexity, the docplex Python API did enable the ability to solve larger linear programmes. Unfortunately, IBM phased out the docplex Python API by incorporating the Decision Optimisation on Cloud services into the IBM Watson Machine Learning cloud services IBM, n.d.-b. This change occurred during September 2020. This service uses IBM Cloud to access assets through credentials, create model deployments in IBM's servers and execute jobs to solve models. The model deployments must be Python-based models with jobs specifying a payloads containing input data and output formats.

6.1.8 PyPI

PyPI[1] is the Python Package Index, a repository of software for the python programming language. This repository helps you find and install software developed by the Python community who have decided to share their work. The GOCPI package is distributed from this platform to enable as many as possible the ability to model their own energy systems to inform and question energy policy and investment. Enter command: **pip install GOCPI** in the terminal to install the package using pip package management software.

6.1.9 Code Style

The GOCPI project was developed as the GOCPI package. All development code is organised within this package. The PEP8 style for Python Code was the formatting style for development code Guido Van Rossum and Coghlan, 2001. All code was formatted with **yapf**, a formatter maintained by Google to format Python files. Standardised formatting is important as makes the code easy to read, helps optimise the code and promotes consistency. Docstrings and commenting were most important in documentation. A docstring is a Python inline comment. Each class and function has an unique docstring, a one sentence description of the function, inputs with data types and types of outputs. The Google style docstring was most appropriate because of it's readability, ease to write and consistency with the Google Style Guide.

[1] https://pypi.org/

Additionally, automated documentation generators (**pdoc3, Sphinx** etc.) can parse this format to create documentation. This self-consistent code style facilitated best practice maintenance and enabled reproducibility.

6.1.10 Infrastructure

GOCPI creates scalable energy system optimisation models with complexity size dependent. Computations either took place locally on a 128 GB, four core Apple MacBook Pro or remotely using a cloud service.

6.2 Documentation

The GOCPI project is well documented to keep an accurate record of key design decisions. The commit history described in 6.1.1 was the most important form of document. Other explicit documentation methods were applied to supplement this commit history. These methods, in addition to in-code documentation, include project updates and meeting minutes nested within a project logbook.

6.2.1 Project updates

Project updates were recorded as itemized lists. Each item is a brief description of the work completed during that day, week or month. Items include, but are not limited to, completing GOCPI submodules, researching energy system statistics, building websites or writing sections of this research report. These updates were pivotal to exploring new options, monitoring progress and making decisions to drive forward development. For example, the decision to adopt the OseMOSYS methodology in favour of the TIMES modelling methodology. Project updates were transcribed to the project logbook held in this project's research compendium.

6.2.2 Meeting minutes

Project meetings took place for half an hour once a week. These meetings included discussions on energy markets, modelling methodologies, project progress and key design decisions. The minutes from these meetings accompanies project updates in the project logbook nested within the research compendium.

7 Results

8 Discussion

9 Conclusion

10 Appendix

10.1 Tables and Charts

	count	mean	std	min	25%	50%	75%	max
Unnamed: 0	100000.0	4.999950e+04	2.886766e+04	0.000000	2.499975e+04	4.999950e+04	7.499925e+04	9.999900e+04
permno	100000.0	1.048988e+04	2.887334e+02	10000.000000	1.023900e+04	1.048100e+04	1.075100e+04	1.099800e+04
permco	100000.0	1.026687e+04	5.756027e+03	13.000000	8.179000e+03	8.473000e+03	8.786000e+03	5.345600e+04
crsp_shrcd	100000.0	1.086098e+01	3.614896e-01	10.000000	1.100000e+01	1.100000e+01	1.100000e+01	1.200000e+01
crsp_exchcd	100000.0	2.506350e+00	8.401826e-01	1.000000	2.000000e+00	3.000000e+00	3.000000e+00	3.000000e+00
sic	99587.0	4.933514e+03	1.790397e+03	100.000000	3.541000e+03	4.955000e+03	6.324000e+03	9.997000e+03
ff49	99337.0	3.189945e+01	1.438264e+01	1.000000	1.800000e+01	3.600000e+01	4.500000e+01	4.900000e+01
adjfct	100000.0	2.378531e+00	1.061822e+01	0.003333	1.000000e+00	1.000000e+00	1.500000e+00	3.240000e+02
shares	100000.0	7.500610e+01	5.179662e+02	0.236000	3.474000e+00	7.747000e+00	2.186800e+01	1.088022e+04
me	100000.0	2.769919e+03	2.851385e+04	1.198969	2.649544e+01	8.089058e+01	3.639356e+02	1.706733e+06
me_company	100000.0	2.786556e+03	2.859709e+04	1.198969	2.659784e+01	8.102900e+01	3.683085e+02	1.706733e+06
prc	100000.0	2.075825e+01	3.837571e+01	0.046875	6.430000e+00	1.325000e+01	2.450000e+01	1.208800e+03
prc_local	100000.0	2.075825e+01	3.837571e+01	0.046875	6.430000e+00	1.325000e+01	2.450000e+01	1.208800e+03
dolvol	98694.0	2.924115e+08	2.828201e+09	0.000000	4.550000e+05	2.514414e+06	1.894224e+07	2.539520e+11
ret	99317.0	1.616719e-02	1.636523e-01	-1.000000	-5.769231e-02	0.000000e+00	7.178751e-02	6.000000e+00
ret_local	99317.0	1.616719e-02	1.636523e-01	-1.000000	-5.769231e-02	0.000000e+00	7.178751e-02	6.000000e+00
ret_exc	99317.0	1.224024e-02	1.637368e-01	-1.006810	-6.171986e-02	-2.286000e-03	6.824456e-02	5.996506e+00
ret_lag_dif	100000.0	1.000000e+00	0.000000e+00	1.000000	1.000000e+00	1.000000e+00	1.000000e+00	1.000000e+00
ret_exc_lead1m	99804.0	5.166515e-03	1.547285e-01	-1.006810	-6.513292e-02	-3.366000e-03	6.428314e-02	5.556758e+00
market_equity_rank_x	100000.0	5.523121e+01	2.424970e+01	1.000000	3.500000e+01	5.300000e+01	7.500000e+01	9.950000e+01
enterprise_value_rank_x	83158.0	5.515533e+01	2.555834e+01	1.000000	3.400000e+01	5.400000e+01	7.700000e+01	9.950000e+01
book_equity_rank_x	82123.0	5.437743e+01	2.705865e+01	1.000000	3.300000e+01	5.300000e+01	7.800000e+01	9.950000e+01
assets_rank_x	84556.0	5.565904e+01	2.753505e+01	1.000000	3.200000e+01	5.700000e+01	8.100000e+01	9.950000e+01
sales_rank_x	83650.0	5.447612e+01	2.711683e+01	1.000000	3.300000e+01	5.400000e+01	7.800000e+01	9.950000e+01
net_income_rank_x	84299.0	5.497000e+01	2.791229e+01	1.000000	3.500000e+01	5.700000e+01	7.700000e+01	9.950000e+01
bidask_x	100000.0	1.671600e-01	3.731205e-01	0.000000	0.000000e+00	0.000000e+00	0.000000e+00	1.000000e+00
prc_high_x	81488.0	2.296097e+01	2.491060e+01	0.281250	8.500000e+00	1.600000e+01	2.900000e+01	4.617600e+02
prc_low_x	82252.0	2.005462e+01	2.231967e+01	0.125000	7.000000e+00	1.375000e+01	2.537500e+01	4.175300e+02
tvol_x	98694.0	5.526569e+06	2.716632e+07	0.000000	5.475000e+04	2.354500e+05	1.192538e+06	6.485186e+08
div1m_me_x	99301.0	1.141127e-03	3.373808e-03	0.000000	0.000000e+00	0.000000e+00	0.000000e+00	9.013069e-02
div3m_me_x	99304.0	3.455602e-03	5.471153e-03	0.000000	0.000000e+00	0.000000e+00	6.153847e-03	1.164144e-01
div6m_me_x	97406.0	7.102777e-03	1.075952e-02	0.000000	0.000000e+00	0.000000e+00	1.249471e-02	1.350614e-01

div12m_me_x	93771.0	1.479920e-02	2.206019e-02	0.000000	0.000000e+00	0.000000e+00	2.555536e-02	2.853118e-01
chcsho_1m_x	99362.0	3.212910e-03	2.676977e-02	-0.116815	0.000000e+00	0.000000e+00	0.000000e+00	6.996410e-01
chcsho_3m_x	98093.0	1.231348e-02	6.122738e-02	-0.139411	0.000000e+00	0.000000e+00	3.277829e-03	1.238208e+00
chcsho_6m_x	96210.0	2.751299e-02	1.126550e-01	-0.176346	0.000000e+00	9.251229e-04	1.032486e-02	2.803931e+00
chcsho_12m_x	92666.0	6.148052e-02	2.132606e-01	-0.263229	0.000000e+00	4.452926e-03	3.278419e-02	4.162894e+00
eqnpo_1m_x	99300.0	-1.599063e-03	2.398460e-02	-0.530417	-2.953366e-09	0.000000e+00	3.239383e-09	1.263216e-01
eqnpo_3m_x	97944.0	-6.543032e-03	5.216505e-02	-0.805667	-1.875397e-03	1.963876e-09	7.120885e-03	1.682730e-01
eqnpo_6m_x	95942.0	-1.386052e-02	8.761607e-02	-1.336026	-7.228694e-03	2.267332e-09	1.492514e-02	2.787605e-01
eqnpo_12m_x	92243.0	-2.812979e-02	1.463166e-01	-1.641488	-2.469933e-02	3.605147e-10	3.115955e-02	4.742966e-01
ret_1_0_x	89880.0	1.469405e-02	1.481324e-01	-0.702586	-6.186453e-02	7.633630e-03	7.662956e-02	2.176471e+00
ret_2_0_x	89196.0	2.926343e-02	2.110165e-01	-0.784206	-8.078757e-02	1.340826e-02	1.154936e-01	3.342466e+00
ret_3_0_x	88594.0	4.348828e-02	2.619169e-01	-0.874142	-9.540903e-02	2.097522e-02	1.498982e-01	5.000000e+00
ret_3_1_x	88575.0	2.853413e-02	2.094853e-01	-0.812500	-8.100121e-02	1.304348e-02	1.153619e-01	3.342466e+00
ret_6_0_x	86806.0	8.693332e-02	3.876104e-01	-0.911980	-1.268082e-01	4.294117e-02	2.324574e-01	8.555556e+00
ret_6_1_x	86754.0	7.169911e-02	3.479608e-01	-0.917098	-1.180619e-01	3.498405e-02	2.051282e-01	8.411765e+00
ret_9_0_x	85134.0	1.287106e-01	4.928214e-01	-0.967262	-1.497804e-01	6.174438e-02	3.046733e-01	9.857143e+00
ret_9_1_x	85025.0	1.137905e-01	4.565818e-01	-0.945833	-1.431280e-01	5.555556e-02	2.798518e-01	9.273728e+00
ret_12_0_x	83458.0	1.749940e-01	6.032653e-01	-0.960000	-1.656086e-01	7.954546e-02	3.732819e-01	1.301592e+01
ret_12_1_x	83348.0	1.574835e-01	5.624462e-01	-0.972763	-1.604938e-01	7.229982e-02	3.477658e-01	1.223077e+01
ret_12_7_x	83314.0	6.937836e-02	3.404595e-01	-0.875000	-1.173493e-01	3.287172e-02	2.000000e-01	8.509434e+00
ret_18_1_x	80200.0	2.556601e-01	7.712462e-01	-0.970071	-1.824084e-01	1.150380e-01	4.910667e-01	2.048485e+01
ret_24_1_x	77210.0	3.561783e-01	9.326939e-01	-0.964844	-1.860465e-01	1.636364e-01	6.200000e-01	1.484615e+01
ret_24_12_x	77107.0	1.716182e-01	5.903369e-01	-0.952381	-1.594150e-01	7.673844e-02	3.601719e-01	1.345161e+01
ret_36_1_x	71757.0	5.782320e-01	1.299369e+00	-0.984514	-1.761381e-01	2.776960e-01	8.842902e-01	1.914000e+01
ret_36_12_x	71493.0	3.769656e-01	9.657810e-01	-0.962121	-1.750000e-01	1.731688e-01	6.308270e-01	1.508065e+01
ret_48_12_x	66152.0	5.972792e-01	1.313366e+00	-0.983600	-1.560323e-01	2.927964e-01	8.965517e-01	1.811811e+01
ret_48_1_x	66379.0	8.118091e-01	1.618954e+00	-0.991708	-1.384253e-01	4.097705e-01	1.182080e+00	1.641714e+01
ret_60_1_x	61417.0	1.094750e+00	2.041543e+00	-0.995389	-6.468322e-02	5.770103e-01	1.500000e+00	2.754724e+01
ret_60_12_x	61101.0	8.308102e-01	1.638511e+00	-0.993829	-1.125176e-01	4.304058e-01	1.185482e+00	1.791406e+01
ret_60_36_x	60690.0	3.719123e-01	9.320425e-01	-0.957597	-1.604938e-01	1.803905e-01	6.216216e-01	1.645517e+01
seas_1_1an_x	87816.0	1.410007e-02	1.435859e-01	-0.670455	-6.122449e-02	7.142857e-03	7.549050e-02	1.823529e+00
seas_1_1na_x	59424.0	1.527346e-02	4.271727e-02	-0.215256	-7.413571e-03	1.271693e-02	3.474624e-02	3.871171e-01
seas_2_5an_x	56641.0	1.519025e-02	7.040538e-02	-0.293678	-2.370873e-02	1.104103e-02	4.825217e-02	6.337087e-01
at_gr1_x	79717.0	2.340090e-01	6.237099e-01	-0.682279	4.476727e-03	8.921103e-02	2.391071e-01	1.032567e+01
ca_gr1_x	68947.0	2.849555e-01	9.986195e-01	-0.821969	-4.250543e-02	9.021184e-02	2.847380e-01	1.567901e+01
nca_gr1_x	68931.0	3.417156e-01	1.099975e+00	-0.795148	-2.000294e-02	8.607418e-02	2.985666e-01	2.841418e+01
lt_gr1_x	79185.0	2.939437e-01	9.534352e-01	-0.802141	-3.323645e-02	8.336500e-02	2.805315e-01	1.384379e+01

