

UNIVERSITY OF AUCKLAND  
DEPARTMENT OF ACCOUNTING & FINANCE

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# FINANCE 788: Research Essay

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## **Abstract**

## **Acknowledgements**

**Paul Geertsema**

## **Declaration of Contribution**

## Contents

1	Introduction	6
2	Literature Review	7
2.1	History of Asset Pricing Theory . . . . .	7
2.1.1	Optimisation Methodologies . . . . .	7
2.1.2	Machine Learning in Financial Contexts . . . . .	7
3	Research Intent	7
4	Theory	7
4.1	Return predictability . . . . .	7
4.2	Modelling, loss, and optimisation . . . . .	7
4.3	Ordinary Least Squares (OLS) . . . . .	7
4.3.1	Criteria for estimation . . . . .	8
4.3.2	Properties of OLS Estimators . . . . .	8
4.3.3	The Gauss-Markov Theorem . . . . .	8
4.3.4	Weaknesses in OLS: Return Predictability . . . . .	9
4.4	Derivation of Loss Functions and Performance Metrics . . . . .	9
4.5	Portfolio Formation: Hedge Portfolios . . . . .	9
5	Data	12
5.1	Summary Statistics . . . . .	12
6	Methodology	12
6.1	Project organisation . . . . .	12
6.1.1	Version Control . . . . .	12
6.1.2	Folder Structure . . . . .	12
6.1.3	Python . . . . .	13
6.1.4	Package Management . . . . .	13
6.1.5	Excel . . . . .	13
6.1.6	IBM ILOG CPLEX Optimization . . . . .	14
6.1.7	IBM Watson Machine Learning Service . . . . .	14
6.1.8	PyPI . . . . .	14
6.1.9	Code Style . . . . .	14
6.1.10	Infrastructure . . . . .	15
6.2	Documentation . . . . .	15
6.2.1	Project updates . . . . .	15
6.2.2	Meeting minutes . . . . .	15
7	Results	15
8	Discussion	15
9	Conclusion	15
10	Appendix	16
10.1	Tables and Charts . . . . .	16
10.2	Meeting Minutes . . . . .	31

**List of Figures**

1	Monotonic ranking functions . . . . .	10
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**List of Tables**

1	Objective (MSE: Mean Square Error, HP: Hedge Portfolio) . . . . .	9
2	Summary Statistics . . . . .	30

## **1 Introduction**

## 2 Literature Review

Insert Literature Review

### 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.

$$\hat{y} = mx_i + b \quad (1)$$

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

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.

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

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

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 predictive 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  $n \times k$  matrix of  $k$  independent variables for  $n$  observations. Secondly,  $\mathbf{y}$ , an  $n \times 1$  vector



of observation on the dependent variable. Thirdly,  $\epsilon$ , an  $n \times 1$  vector of unexplained error. Lastly,  $\theta$ , a  $k \times 1$  vector of parameters to be estimated.

$$y = X\theta + \epsilon \quad (5)$$

#### 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 ( $\epsilon$ ). Equation 7 derives residuals by taking the difference between observations based on parameter estimates.

$$\sum e_i^2 \quad (6)$$

$$e = y - X\hat{\theta} \quad (7)$$

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.

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

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

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.

$$2X^T X \hat{\theta} = 2X^T y \quad (10)$$

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

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

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

$$(14)$$

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.,  $\frac{e}{n} = \frac{y - X\theta}{n} = 0$ . Since  $\bar{e} = 0$  assumed, it is implied  $\bar{y} = \bar{x}\theta$ .
5. The residuals are uncorrelated with the predicted  $y$  i.e.,  $\hat{y} = X\hat{\theta}$ ,  $\hat{y}^T e = (X\hat{\theta})^T e = \hat{\theta}^T X^T e = 0$
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  $\beta$  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:

$$y = x\beta + \epsilon \quad (15)$$

$$E[\epsilon|X] = 0 \quad (16)$$

$$E(\epsilon\epsilon^T|X) = \Omega = \sigma^2 I \quad (17)$$

$$\epsilon|X \sim N[0, \sigma^2 I] \text{ (hypothesis testing)} \quad (18)$$

- X is an  $n \times k$  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 Derivation of Loss Functions and Performance Metrics