cl_gr1_x	69011.0	2.962150e-01	9.203348e-01	-0.849398	-7.455677e-02	1.039493e-01	3.647487e-01	1.258459e+01
ncl_gr1_x	64456.0	1.020352e+00	5.140075e+00	-1.000000	-1.234226e-01	2.977931e-02	3.278159e-01	1.000349e+02
be_gr1_x	76414.0	3.229573e-01	1.169552e+00	-0.916605	9.176165e-03	9.628670e-02	2.341683e-01	2.281264e+01
debt_gr1_x	70167.0	7.568517e-01	4.078033e+00	-1.000000	-1.544372e-01	1.505383e-02	3.400684e-01	1.028462e+02
sale_gr1_x	78017.0	2.150658e-01	6.419372e-01	-0.916926	6.138170e-04	1.028502e-01	2.500313e-01	1.370567e+01
cogs_gr1_x	77838.0	2.007377e-01	5.683719e-01	-0.959409	-1.055398e-02	1.028721e-01	2.650250e-01	9.100222e+00
sga_gr1_x	64077.0	1.752823e-01	3.541695e-01	-0.619202	1.661077e-02	1.017764e-01	2.356600e-01	6.424410e+00
opex_gr1_x	77979.0	1.822789e-01	4.163107e-01	-0.766837	4.384702e-03	1.054838e-01	2.501507e-01	7.187355e+00
capx_gr1_x	68877.0	6.869989e-01	2.476468e+00	-1.336969	-2.551566e-01	1.093750e-01	6.662180e-01	3.425000e+01
inv_gr1_x	64936.0	2.967757e-01	1.134464e+00	-1.000000	-9.695228e-02	7.954545e-02	3.245350e-01	1.698084e+01
at_gr3_x	68888.0	7.703188e-01	1.636661e+00	-0.879679	8.189505e-02	3.294655e-01	8.300190e-01	2.153401e+01
ca_gr3_x	59990.0	8.228253e-01	2.119427e+00	-0.909899	1.107900e-02	3.049346e-01	8.473189e-01	3.133333e+01
nca_gr3_x	59997.0	1.289564e+00	4.052545e+00	-0.925747	3.869653e-02	3.478378e-01	1.052338e+00	1.752574e+02
lt_gr3_x	68299.0	1.031757e+00	2.895572e+00	-0.893593	3.261397e-02	3.369091e-01	9.355124e-01	4.643665e+01
cl_gr3_x	59905.0	9.406877e-01	2.564040e+00	-0.919418	-7.453152e-03	3.546168e-01	9.877497e-01	3.934854e+01
ncl_gr3_x	55807.0	4.049907e+00	1.924271e+01	-1.000000	-1.549412e-01	2.622823e-01	1.301106e+00	5.736961e+02
be_gr3_x	65580.0	9.686404e-01	2.750482e+00	-0.927249	6.973478e-02	3.140574e-01	8.430556e-01	6.185919e+01
debt_gr3_x	60299.0	3.042406e+00	1.514340e+01	-1.000000	-2.407629e-01	2.125217e-01	1.182724e+00	4.269775e+02
sale_gr3_x	67321.0	8.305787e-01	2.444764e+00	-0.993046	6.950777e-02	3.284109e-01	7.885896e-01	5.854740e+01
cogs_gr3_x	66844.0	7.254693e-01	1.799863e+00	-0.975038	4.049441e-02	3.284997e-01	8.118149e-01	2.624880e+01
sga_gr3_x	54237.0	6.196393e-01	1.101842e+00	-0.820593	1.060271e-01	3.421648e-01	7.491501e-01	1.877127e+01
opex_gr3_x	66963.0	6.635705e-01	1.401121e+00	-0.897948	7.536986e-02	3.378616e-01	7.728895e-01	1.909844e+01
capx_gr3_x	59309.0	1.762974e+00	6.205317e+00	-1.208835	-2.642717e-01	3.108488e-01	1.366906e+00	1.076800e+02
cash_gr1a_x	78604.0	1.135718e-02	1.375410e-01	-1.128632	-1.659912e-02	2.359835e-03	3.347940e-02	8.302618e-01
inv_gr1a_x	77556.0	1.217829e-02	5.766522e-02	-0.372305	-1.600734e-03	7.202984e-04	2.453485e-02	2.926627e-01
rec_gr1a_x	77779.0	2.543997e-02	7.279079e-02	-0.418567	-3.799109e-03	1.516738e-02	4.976370e-02	3.340411e-01
ppeg_gr1a_x	68712.0	4.788804e-02	9.573047e-02	-0.729515	8.773603e-03	3.485520e-02	7.680075e-02	5.541908e-01
lti_gr1a_x	73504.0	7.220756e-03	4.863868e-02	-0.496427	0.000000e+00	0.000000e+00	2.234346e-03	3.477723e-01
intan_gr1a_x	67340.0	1.029751e-02	5.742975e-02	-0.761039	-5.794232e-04	0.000000e+00	1.290345e-03	5.224851e-01
debtst_gr1a_x	78277.0	3.565424e-03	7.122081e-02	-0.523627	-5.512812e-03	0.000000e+00	1.347066e-02	4.847275e-01
ap_gr1a_x	75016.0	1.658727e-02	5.520648e-02	-0.275446	-5.126836e-03	7.247856e-03	3.049047e-02	2.944580e-01
txp_gr1a_x	65151.0	8.105253e-04	1.100964e-02	-0.068761	-7.179940e-04	0.000000e+00	1.804448e-03	7.415345e-02
debtlt_gr1a_x	78853.0	1.703068e-02	1.017839e-01	-0.608519	-1.123095e-02	0.000000e+00	3.326809e-02	5.760254e-01
txditc_gr1a_x	67398.0	1.984519e-03	1.132667e-02	-0.090702	0.000000e+00	0.000000e+00	3.895058e-03	8.328985e-02
coa_gr1a_x	68645.0	3.759837e-02	1.161911e-01	-0.790830	-6.164059e-03	2.538175e-02	7.969422e-02	4.923150e-01
col_gr1a_x	69016.0	1.969095e-02	7.047457e-02	-0.470555	-7.172744e-03	1.358034e-02	4.410158e-02	3.834478e-01
cowc_gr1a_x	67837.0	1.791927e-02	9.896435e-02	-0.605159	-1.876779e-02	1.246806e-02	5.558615e-02	4.185010e-01

ncoa_gr1a_x	68947.0	4.753768e-02	1.315620e-01	-1.261411	-6.706370e-03	2.793829e-02	8.686355e-02	7.493556e-01
ncol_gr1a_x	68383.0	6.431273e-03	3.271964e-02	-0.360464	-9.663496e-04	6.525698e-04	1.052875e-02	3.337533e-01
nncoa_gr1a_x	67506.0	3.989812e-02	1.330547e-01	-1.232367	-1.086804e-02	2.360237e-02	7.839400e-02	6.860888e-01
oa_gr1a_x	68645.0	8.497779e-02	2.036658e-01	-1.547159	-5.319661e-03	6.883358e-02	1.712985e-01	8.015212e-01
ol_gr1a_x	68383.0	2.637089e-02	8.431216e-02	-0.574381	-5.649730e-03	2.023225e-02	5.580244e-02	5.422407e-01
fna_gr1a_x	83531.0	5.850670e-03	5.818615e-02	-0.584246	0.000000e+00	0.000000e+00	0.000000e+00	6.895915e-01
fnl_gr1a_x	79044.0	2.087692e-02	1.273948e-01	-0.869471	-1.671030e-02	0.000000e+00	5.263158e-02	9.213636e-01
nfna_gr1a_x	79044.0	-1.476261e-02	1.473476e-01	-1.053214	-5.615308e-02	0.000000e+00	2.727055e-02	9.020642e-01
gp_gr1a_x	77982.0	3.866234e-02	1.236833e-01	-0.745759	-3.193912e-03	1.961027e-02	7.562234e-02	1.122939e+00
ebitda_gr1a_x	78132.0	9.893444e-03	9.809898e-02	-0.737330	-1.159388e-02	8.472428e-03	4.009246e-02	1.186792e+00
ebit_gr1a_x	78113.0	5.169471e-03	9.696567e-02	-0.834222	-1.480965e-02	5.912272e-03	3.394289e-02	8.838689e-01
ope_gr1a_x	65573.0	1.011649e-02	1.036873e-01	-0.722895	-1.745909e-02	1.196690e-02	4.370402e-02	1.179166e+00
ni_gr1a_x	78871.0	8.268237e-04	1.214660e-01	-1.688863	-1.414863e-02	3.230521e-03	2.481572e-02	1.146474e+00
nix_gr1a_x	78871.0	9.680542e-04	1.323251e-01	-1.854896	-1.641065e-02	3.075140e-03	2.596931e-02	1.175522e+00
dp_gr1a_x	75959.0	4.429358e-03	1.326722e-02	-0.132077	-2.364490e-05	2.403962e-03	8.104667e-03	1.919576e-01
fincf_gr1a_x	65320.0	1.275394e-02	2.625873e-01	-1.756601	-5.917252e-02	2.667307e-03	8.008256e-02	1.485072e+00
ocf_gr1a_x	77023.0	-1.386009e-03	1.592057e-01	-0.985635	-4.469304e-02	2.010443e-03	4.770744e-02	1.151193e+00
fcf_gr1a_x	69491.0	-8.766654e-03	1.894055e-01	-1.119445	-6.649983e-02	-8.450264e-04	5.686808e-02	1.202901e+00
nwc_gr1a_x	68139.0	2.678592e-02	1.841561e-01	-1.338601	-2.918488e-02	1.851852e-02	8.239146e-02	8.712542e-01
eqnetis_gr1a_x	65430.0	9.671970e-03	2.131677e-01	-1.591969	-1.142824e-02	0.000000e+00	1.593471e-02	1.207629e+00
dltnetis_gr1a_x	77415.0	-3.375011e-03	1.291037e-01	-0.787435	-2.300374e-02	0.000000e+00	1.893497e-02	7.003337e-01
dstnetis_gr1a_x	75808.0	2.495908e-04	1.069491e-01	-0.806337	-1.192910e-02	0.000000e+00	1.996083e-02	7.197279e-01
dbnetis_gr1a_x	77452.0	-3.235691e-03	1.759903e-01	-1.026894	-4.054027e-02	0.000000e+00	4.235530e-02	1.017915e+00
netis_gr1a_x	65429.0	4.876631e-03	2.851635e-01	-1.836024	-6.502422e-02	1.123007e-03	7.699574e-02	1.539881e+00
eqnpo_gr1a_x	65430.0	-9.129002e-03	2.167009e-01	-1.182054	-1.697817e-02	0.000000e+00	1.371429e-02	1.591969e+00
tax_gr1a_x	78222.0	2.549608e-03	2.769618e-02	-0.215707	-4.079819e-03	7.975302e-04	1.060251e-02	1.883751e-01
eqbb_gr1a_x	60903.0	1.547406e-03	3.389438e-02	-0.380617	0.000000e+00	0.000000e+00	4.022115e-04	2.808763e-01
eqis_gr1a_x	62991.0	1.067099e-02	2.124967e-01	-1.584441	-2.624568e-03	0.000000e+00	6.636662e-03	1.207629e+00
div_gr1a_x	77971.0	7.471557e-04	9.042162e-03	-0.218255	0.000000e+00	0.000000e+00	6.030800e-04	2.030233e-01
eqpo_gr1a_x	60903.0	2.427553e-03	4.216114e-02	-0.461986	-1.137891e-04	0.000000e+00	3.646585e-03	3.901357e-01
capx_gr1a_x	69614.0	6.759772e-03	5.689882e-02	-0.417812	-8.421897e-03	2.170374e-03	1.959634e-02	3.895335e-01
be_gr1a_x	76414.0	4.664042e-02	1.700975e-01	-1.543012	2.124536e-03	3.243210e-02	9.160714e-02	8.468710e-01
cash_gr3a_x	67841.0	2.272632e-02	1.845090e-01	-2.461024	-1.487601e-02	8.141066e-03	6.231487e-02	7.963663e-01
inv_gr3a_x	66702.0	2.669011e-02	9.353412e-02	-0.687334	-2.638247e-04	6.147909e-03	5.502052e-02	4.114685e-01
rec_gr3a_x	67104.0	5.819278e-02	1.204527e-01	-0.779534	3.438571e-03	3.961086e-02	1.080324e-01	4.875428e-01
ppeg_gr3a_x	59478.0	1.143134e-01	1.812052e-01	-1.655304	2.919725e-02	1.007662e-01	1.924517e-01	8.332787e-01
lti_gr3a_x	61945.0	1.707528e-02	8.515605e-02	-0.656623	0.000000e+00	0.000000e+00	1.275369e-02	4.683121e-01

intan_gr3a_x	56225.0	2.469689e-02	1.024489e-01	-1.793814	-5.099699e-05	0.000000e+00	2.023025e-02	6.632143e-01
debtst_gr3a_x	67457.0	7.858057e-03	9.203482e-02	-0.831497	-7.007479e-03	1.451193e-04	2.613803e-02	5.513702e-01
ap_gr3a_x	63589.0	3.990997e-02	9.499532e-02	-0.497308	-6.118856e-04	1.878518e-02	5.864005e-02	4.738813e-01
txp_gr3a_x	55529.0	1.489925e-03	1.340925e-02	-0.076289	-1.064963e-03	0.000000e+00	3.528661e-03	8.995905e-02
debtlt_gr3a_x	68086.0	3.678976e-02	1.560884e-01	-1.169989	-1.297859e-02	8.776581e-03	9.143539e-02	7.496221e-01
txditc_gr3a_x	58233.0	5.085601e-03	2.056567e-02	-0.165240	0.000000e+00	0.000000e+00	1.026694e-02	1.072464e-01
coa_gr3a_x	59716.0	8.130334e-02	1.910139e-01	-1.441231	6.143018e-03	6.922210e-02	1.689665e-01	6.791055e-01
col_gr3a_x	59907.0	4.500265e-02	1.053162e-01	-0.965261	3.879323e-03	3.820093e-02	8.630953e-02	4.559172e-01
cowc_gr3a_x	58839.0	3.653286e-02	1.484395e-01	-1.040474	-2.098227e-02	2.973004e-02	1.033972e-01	5.603979e-01
ncoa_gr3a_x	60007.0	1.050067e-01	2.306541e-01	-3.870719	9.087089e-03	9.623946e-02	2.117214e-01	8.086193e-01
ncol_gr3a_x	59211.0	1.598156e-02	5.947009e-02	-0.578248	-6.920073e-05	5.999244e-03	2.592810e-02	3.988077e-01
nncoa_gr3a_x	58434.0	8.675169e-02	2.252497e-01	-3.194340	-4.928137e-04	7.958930e-02	1.887284e-01	7.883821e-01
oa_gr3a_x	59716.0	1.854313e-01	3.556953e-01	-4.043893	4.026295e-02	2.014626e-01	3.832832e-01	9.247126e-01
ol_gr3a_x	59211.0	6.057444e-02	1.330810e-01	-0.974292	1.182179e-02	5.761910e-02	1.140134e-01	6.233345e-01
fna_gr3a_x	76568.0	1.697186e-02	9.083223e-02	-1.032585	0.000000e+00	0.000000e+00	0.000000e+00	6.829162e-01
fnl_gr3a_x	68310.0	4.619417e-02	1.989910e-01	-1.644118	-1.874554e-02	2.297731e-02	1.244181e-01	8.753479e-01
nfna_gr3a_x	68310.0	-3.360455e-02	2.211303e-01	-1.248189	-1.249060e-01	-1.872066e-02	4.427796e-02	1.644118e+00
gp_gr3a_x	66990.0	8.348589e-02	2.032856e-01	-1.128507	3.839957e-03	5.376685e-02	1.624814e-01	9.814586e-01
ebitda_gr3a_x	67269.0	2.247433e-02	1.361932e-01	-0.884279	-1.071769e-02	2.151470e-02	7.452829e-02	1.271214e+00
ebit_gr3a_x	67236.0	1.189171e-02	1.345816e-01	-1.026774	-1.766170e-02	1.392220e-02	5.929624e-02	1.373007e+00
ope_gr3a_x	56294.0	2.324199e-02	1.429630e-01	-0.841909	-1.949482e-02	2.618806e-02	7.807622e-02	1.009807e+00
ni_gr3a_x	68031.0	3.280394e-03	1.486194e-01	-1.330393	-1.722207e-02	6.743238e-03	4.072211e-02	1.217098e+00
nix_gr3a_x	68031.0	2.927618e-03	1.575718e-01	-1.271989	-1.979606e-02	6.799154e-03	4.272763e-02	1.273113e+00
dp_gr3a_x	65031.0	1.054077e-02	2.405814e-02	-0.223649	4.545630e-04	7.301104e-03	1.922646e-02	2.037688e-01
ocf_gr3a_x	66200.0	2.196724e-02	1.675867e-01	-0.962350	-3.143870e-02	1.281189e-02	7.549920e-02	1.459275e+00
fcf_gr3a_x	59801.0	1.434510e-02	1.944875e-01	-0.959419	-6.064569e-02	7.450519e-03	7.650017e-02	1.662028e+00
nwc_gr3a_x	59130.0	5.304876e-02	2.553131e-01	-2.400334	-2.829289e-02	5.008945e-02	1.613771e-01	9.098618e-01
dltnetis_gr3a_x	66766.0	-8.454382e-03	1.395302e-01	-0.943679	-2.863836e-02	0.000000e+00	1.901740e-02	8.602060e-01
dstnetis_gr3a_x	65151.0	-1.455326e-03	9.284288e-02	-0.777637	-1.439239e-02	0.000000e+00	1.755369e-02	6.541406e-01
dbnetis_gr3a_x	66799.0	-9.665979e-03	1.754118e-01	-1.243730	-4.496743e-02	0.000000e+00	3.891492e-02	1.075731e+00
tax_gr3a_x	67418.0	4.685190e-03	3.529203e-02	-0.218962	-5.200458e-03	1.998450e-03	1.733238e-02	1.809693e-01
div_gr3a_x	67107.0	1.920768e-03	1.210645e-02	-0.205875	0.000000e+00	0.000000e+00	2.522659e-03	1.810838e-01
capx_gr3a_x	59930.0	1.024212e-02	6.735920e-02	-0.596642	-7.570922e-03	6.323187e-03	3.056904e-02	3.583062e-01
capx_at_x	74522.0	6.405274e-02	7.352952e-02	-0.030504	1.845855e-02	4.280397e-02	8.151096e-02	5.760933e-01
spi_at_x	80392.0	-8.938327e-03	4.499022e-02	-1.176871	-5.042731e-04	0.000000e+00	0.000000e+00	1.960574e-01
xido_at_x	84265.0	6.160027e-05	1.687795e-02	-0.260502	0.000000e+00	0.000000e+00	0.000000e+00	1.761674e-01
nri_at_x	80392.0	-9.093377e-03	5.510842e-02	-1.533786	-2.029198e-03	0.000000e+00	0.000000e+00	2.675198e-01