Table 1 provides an overview of

Variable	Description	$MSE(y, \hat{y})$	$HP(y, \hat{y})$
$\theta$	Estimation Training	$\hat{\theta}_{MSE}$	$\hat{\theta}_{HP}$
$\lambda$	Validation	$\hat{\lambda}_{MSE}$	$\hat{\lambda}_{HP}$

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

### 4.5 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.

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

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

$$L = \{y_{i,t} | R(y_{i,t}) \geq u\} \quad (20)$$

$$S = \{y_{i,t} | R(y_{i,t}) \leq v\} \quad (21)$$

$$0 < u < 1 \quad (22)$$

$$0 < v < 1 \quad (23)$$

$$u > v \quad (24)$$

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.

$$H_t = \frac{1}{|L|} \sum_{i \in L} y_{i,t} - \frac{1}{|S|} \sum_{i \in S} y_{i,t} \quad (25)$$

$$(26)$$

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

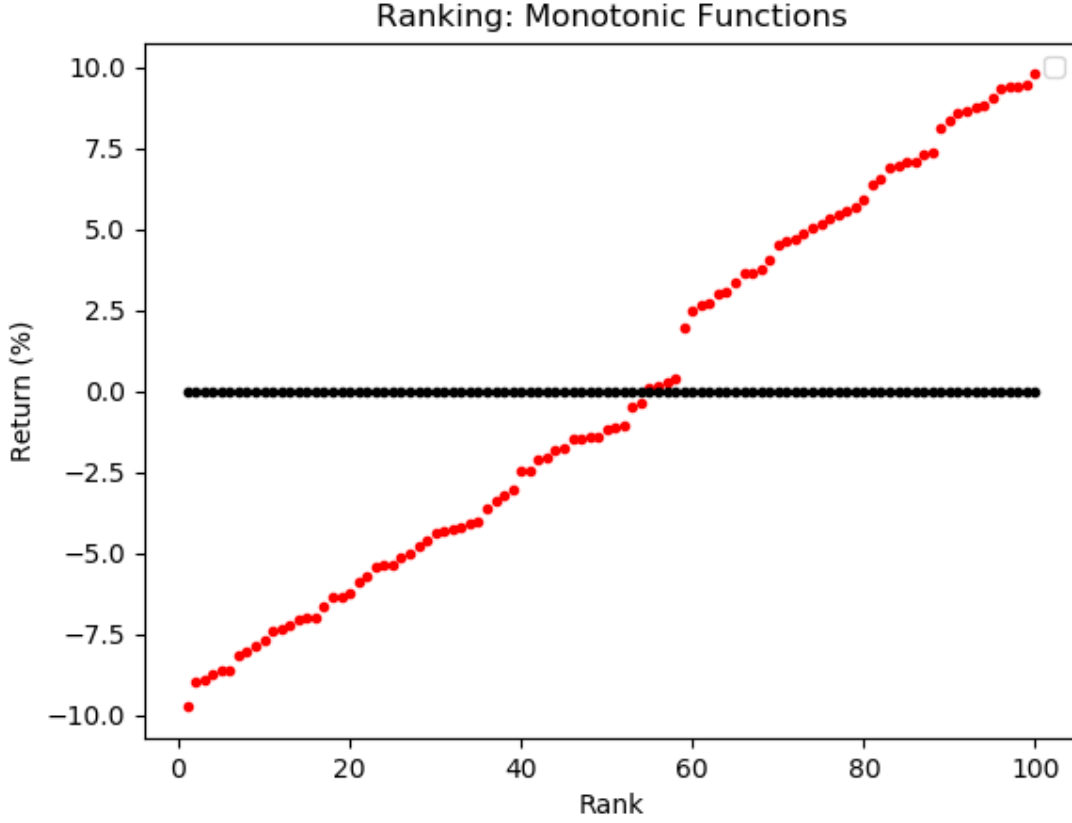


Figure 1: Monotonic ranking functions

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

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

$$W := \frac{\hat{y}}{\mathbf{1}\hat{y}} \quad (28)$$

$$\hat{y} = X^T \hat{\theta} \quad (29)$$

$$f_{\hat{\theta}}(X) = \left( \frac{X^T \hat{\theta}}{\mathbf{1} X^T \hat{\theta}} \right)^{\top} X^T \hat{\theta} \quad (30)$$

$$(31)$$

Section 4.2 explains the theory on predicative modelling, loss functions and optimisation algorithms. The ability to find partial derivatives (32) and argmax (4.5) inform the practicality of this ranking function.