gp_sale_x	83302.0	1.192524e-01	2.161043e+00	-108.252336	1.975654e-01	3.261121e-01	4.984402e-01	9.722307e-01
ebitda_sale_x	83389.0	-2.042675e-01	2.961699e+00	-143.688525	5.236953e-02	1.215018e-01	2.165036e-01	7.141322e-01
ebit_sale_x	83369.0	-2.682005e-01	3.091808e+00	-146.737705	2.551892e-02	8.570296e-02	1.654666e-01	5.693628e-01
pi_sale_x	83439.0	-3.124057e-01	3.309065e+00	-174.174781	7.337319e-03	7.007719e-02	1.426619e-01	6.559774e-01
ni_sale_x	83441.0	-3.380056e-01	3.248960e+00	-174.174781	4.740297e-03	4.408514e-02	9.292270e-02	5.417515e-01
nix_sale_x	83411.0	-3.430431e-01	3.293034e+00	-174.174781	3.671240e-03	4.456242e-02	9.560031e-02	6.243023e-01
ocf_sale_x	82361.0	-2.834958e-01	2.706786e+00	-115.470103	-1.709783e-02	5.755859e-02	1.375354e-01	1.197232e+00
fcf_sale_x	74144.0	-4.568814e-01	3.084399e+00	-114.804688	-1.034250e-01	-2.376246e-03	6.329335e-02	1.014327e+00
gp_at_x	83519.0	3.058489e-01	3.075106e-01	-1.039113	7.776304e-02	2.762770e-01	4.781763e-01	1.412338e+00
ebitda_at_x	83606.0	7.254892e-02	1.964921e-01	-1.871416	2.402509e-02	1.025681e-01	1.681772e-01	4.597082e-01
ebit_at_x	83582.0	3.641471e-02	1.965754e-01	-1.910124	1.701226e-02	6.710267e-02	1.235551e-01	4.105165e-01
fi_at_x	70643.0	1.285423e-02	2.116006e-01	-2.281424	1.815834e-02	6.301707e-02	9.733451e-02	3.715535e-01
cop_at_x	71079.0	1.242040e-01	2.137309e-01	-1.188215	3.174832e-02	1.325974e-01	2.364487e-01	1.531592e+00
ni_at_x	84295.0	-6.934733e-03	1.972960e-01	-2.300792	3.028539e-03	3.230118e-02	7.146967e-02	3.331630e-01
ope_be_x	68080.0	1.244371e-01	6.129974e-01	-8.379530	8.509552e-02	2.109810e-01	3.171122e-01	3.284896e+00
ni_be_x	81843.0	-4.170810e-02	6.540741e-01	-10.754148	1.944193e-02	9.476066e-02	1.466488e-01	1.450547e+00
nix_be_x	81843.0	-4.512749e-02	6.799785e-01	-11.951532	1.740826e-02	9.614812e-02	1.489557e-01	1.558275e+00
ocf_be_x	80045.0	9.325967e-03	6.544577e-01	-7.245926	-3.761535e-02	1.144212e-01	2.205872e-01	4.068686e+00
fcf_be_x	71780.0	-1.769148e-01	8.234297e-01	-9.895939	-2.180495e-01	-4.334297e-03	1.286074e-01	2.895115e+00
gp_bev_x	81261.0	6.877303e-01	1.192313e+00	-9.210272	2.270252e-01	4.805274e-01	8.840906e-01	1.753113e+01
ebitda_bev_x	81348.0	7.059743e-02	1.031921e+00	-28.063673	8.688913e-02	1.814286e-01	3.008124e-01	3.228898e+00
ebit_bev_x	81328.0	-1.460347e-02	1.100053e+00	-35.603143	4.670120e-02	1.289825e-01	2.286745e-01	2.634083e+00
fi_bev_x	68875.0	-8.077968e-02	1.109721e+00	-21.894597	3.656339e-02	9.945921e-02	1.674235e-01	2.202873e+00
cop_bev_x	69611.0	2.923736e-01	8.535565e-01	-5.537906	7.534899e-02	2.259287e-01	4.371082e-01	1.244377e+01
gp_ppen_x	82611.0	2.921862e+00	5.386306e+00	-130.538462	6.349292e-01	1.863453e+00	3.900439e+00	1.035052e+02
ebitda_ppen_x	82698.0	5.588297e-01	5.310174e+00	-252.813559	2.015400e-01	5.743982e-01	1.387999e+00	3.389320e+01
fcf_ppen_x	73568.0	-4.374453e-01	4.885994e+00	-229.500000	-4.317279e-01	-1.535052e-02	4.317829e-01	2.892105e+01
fincf_at_x	70465.0	5.923096e-02	2.276332e-01	-0.908497	-3.863822e-02	1.868365e-03	8.381301e-02	1.539186e+00
netis_at_x	70522.0	2.586771e-02	2.588545e-01	-1.368065	-4.814651e-02	-7.912986e-04	5.578284e-02	1.430119e+00
eqnetis_at_x	70530.0	5.580960e-02	1.815813e-01	-0.350709	-6.623314e-04	7.250965e-04	1.704739e-02	1.375146e+00
eqis_at_x	68765.0	7.020270e-02	1.843317e-01	-0.103400	7.457109e-05	3.428571e-03	2.609577e-02	1.407882e+00
dbnetis_at_x	82532.0	-2.273721e-02	1.659351e-01	-1.362369	-3.972132e-02	-1.446212e-03	2.101781e-02	6.455704e-01
dltnetis_at_x	82512.0	-2.416266e-02	1.381219e-01	-1.226849	-3.050334e-02	-3.224409e-03	0.000000e+00	5.183637e-01
dstnetis_at_x	81059.0	2.397359e-03	7.375303e-02	-0.478936	-6.481128e-03	0.000000e+00	1.144933e-02	4.835838e-01
eqnpo_at_x	70530.0	-4.684199e-02	1.858772e-01	-1.375146	-1.352162e-02	0.000000e+00	1.557461e-02	4.461726e-01
eqbb_at_x	67111.0	1.170811e-02	3.229884e-02	-0.002558	0.000000e+00	0.000000e+00	5.502863e-03	4.017798e-01
div_at_x	83608.0	8.948964e-03	1.856573e-02	0.000000	0.000000e+00	0.000000e+00	1.006291e-02	2.644511e-01

oaccruals_at_x	71182.0	-8.511955e-03	1.569651e-01	-2.004772	-7.306808e-02	-1.672894e-02	5.116442e-02	6.719221e-01
oaccruals_ni_x	71091.0	-2.636272e-01	6.400549e+00	-71.441767	-1.169122e+00	-2.462554e-01	7.370952e-01	8.515789e+01
taccruals_at_x	70912.0	-2.419045e-02	1.934654e-01	-2.276390	-9.023051e-02	-1.349768e-02	4.721009e-02	9.277600e-01
taccruals_ni_x	70803.0	-1.038130e+00	7.895110e+00	-112.261538	-1.439394e+00	-2.018444e-01	7.259226e-01	6.728571e+01
noa_at_x	67827.0	6.624244e-01	4.239865e-01	-0.965822	4.576732e-01	6.774060e-01	8.305522e-01	4.265072e+00
be_bev_x	80358.0	1.337380e+00	2.313888e+00	0.035054	5.615100e-01	8.227822e-01	1.223881e+00	4.400549e+01
debt_bev_x	81603.0	4.635573e-01	5.203591e-01	0.000000	1.494456e-01	3.751129e-01	6.312745e-01	8.264789e+00
cash_bev_x	81239.0	8.065404e-01	2.594199e+00	0.000000	4.214693e-02	1.396889e-01	4.654783e-01	4.223059e+01
pstk_bev_x	82205.0	2.234662e-02	1.105032e-01	0.000000	0.000000e+00	0.000000e+00	0.000000e+00	2.730344e+00
debtlt_bev_x	81510.0	3.274546e-01	3.957937e-01	0.000000	4.695412e-02	2.499551e-01	4.585166e-01	6.674744e+00
debtst_bev_x	81109.0	1.303392e-01	2.386261e-01	0.000000	4.750627e-03	4.107521e-02	1.510107e-01	3.471524e+00
int_debt_x	62360.0	1.191078e-01	2.352767e-01	0.000000	5.559077e-02	7.925713e-02	1.098973e-01	7.543210e+00
int_debtlt_x	59223.0	3.477440e-01	1.333440e+00	0.000000	6.712647e-02	1.008625e-01	1.649806e-01	4.055319e+01
ebitda_debt_x	74454.0	1.873789e+00	1.369748e+01	-274.000000	1.469308e-01	4.032451e-01	9.404641e-01	3.095487e+02
profit_cl_x	72705.0	3.879935e-01	1.571841e+00	-11.903846	1.735159e-01	5.130435e-01	9.684604e-01	5.768146e+00
ocf_cl_x	72652.0	2.827570e-03	1.599381e+00	-14.956800	-1.503859e-01	1.980802e-01	5.943197e-01	5.976386e+00
ocf_debt_x	73489.0	9.986423e-01	1.210108e+01	-239.354167	-6.991422e-02	1.465671e-01	5.342936e-01	3.818136e+02
cash_lt_x	83132.0	8.512404e-01	2.430332e+00	0.000000	3.751187e-02	1.177077e-01	5.170697e-01	2.990909e+01
inv_act_x	66454.0	2.857719e-01	2.312413e-01	0.000000	5.815148e-02	2.767750e-01	4.605285e-01	9.008857e-01
rec_act_x	66896.0	3.547460e-01	2.078579e-01	0.000000	2.060601e-01	3.440109e-01	4.788401e-01	9.356141e-01
debtst_debt_x	74143.0	3.130781e-01	3.238387e-01	0.000000	4.503603e-02	1.876543e-01	4.984650e-01	1.000000e+00
cl_lt_x	72576.0	5.751892e-01	2.798983e-01	0.018302	3.451427e-01	5.657963e-01	8.274718e-01	1.000000e+00
debtlt_debt_x	74698.0	6.992906e-01	3.227056e-01	0.000000	5.209669e-01	8.281028e-01	9.650736e-01	1.000000e+00
lt_ppen_x	82539.0	1.646287e+01	3.672835e+01	0.082926	1.172060e+00	2.420959e+00	8.045524e+00	5.580774e+02
debtlt_be_x	81349.0	7.088002e-01	1.481488e+00	0.000000	3.016158e-02	2.803062e-01	6.947088e-01	2.225157e+01
opex_at_x	83519.0	9.681317e-01	7.838660e-01	0.015471	3.676639e-01	8.565324e-01	1.357200e+00	5.195711e+00
nwc_at_x	72102.0	2.993303e-01	2.430646e-01	-0.750746	1.286938e-01	2.842063e-01	4.563323e-01	9.547180e-01
debt_at_x	83900.0	2.204809e-01	2.014133e-01	0.000000	5.117692e-02	1.814944e-01	3.300031e-01	1.362951e+00
debt_be_x	81454.0	1.004806e+00	2.067362e+00	0.000000	1.040678e-01	4.318686e-01	1.007597e+00	3.440000e+01
ebit_int_x	64860.0	2.203736e+01	1.439395e+02	-2004.500000	1.009360e+00	4.227928e+00	1.064839e+01	3.302250e+03
inv_days_x	81141.0	9.016036e+01	1.504356e+02	0.000000	1.058337e+01	5.807602e+01	1.147962e+02	3.361770e+03
rec_days_x	81348.0	4.533771e+02	1.063423e+03	0.000000	4.095771e+01	5.953132e+01	1.018888e+02	7.237302e+03
ap_days_x	78306.0	1.694485e+03	7.499180e+03	1.847278	2.641508e+01	4.306637e+01	8.541383e+01	1.412089e+05
cash_conversion_x	62364.0	1.205373e+02	1.828092e+02	0.959246	4.343297e+01	8.349357e+01	1.415533e+02	3.378626e+03
cash_cl_x	72645.0	1.587329e+00	3.672043e+00	0.000000	1.026845e-01	3.799188e-01	1.280104e+00	3.650000e+01
caliq_cl_x	71876.0	2.713301e+00	4.164386e+00	0.058065	9.339201e-01	1.455641e+00	2.627170e+00	4.066667e+01
ca_cl_x	72102.0	3.418742e+00	4.260148e+00	0.082422	1.489684e+00	2.203071e+00	3.508772e+00	4.119531e+01

inv_turnover_x	68895.0	2.242767e+01	6.236376e+01	0.067068	2.873214e+00	5.072081e+00	1.136274e+01	7.307939e+02
at_turnover_x	82642.0	1.097531e+00	8.725862e-01	0.000000	3.906878e-01	9.962542e-01	1.566137e+00	7.064076e+00
rec_turnover_x	81025.0	9.793634e+00	1.974440e+01	0.000000	3.546595e+00	6.100333e+00	8.825811e+00	2.429282e+02
ap_turnover_x	73584.0	1.147989e+01	1.183788e+01	-0.125771	4.654945e+00	8.888918e+00	1.424170e+01	1.189623e+02
sale_bev_x	81359.0	2.313859e+00	2.750359e+00	0.000000	8.970396e-01	1.692978e+00	2.711775e+00	3.887111e+01
sale_be_x	81190.0	2.871376e+00	3.918959e+00	0.000000	1.010853e+00	1.803098e+00	3.166093e+00	5.438940e+01
div_ni_x	65748.0	2.488976e-01	4.894397e-01	0.000000	0.000000e+00	6.298021e-02	3.723615e-01	7.344846e+00
sale_nwc_x	66992.0	9.200458e+00	2.230582e+01	0.000000	2.041145e+00	3.987682e+00	7.646116e+00	3.110241e+02
tax_pi_x	66498.0	3.367923e-01	2.575675e-01	-7.298061	2.906079e-01	3.654051e-01	4.199396e-01	3.400000e+00
cash_at_x	83501.0	1.581450e-01	2.048565e-01	0.000000	2.521067e-02	6.965240e-02	2.037783e-01	9.767365e-01
ni_emp_x	76496.0	-1.339722e+00	9.360554e+01	-2141.200000	2.866894e-01	3.968165e+00	1.566763e+01	1.231566e+03
sale_emp_x	76452.0	2.140042e+02	3.052528e+02	0.000000	7.065876e+01	1.342804e+02	2.365857e+02	4.877250e+03
sale_emp_gr1_x	70121.0	1.177862e-01	4.966576e-01	-0.890288	-3.942313e-02	5.135502e-02	1.531171e-01	7.026989e+00
emp_gr1_x	66623.0	8.259271e-02	2.599311e-01	-1.333333	-3.076923e-02	4.903226e-02	1.690566e-01	1.483146e+00
ni_inc8q_x	60896.0	3.106887e+00	3.264821e+00	0.000000	0.000000e+00	2.000000e+00	7.000000e+00	8.000000e+00
noa_gr1a_x	67207.0	1.250491e-01	3.423647e-01	-0.736602	-1.846122e-02	5.091181e-02	1.612248e-01	4.296839e+00
ppeinv_gr1a_x	67558.0	1.057254e-01	2.233637e-01	-0.533628	6.690184e-03	5.608215e-02	1.335582e-01	2.537166e+00
lnoa_gr1a_x	65034.0	2.744474e-02	8.094853e-02	-0.513831	-3.927273e-03	1.200822e-02	4.209292e-02	7.190295e-01
capx_gr2_x	63802.0	1.297898e+00	4.480451e+00	-1.427673	-2.857143e-01	2.158273e-01	1.077308e+00	6.113636e+01
saleq_gr1_x	76539.0	2.451190e-01	8.267316e-01	-0.988281	-1.378171e-02	1.027824e-01	2.704012e-01	1.574839e+01
niq_be_x	73386.0	-1.513640e-03	1.475069e-01	-1.912737	2.469740e-03	2.567089e-02	4.390478e-02	6.993226e-01
niq_at_x	75565.0	-1.401605e-03	5.741210e-02	-0.612623	2.940312e-04	7.857586e-03	2.112949e-02	1.436121e-01
niq_be_chg1_x	66684.0	-9.053799e-03	1.413834e-01	-1.480706	-1.850244e-02	-6.942826e-04	1.116203e-02	1.111581e+00
niq_at_chg1_x	69434.0	-4.994719e-04	5.068063e-02	-0.439551	-7.785512e-03	-2.847820e-05	5.850832e-03	5.819829e-01
dsale_dinv_x	60161.0	-6.107373e-02	1.000608e+00	-19.477765	-1.699651e-01	3.203414e-02	2.317339e-01	3.665530e+00
dsale_drec_x	70764.0	-4.694890e-02	6.304575e-01	-6.688995	-1.473693e-01	-6.383642e-04	1.412617e-01	3.914748e+00
dgp_dsale_x	68451.0	2.134719e-02	5.699486e-01	-5.128244	-8.186639e-02	2.294753e-03	8.778243e-02	1.201122e+01
dsale_dsga_x	58615.0	1.615284e-02	3.497148e-01	-1.984123	-9.536589e-02	-2.192614e-03	9.249705e-02	3.889022e+00
saleq_su_x	65126.0	1.511078e-01	1.709319e+00	-12.771889	-8.898380e-01	1.348893e-01	1.112284e+00	3.358815e+01
niq_su_x	65588.0	-1.390255e-01	1.914644e+00	-31.876139	-7.605811e-01	-5.764519e-03	7.521605e-01	2.019493e+01
capex_abn_x	58610.0	1.327560e-01	1.087577e+00	-1.091502	-4.172758e-01	-8.799162e-02	2.934888e-01	1.152288e+01
op_atl1_x	79018.0	1.323773e-01	2.093965e-01	-1.926360	3.335684e-02	1.297180e-01	2.219123e-01	1.052507e+00
gp_atl1_x	78942.0	3.720076e-01	3.925127e-01	-1.323850	9.590590e-02	3.092312e-01	5.573714e-01	2.454601e+00
ope_bel1_x	64365.0	1.966408e-01	6.610150e-01	-9.572464	8.983696e-02	2.346555e-01	3.745607e-01	4.617612e+00
cop_atl1_x	70746.0	1.186679e-01	3.450330e-01	-3.468293	3.500546e-02	1.458965e-01	2.635601e-01	1.860381e+00
pi_nix_x	65416.0	1.584331e+00	6.152730e-01	0.105934	1.357475e+00	1.561167e+00	1.720949e+00	1.896136e+01
ocf_at_x	82588.0	4.146748e-03	2.005892e-01	-1.409339	-2.020202e-02	3.194530e-02	1.039386e-01	5.979282e-01

op_at_x	83606.0	1.051384e-01	1.683643e-01	-1.188251	2.842564e-02	1.159374e-01	1.898745e-01	5.662447e-01
ocf_at_chg1_x	77016.0	-1.010285e-03	1.765458e-01	-1.078245	-5.123672e-02	-4.131576e-04	4.587812e-02	1.152536e+00
at_be_x	82123.0	4.148569e+00	5.205270e+00	1.000000	1.488785e+00	2.072054e+00	3.774461e+00	5.963100e+01
niq_saleq_std_x	64320.0	1.097171e+00	7.179398e+00	0.002743	1.959966e-02	4.280156e-02	1.243409e-01	1.737442e+02
roe_be_std_x	58221.0	1.804175e-01	4.878293e-01	0.002090	2.228078e-02	5.125864e-02	1.314519e-01	7.343358e+00
tangibility_x	71067.0	6.499174e-01	1.855006e-01	0.060243	5.522301e-01	6.669986e-01	7.594401e-01	1.383213e+00
earnings_variability_x	56507.0	8.413799e-01	8.699197e-01	0.024259	2.882220e-01	6.201087e-01	1.070644e+00	1.055215e+01
aliq_at_x	68986.0	8.309651e-01	5.303968e-01	0.154002	6.090829e-01	7.119111e-01	8.695792e-01	1.036159e+01
f_score_x	62773.0	4.826231e+00	1.770469e+00	0.000000	4.000000e+00	5.000000e+00	6.000000e+00	9.000000e+00
o_score_x	66971.0	-1.745555e+00	3.168451e+00	-9.387183	-3.586176e+00	-2.206265e+00	-5.551877e-01	2.287028e+01
z_score_x	67791.0	6.191255e+00	1.049266e+01	-32.148758	2.266922e+00	3.656338e+00	5.914621e+00	1.744239e+02
intrinsic_value_x	63015.0	1.164555e+03	5.506747e+03	0.099021	2.345727e+01	8.694705e+01	4.217882e+02	1.130984e+05
kz_index_x	72617.0	-8.828321e+00	2.692506e+01	-838.030969	-7.898284e+00	-1.764138e+00	4.390594e-01	3.059257e+01
gpoa_ch5_x	57603.0	-3.978293e-04	2.126478e-01	-1.019019	-7.546087e-02	-2.977406e-03	6.227772e-02	1.188695e+00
roe_ch5_x	55439.0	-1.754195e-02	5.879380e-01	-7.510668	-8.071763e-02	-7.641382e-03	5.496587e-02	6.941738e+00
roa_ch5_x	58716.0	3.356618e-03	1.902936e-01	-1.167028	-3.886925e-02	-1.826873e-03	2.622766e-02	2.250596e+00
cfoa_ch5_x	57080.0	2.722729e-02	1.952940e-01	-0.802356	-5.093941e-02	3.016425e-03	7.828026e-02	1.308587e+00
gmar_ch5_x	57454.0	5.645894e-02	9.163679e-01	-14.013283	-4.365978e-02	4.211377e-03	6.137274e-02	2.356940e+01
ni_ar1_x	57583.0	2.216108e-01	6.239962e-01	-3.280079	-1.388188e-01	1.677655e-01	5.072772e-01	9.144218e+00
ni_ivol_x	57583.0	5.457318e-02	1.011351e-01	0.000370	7.940998e-03	2.073894e-02	5.324582e-02	1.499085e+00
at_me_x	84556.0	2.929763e+00	5.324918e+00	0.013771	5.597052e-01	1.250320e+00	2.917356e+00	1.923122e+02
be_me_x	82123.0	6.984930e-01	6.282720e-01	0.006247	2.899460e-01	5.638439e-01	9.133239e-01	1.377468e+01
debt_me_x	83911.0	6.647230e-01	1.495608e+00	0.000000	3.779173e-02	2.205748e-01	6.766721e-01	5.045170e+01
netdebt_me_x	83911.0	4.678165e-01	1.409323e+00	-2.597593	-6.403876e-02	1.026399e-01	5.270806e-01	4.390182e+01
cash_me_x	83503.0	2.028630e-01	3.444483e-01	0.000000	3.574154e-02	1.005355e-01	2.340919e-01	9.302887e+00
sale_me_x	83650.0	1.783132e+00	2.640350e+00	0.000000	4.151599e-01	9.483532e-01	2.063972e+00	5.255512e+01
gp_me_x	83519.0	4.781585e-01	6.666753e-01	-3.093659	1.499359e-01	3.001301e-01	5.649697e-01	1.754157e+01
ebitda_me_x	83607.0	1.453847e-01	2.312733e-01	-4.065775	5.535261e-02	1.306762e-01	2.239696e-01	3.479631e+00
ebit_me_x	83583.0	8.696789e-02	2.103845e-01	-6.203592	2.968297e-02	9.351608e-02	1.624395e-01	1.692275e+00
ope_me_x	70601.0	9.406612e-02	2.218590e-01	-5.286894	3.211401e-02	1.013759e-01	1.797755e-01	2.831705e+00
ni_me_x	84299.0	6.155164e-05	2.924457e-01	-12.160742	5.518574e-03	4.948698e-02	8.121504e-02	5.914891e-01
nix_me_x	84299.0	-7.190738e-04	3.032439e-01	-13.961297	3.816692e-03	4.985760e-02	8.227749e-02	7.778763e-01
cop_me_x	71079.0	2.034288e-01	4.522853e-01	-2.833791	3.652930e-02	1.348918e-01	2.729984e-01	1.275123e+01
ocf_me_x	82588.0	4.142666e-02	2.472220e-01	-3.829179	-1.771602e-02	5.607050e-02	1.201991e-01	3.357007e+00
fcf_me_x	74414.0	-5.796020e-02	3.055229e-01	-5.424912	-1.048852e-01	-2.788763e-03	5.595100e-02	2.903784e+00
div_me_x	83608.0	1.470828e-02	2.618240e-02	0.000000	0.000000e+00	0.000000e+00	2.212487e-02	5.078861e-01
eqbb_me_x	67111.0	1.260051e-02	3.508560e-02	-0.003733	0.000000e+00	0.000000e+00	6.629355e-03	8.704404e-01