$$\frac{\partial f_{\hat{\theta}}(X)}{\partial \hat{\theta}} = \frac{\partial \left( \left( \frac{X^T \hat{\theta}}{\mathbf{1} X^T \hat{\theta}} \right)^{\top} X^T \hat{\theta} \right)}{\partial \hat{\theta}} \quad (32)$$

$$\operatorname{argmax}_{\hat{\theta}} : \left( \frac{X^T \hat{\theta}}{\mathbf{1} X^T \hat{\theta}} \right)^{\top} X^T \hat{\theta} \quad (33)$$

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

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

$$+ \frac{1}{\vec{1}X^{\top}\hat{\theta}}XX^{\top}\hat{\theta} \quad (35)$$

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

## 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 hierarchical 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 reproducibly. 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<sup>1</sup>. 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

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<sup>1</sup><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<sup>2</sup> and install using pip<sup>3</sup>. 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, parameters, 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.

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<sup>2</sup><https://pypi.org/>

<sup>3</sup><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<sup>1</sup> 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.

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<sup>1</sup><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
permno	2739928.0	5.405281e+04	2.782267e+04	10000.0000	2.651800e+04	5.715400e+04	8.018600e+04	9.343600e+04
permco	2739928.0	1.843974e+04	1.402881e+04	3.0000	7.702000e+03	1.640850e+04	2.321000e+04	5.766700e+04
crsp_shrcl	2739928.0	1.089520e+01	4.571000e-01	10.0000	1.100000e+01	1.100000e+01	1.100000e+01	1.200000e+01
crsp_exchcd	2739928.0	2.127400e+00	9.343000e-01	1.0000	1.000000e+00	3.000000e+00	3.000000e+00	3.000000e+00
sic	2692217.0	4.605936e+03	1.921398e+03	100.0000	3.271000e+03	4.011000e+03	6.036000e+03	9.999000e+03
ff49	2674304.0	3.037380e+01	1.341740e+01	1.0000	1.800000e+01	3.400000e+01	4.300000e+01	4.900000e+01
adjfct	2739928.0	2.838700e+00	1.267170e+01	0.0000	1.000000e+00	1.000000e+00	2.000000e+00	1.215000e+03
shares	2739928.0	6.078630e+01	2.852566e+02	0.0830	4.399000e+00	1.251900e+01	3.808200e+01	2.920640e+04
me	2739928.0	2.241254e+03	1.473073e+04	1.1708	4.367020e+01	1.563628e+02	7.167608e+02	2.255969e+06
me_company	2739928.0	2.283180e+03	1.527340e+04	1.1708	4.387450e+01	1.574086e+02	7.211363e+02	2.255969e+06
prc	2739928.0	2.876220e+01	6.488772e+02	0.0078	7.875000e+00	1.612500e+01	2.912500e+01	1.416000e+05
prc_local	2739928.0	2.876220e+01	6.488772e+02	0.0078	7.875000e+00	1.612500e+01	2.912500e+01	1.416000e+05
dolvol	2580622.0	3.282292e+08	2.520900e+09	0.0000	1.070786e+06	7.165154e+06	7.076108e+07	8.441730e+11
ret	2719460.0	1.640000e-02	1.672000e-01	-1.0000	-5.880000e-02	4.100000e-03	7.410000e-02	2.400000e+01
ret_local	2719460.0	1.640000e-02	1.672000e-01	-1.0000	-5.880000e-02	4.100000e-03	7.410000e-02	2.400000e+01
ret_exc	2719460.0	1.270000e-02	1.673000e-01	-1.0068	-6.250000e-02	7.000000e-04	7.060000e-02	2.399690e+01
ret_lag_dif	2739928.0	1.000000e+00	0.000000e+00	1.0000	1.000000e+00	1.000000e+00	1.000000e+00	1.000000e+00
ret_exc_lead1m	2732542.0	6.400000e-03	1.559000e-01	-1.0113	-6.560000e-02	-1.800000e-03	6.710000e-02	1.988170e+01
market_equity_rank_x	2739928.0	5.982920e+01	2.380660e+01	1.0000	4.000000e+01	6.000000e+01	8.000000e+01	9.950000e+01
enterprise_value_rank_x	2480615.0	5.845440e+01	2.501660e+01	1.0000	3.800000e+01	5.900000e+01	8.000000e+01	9.950000e+01
book_equity_rank_x	2452453.0	5.800700e+01	2.593820e+01	1.0000	3.800000e+01	5.900000e+01	8.000000e+01	9.950000e+01
assets_rank_x	2522907.0	5.751850e+01	2.635510e+01	1.0000	3.700000e+01	5.900000e+01	8.000000e+01	9.950000e+01
sales_rank_x	2509790.0	5.691950e+01	2.717080e+01	1.0000	3.600000e+01	5.900000e+01	8.000000e+01	9.950000e+01
net_income_rank_x	2517298.0	5.581200e+01	2.878360e+01	1.0000	3.300000e+01	6.000000e+01	8.000000e+01	9.950000e+01
bidask_x	2739928.0	1.289000e-01	3.351000e-01	0.0000	0.000000e+00	0.000000e+00	0.000000e+00	1.000000e+00
prc_high_x	2355383.0	2.540480e+01	2.608370e+01	0.1790	9.250000e+00	1.850000e+01	3.300000e+01	4.617600e+02
prc_low_x	2365005.0	2.211970e+01	2.325750e+01	0.0818	7.640000e+00	1.600000e+01	2.880000e+01	4.175300e+02
tvol_x	2580622.0	8.316484e+06	2.941295e+07	0.0000	9.875000e+04	5.510000e+05	3.923700e+06	6.485186e+08
div1m_me_x	2718102.0	1.300000e-03	3.700000e-03	0.0000	0.000000e+00	0.000000e+00	0.000000e+00	9.010000e-02
div3m_me_x	2718121.0	4.000000e-03	6.000000e-03	0.0000	0.000000e+00	0.000000e+00	6.700000e-03	1.164000e-01
div6m_me_x	2660395.0	8.100000e-03	1.170000e-02	0.0000	0.000000e+00	0.000000e+00	1.360000e-02	1.472000e-01
div12m_me_x	2548844.0	1.670000e-02	2.350000e-02	0.0000	0.000000e+00	3.800000e-03	2.780000e-02	4.015000e-01