eqis_me_x	68765.0	4.153043e-02	1.172707e-01	-0.133888	1.185307e-04	3.486411e-03	1.801408e-02	3.911242e+00
eqpo_me_x	67111.0	2.592780e-02	5.148613e-02	-0.001343	0.000000e+00	3.980878e-03	3.335759e-02	1.180533e+00
eqnpo_me_x	70530.0	-1.481346e-02	1.228013e-01	-3.911242	-9.300330e-03	0.000000e+00	2.399186e-02	1.104935e+00
eqnetis_me_x	70530.0	2.787636e-02	1.182987e-01	-0.683904	-1.005150e-03	9.391216e-04	1.269223e-02	3.810478e+00
at_mev_x	83147.0	1.848183e+00	3.098122e+00	0.013739	5.524892e-01	1.042183e+00	1.775341e+00	5.675791e+01
bev_mev_x	81361.0	6.617545e-01	5.018030e-01	0.000899	2.891198e-01	6.210654e-01	9.273291e-01	1.328872e+01
ppen_mev_x	82406.0	2.734495e-01	3.365012e-01	0.000000	4.894221e-02	1.449246e-01	3.694456e-01	6.654435e+00
be_mev_x	80718.0	5.865497e-01	7.405467e-01	0.006233	2.340377e-01	4.288408e-01	7.003017e-01	2.440641e+01
cash_mev_x	82744.0	2.144076e-01	5.569491e-01	0.000000	2.539117e-02	7.423303e-02	1.865281e-01	1.486958e+01
sale_mev_x	82937.0	1.263214e+00	1.627088e+00	0.000000	3.298012e-01	7.870414e-01	1.593029e+00	3.217673e+01
gp_mev_x	82806.0	3.474234e-01	4.327518e-01	-1.738316	1.208217e-01	2.361721e-01	4.399957e-01	8.870365e+00
ebitda_mev_x	82893.0	9.830617e-02	1.776719e-01	-5.586889	4.861481e-02	1.031668e-01	1.642463e-01	2.436766e+00
ebit_mev_x	82871.0	5.926524e-02	1.773106e-01	-6.586314	2.528635e-02	7.465916e-02	1.190613e-01	1.676003e+00
cop_mev_x	70715.0	1.444199e-01	2.585223e-01	-2.002014	3.446826e-02	1.181415e-01	2.173679e-01	7.406066e+00
ocf_mev_x	81990.0	3.347301e-02	1.821960e-01	-4.376771	-1.617929e-02	4.260002e-02	9.639720e-02	1.677509e+00
fcf_mev_x	74019.0	-3.318816e-02	2.116088e-01	-6.041038	-8.445145e-02	-2.592155e-03	4.953345e-02	1.342666e+00
debt_mev_x	83158.0	2.887401e-01	2.929176e-01	0.000000	4.327948e-02	2.074834e-01	4.575198e-01	3.431370e+00
pstk_mev_x	83147.0	1.274111e-02	5.250769e-02	0.000000	0.000000e+00	0.000000e+00	0.000000e+00	9.036842e-01
debtlt_mev_x	83041.0	2.119651e-01	2.389737e-01	0.000000	1.179506e-02	1.314957e-01	3.348305e-01	2.411272e+00
debtst_mev_x	82474.0	7.946954e-02	1.478955e-01	0.000000	1.276192e-03	1.945982e-02	8.670794e-02	1.937046e+00
dltnetis_mev_x	81800.0	-3.340257e-02	2.078127e-01	-3.561275	-3.197128e-02	-2.693906e-03	0.000000e+00	5.827552e-01
dstnetis_mev_x	80331.0	3.106754e-03	9.930116e-02	-1.016270	-6.217485e-03	0.000000e+00	1.181754e-02	7.904728e-01
dbnetis_mev_x	81820.0	-3.225556e-02	2.488737e-01	-4.484819	-4.192480e-02	-9.653326e-04	2.227614e-02	9.123492e-01
netis_mev_x	70146.0	-1.772557e-02	2.791101e-01	-4.639464	-4.818800e-02	-4.964442e-04	4.389106e-02	2.962339e+00
fincf_mev_x	70075.0	2.675977e-02	1.979185e-01	-1.693251	-3.708652e-02	1.309107e-03	6.683606e-02	6.822040e+00
aliq_mat_x	65569.0	5.056027e-01	2.550810e-01	0.026987	3.163387e-01	4.964848e-01	6.572652e-01	3.672692e+00
eq_dur_x	72186.0	1.601384e+01	3.712803e+00	0.551411	1.429448e+01	1.610058e+01	1.766705e+01	1.303612e+02
beta_60m_x	77134.0	1.060670e+00	6.567785e-01	-1.704550	6.173713e-01	9.996281e-01	1.424882e+00	4.509855e+00
ivol_capm_60m_x	77134.0	1.234036e-01	6.976252e-02	0.029443	7.244625e-02	1.048899e-01	1.549846e-01	5.391683e-01
resff3_12_1_x	83777.0	-2.093786e-02	2.785045e-01	-1.155041	-1.925971e-01	-6.213540e-03	1.660134e-01	7.899297e-01
resff3_6_1_x	83716.0	-5.561718e-02	5.530217e-01	-2.895343	-3.470933e-01	-1.858816e-02	2.763570e-01	1.925807e+00
mispricing_mgmt_x	79680.0	4.952410e-01	1.900122e-01	0.014707	3.657305e-01	5.132234e-01	6.370265e-01	9.426676e-01
mispricing_perf_x	94449.0	5.215823e-01	2.112373e-01	0.013238	3.719368e-01	5.226515e-01	6.806346e-01	9.843158e-01
zero_trades_21d_x	98251.0	1.877483e+00	3.863895e+00	0.000036	2.359213e-03	4.996094e-03	1.912556e+00	2.100977e+01
dolvol_126d_x	96820.0	8.238719e+06	4.482028e+07	36.100000	2.662274e+04	1.352160e+05	9.434239e+05	1.038495e+09
dolvol_var_126d_x	96820.0	1.486441e+00	8.890348e-01	0.262216	8.823349e-01	1.283782e+00	1.836217e+00	6.908058e+00
turnover_126d_x	96821.0	2.923526e-03	4.181909e-03	0.000016	7.083495e-04	1.592720e-03	3.529786e-03	2.194381e-01

turnover_var_126d_x	96821.0	1.461261e+00	8.850852e-01	0.283229	8.587533e-01	1.244919e+00	1.803110e+00	6.883777e+00
zero_trades_126d_x	96821.0	1.879813e+00	3.637247e+00	0.000068	2.562945e-03	6.645662e-03	1.854481e+00	1.949735e+01
zero_trades_252d_x	94958.0	1.890639e+00	3.589353e+00	0.000103	2.741608e-03	8.406343e-02	1.994417e+00	1.910032e+01
bidaskhl_21d_x	90035.0	2.187471e-02	2.647153e-02	0.001182	7.027678e-03	1.373674e-02	2.705105e-02	5.317774e-01
rvolhl_21d_x	90035.0	1.898309e-02	1.405016e-02	0.000000	9.641240e-03	1.537071e-02	2.424611e-02	1.702432e-01
beta_21d_x	86682.0	7.243168e-01	1.335989e+00	-9.554101	7.247420e-02	6.947803e-01	1.375468e+00	1.164544e+01
ivol_capm_21d_x	86682.0	3.025362e-02	2.178898e-02	0.001900	1.546839e-02	2.458412e-02	3.822354e-02	2.277315e-01
iskew_capm_21d_x	86680.0	2.249933e-01	8.058674e-01	-3.566487	-2.295445e-01	1.822125e-01	6.416149e-01	3.679639e+00
coskew_21d_x	86681.0	-1.685966e-02	3.166455e-01	-1.467822	-2.274142e-01	-2.100722e-02	1.923923e-01	1.347456e+00
beta_dimson_21d_x	86682.0	7.944653e-01	2.095418e+00	-18.580983	-1.156884e-01	7.359997e-01	1.701827e+00	1.930939e+01
ivol_ff3_21d_x	86682.0	2.976449e-02	2.177381e-02	0.001986	1.504091e-02	2.405140e-02	3.769409e-02	2.290283e-01
iskew_ff3_21d_x	86682.0	1.869014e-01	7.369739e-01	-3.088850	-2.418641e-01	1.544618e-01	5.864311e-01	3.412277e+00
ivol_hxz4_21d_x	82383.0	3.041807e-02	2.190582e-02	0.001996	1.564665e-02	2.479881e-02	3.841895e-02	2.176833e-01
iskew_hxz4_21d_x	82383.0	1.684803e-01	7.046432e-01	-3.008153	-2.481487e-01	1.390978e-01	5.589527e-01	3.275584e+00
rmax5_21d_x	86678.0	4.273674e-02	3.210989e-02	0.002471	2.162565e-02	3.411291e-02	5.357032e-02	3.416667e-01
rmax1_21d_x	86678.0	7.218306e-02	6.064151e-02	0.003457	3.382609e-02	5.479452e-02	8.888889e-02	7.887325e-01
rvol_21d_x	86682.0	3.243508e-02	2.242950e-02	0.001986	1.732132e-02	2.659881e-02	4.057757e-02	2.288038e-01
rskew_21d_x	86679.0	2.316484e-01	8.097577e-01	-3.581022	-2.197538e-01	1.865828e-01	6.480664e-01	3.737575e+00
ami_126d_x	88556.0	5.431998e+00	2.114215e+01	0.000012	2.177859e-02	2.904872e-01	2.893247e+00	5.373567e+02
beta_252d_x	87257.0	7.606284e-01	5.974032e-01	-1.832510	3.474536e-01	7.164052e-01	1.124320e+00	3.876583e+00
ivol_capm_252d_x	87257.0	3.259666e-02	1.915093e-02	0.006209	1.892541e-02	2.840892e-02	4.113744e-02	1.684058e-01
betadown_252d_x	85872.0	8.869377e-01	8.219245e-01	-3.982064	4.115923e-01	8.451321e-01	1.321289e+00	5.064865e+00
prc_highprc_252d_x	87257.0	7.769191e-01	1.932278e-01	0.024546	6.666667e-01	8.286334e-01	9.320611e-01	1.000000e+00
rvol_252d_x	87257.0	3.407308e-02	1.902228e-02	0.007013	2.047494e-02	2.996600e-02	4.261209e-02	1.689545e-01
corr_1260d_x	68388.0	3.162626e-01	1.723670e-01	-0.037438	1.788491e-01	2.952028e-01	4.487134e-01	8.218867e-01
betabab_1260d_x	67952.0	1.074716e+00	6.151254e-01	-0.325938	6.112594e-01	9.960985e-01	1.431656e+00	3.865774e+00
rmax5_rvol_21d_x	82360.0	1.249722e+00	4.955465e-01	0.150782	8.957877e-01	1.184137e+00	1.527926e+00	4.328684e+00
age_x	100000.0	2.157037e+02	2.199572e+02	1.000000	6.400000e+01	1.270000e+02	2.970000e+02	1.115000e+03
qmj_x	58711.0	1.091165e-01	9.847687e-01	-1.702300	-7.340467e-01	1.618346e-01	9.626112e-01	1.698150e+00
qmj_prof_x	84013.0	7.483002e-02	9.897356e-01	-1.703258	-7.341608e-01	8.283219e-02	9.330273e-01	1.698217e+00
qmj_growth_x	58711.0	3.858670e-02	9.858111e-01	-1.698345	-7.897767e-01	5.274494e-02	8.814861e-01	1.698090e+00
qmj_safety_x	89920.0	1.589256e-01	9.599890e-01	-1.698214	-6.037739e-01	2.307058e-01	9.786219e-01	1.701979e+00
r	100000.0	5.156389e-03	1.545769e-01	-1.006810	-6.497919e-02	-3.233000e-03	6.414079e-02	5.556758e+00
ri	100000.0	1.165169e+01	5.980990e+01	-0.006344	6.042135e-01	1.200928e+00	3.730815e+00	1.600733e+03
r_f001m	98927.0	3.271115e+00	1.509815e+03	-10738.883000	-6.760320e+02	-7.498770e+01	5.624864e+02	9.859989e+04
r_f002m	97862.0	5.018100e+00	1.518794e+03	-10733.167000	-6.756641e+02	-7.328386e+01	5.627983e+02	9.860550e+04
r_f003m	96791.0	3.740881e+00	1.518681e+03	-10744.929000	-6.727991e+02	-7.172671e+01	5.624126e+02	9.860289e+04

r_f004m	95739.0	4.291302e+00	1.527284e+03	-10729.681000	-6.722330e+02	-7.002170e+01	5.635835e+02	9.858806e+04
r_f005m	94676.0	4.190525e+00	1.544754e+03	-11457.587000	-6.738819e+02	-7.054557e+01	5.631321e+02	9.854241e+04
r_f006m	93605.0	3.563573e+00	1.552628e+03	-10710.281000	-6.743946e+02	-7.157954e+01	5.608759e+02	9.855400e+04
r_f007m	92516.0	2.991548e+00	1.555292e+03	-11441.874000	-6.720013e+02	-6.973413e+01	5.603870e+02	9.855812e+04
r_f008m	91424.0	1.333788e+00	1.546753e+03	-10704.672000	-6.718364e+02	-7.123190e+01	5.604061e+02	9.856775e+04
r_f009m	90319.0	4.139605e-02	1.551292e+03	-11436.763000	-6.707939e+02	-7.061808e+01	5.582783e+02	9.856323e+04
r_f010m	89219.0	-6.002517e-01	1.546158e+03	-11480.736000	-6.690344e+02	-7.051352e+01	5.577808e+02	9.851926e+04
r_f011m	88143.0	2.113953e+00	1.549540e+03	-10693.790000	-6.678199e+02	-6.843069e+01	5.577770e+02	9.849699e+04
r_f012m	87055.0	-2.450175e-01	1.509044e+03	-10681.956000	-6.645585e+02	-6.785342e+01	5.552205e+02	5.947356e+04
r_f013m	85957.0	-2.314480e+00	1.503974e+03	-10680.052000	-6.649706e+02	-6.797798e+01	5.525928e+02	5.945935e+04
r_f014m	84862.0	-1.621111e+00	1.508776e+03	-10680.106000	-6.637331e+02	-6.803877e+01	5.511831e+02	5.945346e+04
r_f015m	83808.0	-5.022624e-01	1.511806e+03	-10676.090000	-6.625809e+02	-6.866151e+01	5.499827e+02	5.944619e+04
r_f016m	82768.0	-3.554409e+00	1.506320e+03	-10674.240000	-6.641759e+02	-7.222612e+01	5.451690e+02	5.944829e+04
r_f017m	81736.0	-4.079019e+00	1.520699e+03	-10668.721000	-6.657695e+02	-7.598305e+01	5.426826e+02	5.945334e+04
r_f018m	80718.0	-4.786131e+00	1.525053e+03	-10665.890000	-6.654693e+02	-7.606993e+01	5.425367e+02	5.942137e+04
r_f019m	79693.0	-5.260806e+00	1.521124e+03	-10652.080000	-6.630579e+02	-7.589508e+01	5.415535e+02	5.943060e+04
r_f020m	78676.0	-4.436615e+00	1.527620e+03	-10657.756000	-6.622295e+02	-7.602907e+01	5.413119e+02	5.942841e+04
r_f021m	77655.0	-5.060093e+00	1.528156e+03	-10659.459000	-6.627197e+02	-7.608496e+01	5.390190e+02	5.940572e+04
r_f022m	76639.0	-7.106869e+00	1.510079e+03	-10415.670000	-6.621522e+02	-7.470581e+01	5.367378e+02	5.943171e+04
r_f023m	75612.0	-7.329124e+00	1.527170e+03	-10416.775000	-6.620809e+02	-7.672954e+01	5.359649e+02	5.942110e+04
r_f024m	74602.0	-9.104947e+00	1.507250e+03	-10420.092000	-6.609627e+02	-7.580225e+01	5.345417e+02	5.942053e+04
r_f025m	73613.0	-6.607700e+00	1.509243e+03	-10418.719000	-6.582901e+02	-7.469734e+01	5.362330e+02	5.941582e+04
r_f026m	72615.0	-2.945246e+00	1.545698e+03	-10416.563000	-6.575508e+02	-7.417795e+01	5.361466e+02	6.321793e+04
r_f027m	71626.0	-2.669313e+00	1.548650e+03	-10414.928000	-6.586823e+02	-7.461353e+01	5.367153e+02	6.320860e+04
r_f028m	70648.0	-1.515816e+00	1.538828e+03	-10429.885000	-6.553047e+02	-7.053949e+01	5.382081e+02	6.321259e+04
r_f029m	69691.0	-3.572408e+00	1.533275e+03	-10437.554000	-6.562574e+02	-7.319044e+01	5.379796e+02	6.322903e+04
r_f030m	68731.0	-3.138611e+00	1.512247e+03	-10426.734000	-6.549358e+02	-7.123572e+01	5.377449e+02	5.944378e+04
r_f031m	67787.0	-3.410255e+00	1.508660e+03	-10417.314000	-6.548384e+02	-6.977262e+01	5.371362e+02	5.945365e+04
r_f032m	66846.0	-1.953905e+00	1.531923e+03	-10424.988000	-6.544614e+02	-7.039856e+01	5.377776e+02	6.322580e+04
r_f033m	65912.0	-1.199010e+00	1.536553e+03	-10422.988000	-6.533563e+02	-7.003932e+01	5.377048e+02	6.322768e+04
r_f034m	65017.0	-1.958893e-02	1.521170e+03	-10429.454000	-6.533381e+02	-6.924770e+01	5.390308e+02	5.950305e+04
r_f035m	64108.0	-2.575389e+00	1.513954e+03	-10404.311000	-6.535217e+02	-7.082158e+01	5.373428e+02	5.950802e+04
r_f036m	63212.0	-3.137175e+00	1.533446e+03	-10403.984000	-6.536372e+02	-7.043970e+01	5.356333e+02	6.322943e+04
r_f037m	62323.0	-2.882936e+00	1.544634e+03	-10411.932000	-6.554271e+02	-7.085277e+01	5.363863e+02	6.324339e+04
r_f038m	61439.0	-4.294863e+00	1.540269e+03	-10422.816000	-6.558193e+02	-7.148895e+01	5.344829e+02	6.324044e+04
r_f039m	60559.0	-4.599334e+00	1.526353e+03	-10423.005000	-6.534212e+02	-7.087361e+01	5.336784e+02	5.955371e+04
r_f040m	59711.0	-4.483832e+00	1.542458e+03	-10418.293000	-6.528005e+02	-7.153575e+01	5.320833e+02	6.324383e+04

r_f041m	58845.0	-4.482899e+00	1.545260e+03	-10406.332000	-6.519616e+02	-7.314642e+01	5.301465e+02	6.325702e+04
r_f042m	57981.0	-4.460517e+00	1.541767e+03	-10399.265000	-6.501664e+02	-7.224573e+01	5.314885e+02	6.324923e+04
r_f043m	57121.0	-2.912739e+00	1.543713e+03	-10396.747000	-6.490922e+02	-7.092249e+01	5.324915e+02	6.325023e+04
r_f044m	56262.0	-1.978275e+00	1.548602e+03	-10387.404000	-6.482211e+02	-7.202905e+01	5.329102e+02	6.325233e+04
r_f045m	55405.0	-2.413681e+00	1.544317e+03	-10386.758000	-6.489915e+02	-7.243176e+01	5.315914e+02	6.325634e+04
r_f046m	54560.0	9.722051e-02	1.545967e+03	-10379.816000	-6.463896e+02	-7.134686e+01	5.327216e+02	6.324273e+04
r_f047m	53718.0	3.333567e+00	1.557006e+03	-10382.168000	-6.447844e+02	-7.170387e+01	5.308699e+02	6.325298e+04
r_f048m	52891.0	1.898034e+00	1.553644e+03	-10382.892000	-6.443417e+02	-7.138354e+01	5.296839e+02	6.326751e+04
r_f049m	52075.0	5.136870e+00	1.569055e+03	-10392.044000	-6.431284e+02	-7.170633e+01	5.295754e+02	6.325790e+04
r_f050m	51279.0	6.744647e+00	1.564388e+03	-10368.368000	-6.405642e+02	-7.045908e+01	5.290285e+02	6.324755e+04
r_f051m	50528.0	4.996289e+00	1.556816e+03	-10356.321000	-6.386450e+02	-6.930112e+01	5.273007e+02	6.325250e+04
r_f052m	49803.0	6.062511e+00	1.546312e+03	-10366.471000	-6.351481e+02	-6.922331e+01	5.278184e+02	6.324737e+04
r_f053m	49128.0	5.873627e+00	1.536593e+03	-10365.270000	-6.351065e+02	-6.940372e+01	5.258674e+02	6.324610e+04
r_f054m	48494.0	6.445858e+00	1.535675e+03	-10366.589000	-6.348931e+02	-6.995440e+01	5.222039e+02	6.324542e+04
r_f055m	47910.0	6.192648e+00	1.528904e+03	-10380.610000	-6.325822e+02	-6.748705e+01	5.223979e+02	6.323224e+04
r_f056m	47398.0	4.305310e+00	1.521999e+03	-10376.176000	-6.331227e+02	-6.692050e+01	5.216802e+02	6.321965e+04
r_f057m	46929.0	2.912966e+00	1.523539e+03	-10365.727000	-6.347152e+02	-6.782779e+01	5.187734e+02	6.321752e+04
r_f058m	46499.0	3.105744e+00	1.499175e+03	-10376.918000	-6.331339e+02	-6.862460e+01	5.190269e+02	5.955449e+04
r_f059m	46100.0	5.499946e+00	1.501061e+03	-10369.111000	-6.306282e+02	-6.662137e+01	5.188628e+02	5.958527e+04
r_f060m	45716.0	4.061848e+00	1.503396e+03	-10352.301000	-6.310545e+02	-6.650430e+01	5.187410e+02	5.958494e+04
r_f061m	45341.0	7.811781e+00	1.541473e+03	-10354.663000	-6.301486e+02	-6.530281e+01	5.199156e+02	6.321766e+04
r_f062m	44977.0	8.678788e+00	1.542924e+03	-10356.283000	-6.293376e+02	-6.243243e+01	5.217684e+02	6.322699e+04
r_f063m	44620.0	1.050418e+01	1.542486e+03	-10358.044000	-6.266226e+02	-6.088279e+01	5.230012e+02	6.322569e+04
r_f064m	44265.0	1.165597e+01	1.546109e+03	-10353.549000	-6.261674e+02	-5.921640e+01	5.229312e+02	6.322036e+04
r_f065m	43909.0	1.320759e+01	1.548645e+03	-10349.189000	-6.265927e+02	-5.923018e+01	5.225911e+02	6.321708e+04
r_f066m	43555.0	1.207482e+01	1.548203e+03	-10354.425000	-6.270652e+02	-6.139478e+01	5.187320e+02	6.322556e+04
r_f067m	43214.0	1.300471e+01	1.548251e+03	-10356.312000	-6.259925e+02	-6.118928e+01	5.206501e+02	6.322477e+04
r_f068m	42870.0	8.840244e+00	1.517295e+03	-10354.201000	-6.267897e+02	-6.238219e+01	5.197451e+02	5.960589e+04
r_f069m	42530.0	9.339943e+00	1.518786e+03	-10353.575000	-6.261504e+02	-6.262163e+01	5.185709e+02	5.959792e+04
r_f070m	42190.0	1.183728e+01	1.553401e+03	-10364.822000	-6.258608e+02	-6.272597e+01	5.174246e+02	6.322801e+04
r_f071m	41854.0	1.144214e+01	1.528550e+03	-10359.066000	-6.255535e+02	-6.392621e+01	5.187892e+02	5.962048e+04
r_f072m	41521.0	1.184666e+01	1.526583e+03	-10337.969000	-6.231732e+02	-6.187244e+01	5.202314e+02	5.961686e+04
r_f073m	41192.0	1.100189e+01	1.527136e+03	-10346.975000	-6.249619e+02	-6.212552e+01	5.195784e+02	5.963830e+04
r_f074m	40861.0	9.637871e+00	1.523174e+03	-10346.045000	-6.256456e+02	-6.270328e+01	5.186792e+02	5.962802e+04
r_f075m	40535.0	9.409494e+00	1.525669e+03	-10341.357000	-6.267688e+02	-6.429114e+01	5.197238e+02	5.962497e+04
r_f076m	40208.0	1.051646e+01	1.524390e+03	-10349.247000	-6.241584e+02	-6.101120e+01	5.201712e+02	5.962443e+04
r_f077m	39880.0	1.113472e+01	1.531908e+03	-10340.050000	-6.226339e+02	-6.196700e+01	5.178622e+02	5.962819e+04