chcsbo_1m_x	2720001.0	3.200000e-03	2.550000e-02	-0.1168	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	1.096800e+00
chcsbo_3m_x	2681179.0	1.240000e-02	6.180000e-02	-0.1424	0.000000e+00	0.000000e+00	0.000000e+00	3.300000e-03	1.686700e+00
chcsbo_6m_x	2624125.0	2.810000e-02	1.189000e-01	-0.1880	0.000000e+00	9.000000e-04	1.070000e-02	1.070000e-02	3.832600e+00
chcsbo_12m_x	2514147.0	6.190000e-02	2.297000e-01	-0.2696	0.000000e+00	4.700000e-03	3.390000e-02	3.390000e-02	8.477000e+00
eqnp_1m_x	2718435.0	-1.500000e-03	2.310000e-02	-0.6801	-0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	1.263000e-01
eqnp_3m_x	2677912.0	-6.200000e-03	5.200000e-02	-0.9973	-1.800000e-03	0.000000e+00	0.000000e+00	8.000000e-03	1.696000e-01
eqnp_6m_x	2618619.0	-1.350000e-02	8.900000e-02	-1.5754	-7.400000e-03	0.000000e+00	0.000000e+00	1.640000e-02	2.788000e-01
eqnp_12m_x	2504936.0	-2.670000e-02	1.474000e-01	-2.2489	-2.450000e-02	0.000000e+00	0.000000e+00	3.340000e-02	4.743000e-01
ret_1_0_x	2541516.0	1.490000e-02	1.481000e-01	-0.7242	-6.120000e-02	7.900000e-03	7.900000e-02	7.690000e-02	2.176500e+00
ret_2_0_x	2521767.0	2.960000e-02	2.125000e-01	-0.8327	-8.110000e-02	1.480000e-02	1.176000e-01	1.176000e-01	3.342500e+00
ret_3_0_x	2503682.0	4.400000e-02	2.649000e-01	-0.8864	-9.610000e-02	2.270000e-02	1.506000e-01	1.506000e-01	5.000000e+00
ret_3_1_x	2502019.0	2.870000e-02	2.108000e-01	-0.8310	-8.140000e-02	1.440000e-02	1.167000e-01	1.167000e-01	3.342500e+00
ret_6_0_x	2447794.0	8.830000e-02	3.970000e-01	-0.9396	-1.267000e-01	4.500000e-02	2.336000e-01	2.336000e-01	8.555600e+00
ret_6_1_x	2446030.0	7.230000e-02	3.553000e-01	-0.9171	-1.184000e-01	3.700000e-02	2.059000e-01	2.059000e-01	8.411800e+00
ret_9_0_x	2393988.0	1.336000e-01	5.093000e-01	-0.9721	-1.466000e-01	6.750000e-02	3.069000e-01	3.069000e-01	9.857100e+00
ret_9_1_x	2392087.0	1.168000e-01	4.700000e-01	-0.9555	-1.414000e-01	5.930000e-02	2.812000e-01	2.812000e-01	9.273700e+00
ret_12_0_x	2341375.0	1.813000e-01	6.179000e-01	-0.9783	-1.593000e-01	9.080000e-02	3.773000e-01	3.773000e-01	1.301590e+01