r_f078m	39554.0	8.950152e+00	1.501954e+03	-10349.308000	-6.221765e+02	-6.197096e+01	5.178637e+02	5.962574e+04
r_f079m	39236.0	7.802610e+00	1.504687e+03	-10358.770500	-6.223158e+02	-6.227667e+01	5.169084e+02	5.961465e+04
r_f080m	38926.0	6.201185e+00	1.503234e+03	-10352.776000	-6.224030e+02	-6.187724e+01	5.149476e+02	5.962129e+04
r_f081m	38619.0	5.948074e+00	1.503799e+03	-10355.650000	-6.205610e+02	-6.197594e+01	5.137233e+02	5.961100e+04
r_f082m	38314.0	3.864463e+00	1.505996e+03	-10352.750000	-6.240520e+02	-6.367259e+01	5.131173e+02	5.961196e+04
r_f083m	38007.0	3.664052e+00	1.503338e+03	-10354.820000	-6.237713e+02	-6.481509e+01	5.089269e+02	5.961755e+04
r_f084m	37703.0	4.440729e+00	1.504918e+03	-10350.633000	-6.221347e+02	-6.311951e+01	5.091483e+02	5.963480e+04
r_f085m	37402.0	4.544894e+00	1.515499e+03	-10354.544000	-6.222024e+02	-6.220860e+01	5.081079e+02	5.964762e+04
r_f086m	37109.0	3.281831e+00	1.516751e+03	-10360.853000	-6.230770e+02	-6.226910e+01	5.079928e+02	5.965596e+04
r_f087m	36813.0	3.482398e+00	1.519468e+03	-10360.866000	-6.210749e+02	-6.140710e+01	5.078410e+02	5.967020e+04
r_f088m	36523.0	-3.125911e-01	1.511755e+03	-10362.454000	-6.213485e+02	-6.181438e+01	5.054173e+02	5.966344e+04
r_f089m	36232.0	-9.558926e-01	1.516491e+03	-10366.354500	-6.225936e+02	-6.464190e+01	5.035286e+02	5.966336e+04
r_f090m	35949.0	9.098750e-01	1.521934e+03	-10372.805000	-6.205939e+02	-6.451032e+01	5.046404e+02	5.967817e+04
r_f091m	35668.0	1.643679e+00	1.518625e+03	-10379.918000	-6.187950e+02	-6.462747e+01	5.026715e+02	5.966468e+04
r_f092m	35383.0	4.419948e-01	1.504417e+03	-10362.747000	-6.158791e+02	-6.483363e+01	5.017794e+02	5.967876e+04
r_f093m	35101.0	1.221775e+00	1.508261e+03	-10363.837000	-6.128359e+02	-6.500624e+01	4.981270e+02	5.967981e+04
r_f094m	34821.0	3.271227e+00	1.502136e+03	-10362.395500	-6.099118e+02	-6.210327e+01	4.992652e+02	5.967661e+04
r_f095m	34545.0	1.844988e+00	1.500251e+03	-10366.634000	-6.095762e+02	-6.391000e+01	4.962382e+02	5.964983e+04
r_f096m	34273.0	-4.195719e+00	1.452523e+03	-10351.669000	-6.076497e+02	-6.405402e+01	4.946187e+02	3.822466e+04
r_f097m	34008.0	-1.272113e+00	1.457855e+03	-10360.526000	-6.060871e+02	-6.261897e+01	4.944443e+02	3.825629e+04
r_f098m	33743.0	-1.157872e+00	1.455692e+03	-10349.928000	-6.044998e+02	-6.086780e+01	4.940435e+02	3.825998e+04
r_f099m	33481.0	-3.447836e+00	1.440899e+03	-10343.477000	-6.042529e+02	-6.154080e+01	4.935040e+02	3.824384e+04
r_f100m	33215.0	-1.394467e+00	1.448095e+03	-10360.437000	-6.027424e+02	-5.857706e+01	4.950108e+02	3.824502e+04
r_f101m	32952.0	-6.165224e-01	1.448491e+03	-10355.797000	-6.017300e+02	-5.825537e+01	4.938312e+02	3.823775e+04
r_f102m	32690.0	-4.280057e+00	1.448729e+03	-10357.049000	-6.029036e+02	-5.932628e+01	4.912056e+02	3.822794e+04
r_f103m	32433.0	-4.169329e+00	1.443659e+03	-10353.271000	-6.014415e+02	-5.832873e+01	4.926676e+02	3.822712e+04
r_f104m	32179.0	-4.386276e+00	1.451031e+03	-10351.789000	-6.009376e+02	-6.033015e+01	4.917939e+02	3.822126e+04
r_f105m	31925.0	-5.588626e+00	1.444452e+03	-10343.070000	-6.015952e+02	-5.946735e+01	4.896229e+02	3.822553e+04
r_f106m	31673.0	-5.495144e+00	1.439349e+03	-10349.243000	-5.978656e+02	-5.850847e+01	4.895872e+02	3.824129e+04
r_f107m	31422.0	-4.179788e+00	1.424058e+03	-10343.244000	-5.930051e+02	-5.639424e+01	4.908173e+02	3.824780e+04
r_f108m	31177.0	-7.865083e+00	1.407189e+03	-10352.471000	-5.924061e+02	-5.598181e+01	4.885238e+02	3.824807e+04
r_f109m	30933.0	-1.108934e+01	1.374479e+03	-10346.243000	-5.872474e+02	-5.246011e+01	4.871806e+02	3.824170e+04
r_f110m	30687.0	-9.377418e+00	1.366875e+03	-10356.089000	-5.848843e+02	-5.288901e+01	4.885097e+02	3.825065e+04
r_f111m	30441.0	-4.283699e+00	1.373127e+03	-10347.593000	-5.807097e+02	-5.207065e+01	4.868884e+02	3.823437e+04
r_f112m	30200.0	-4.324890e+00	1.374586e+03	-10357.649000	-5.775489e+02	-5.352940e+01	4.852102e+02	3.825164e+04
r_f113m	29961.0	-7.820449e+00	1.358095e+03	-10351.500000	-5.764953e+02	-5.361243e+01	4.817252e+02	3.825919e+04
r_f114m	29724.0	-5.331258e+00	1.357445e+03	-10342.195000	-5.751320e+02	-5.278899e+01	4.823461e+02	3.826692e+04

r_f115m	29493.0	-3.351582e+00	1.357031e+03	-10344.105000	-5.724246e+02	-5.157797e+01	4.820931e+02	3.826194e+04
r_f116m	29264.0	-4.909057e+00	1.350862e+03	-10339.466000	-5.686309e+02	-5.280978e+01	4.770111e+02	3.826857e+04
r_f117m	29035.0	-3.586359e+00	1.350565e+03	-10336.246000	-5.673146e+02	-5.437125e+01	4.764985e+02	3.826332e+04
r_f118m	28811.0	-1.277362e-01	1.358212e+03	-10342.192000	-5.641010e+02	-5.377197e+01	4.748591e+02	3.824484e+04
r_f119m	28589.0	1.866892e+00	1.349068e+03	-10337.505000	-5.623622e+02	-5.419829e+01	4.726981e+02	3.824567e+04
r_f120m	28371.0	-4.455160e+00	1.285383e+03	-10347.784000	-5.552332e+02	-5.160284e+01	4.716766e+02	3.825636e+04
train	100000.0	4.323200e-01	4.954007e-01	0.000000	0.000000e+00	0.000000e+00	1.000000e+00	1.000000e+00
test	100000.0	5.676800e-01	4.954007e-01	0.000000	0.000000e+00	1.000000e+00	1.000000e+00	1.000000e+00
dev	100000.0	4.323200e-01	4.954007e-01	0.000000	0.000000e+00	0.000000e+00	1.000000e+00	1.000000e+00

Table 2: Summary Statistics

10.2 Meeting Minutes

27/08/2021

Notes:

- Langrangion
- KKT Theoretical
- Hobbyists Edition - Mathematica
- Raspberry PI:
- Can you predict returns, interogate returns, take inspiration from GKX, look at hedge portfolio's.
- Use two loss functions (MSE, Huber Loss Function), Begs question if maximise profitability
- Give a toy example
- Two period, two stocks, predict accurately but not make more money, no dials to turn, OLS susceptible to outliers, one outlier creates a massive error.
- OLS susceptible to outliers, windsorize (not true)

To do list:

- Mathematical Function for Maximising the portfolio weight functions
- Tensorflows OLS with Dataset
- Literature

Next Date

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