ret_12_1_x	2339380.0	1.635000e-01	5.789000e-01	-0.9728	-1.558000e-01	8.200000e-02	3.514000e-01	3.514000e-01	1.223080e+01
ret_12_7_x	2337747.0	7.050000e-02	3.478000e-01	-0.9055	-1.163000e-01	3.610000e-02	2.015000e-01	2.015000e-01	8.509400e+00
ret_18_1_x	2239551.0	2.625000e-01	7.812000e-01	-0.9850	-1.710000e-01	1.321000e-01	4.926000e-01	4.926000e-01	2.048480e+01
ret_24_1_x	2145964.0	3.596000e-01	9.260000e-01	-0.9890	-1.717000e-01	1.837000e-01	6.267000e-01	6.267000e-01	1.484620e+01
ret_24_12_x	2142652.0	1.821000e-01	6.037000e-01	-0.9678	-1.493000e-01	9.260000e-02	3.714000e-01	3.714000e-01	1.345160e+01
ret_36_1_x	1976435.0	5.673000e-01	1.234400e+00	-0.9935	-1.548000e-01	2.964000e-01	8.916000e-01	8.916000e-01	1.914000e+01
ret_36_12_x	1972590.0	3.838000e-01	9.482000e-01	-0.9864	-1.546000e-01	2.006000e-01	6.490000e-01	6.490000e-01	1.702520e+01
ret_48_12_x	1821582.0	5.938000e-01	1.256400e+00	-0.9918	-1.358000e-01	3.161000e-01	9.172000e-01	9.172000e-01	1.811810e+01
ret_48_1_x	1826053.0	7.976000e-01	1.577300e+00	-0.9965	-1.285000e-01	4.175000e-01	1.176300e+00	1.176300e+00	1.772000e+01
ret_60_1_x	1691563.0	1.064400e+00	2.014800e+00	-0.9985	-9.170000e-02	5.486000e-01	1.492300e+00	1.492300e+00	2.754720e+01
ret_60_12_x	1686573.0	8.258000e-01	1.611700e+00	-0.9960	-1.096000e-01	4.364000e-01	1.200000e+00	1.200000e+00	2.063640e+01
ret_60_36_x	1680619.0	3.857000e-01	9.340000e-01	-0.9860	-1.429000e-01	2.072000e-01	6.479000e-01	6.479000e-01	1.808570e+01
seas_1_1an_x	2426517.0	1.420000e-02	1.421000e-01	-0.6705	-6.040000e-02	7.600000e-03	7.560000e-02	7.560000e-02	1.823500e+00
seas_1_1na_x	1870192.0	1.490000e-02	4.360000e-02	-0.2355	-7.800000e-03	1.280000e-02	3.460000e-02	3.460000e-02	3.871000e-01
seas_2_5an_x	1599992.0	1.520000e-02	6.790000e-02	-0.2970	-2.260000e-02	1.180000e-02	4.810000e-02	4.810000e-02	6.337000e-01
at_gr1_x	2426455.0	2.641000e-01	9.239000e-01	-0.7398	4.800000e-03	9.050000e-02	2.391000e-01	2.391000e-01	3.163840e+01
ca_gr1_x	2184566.0	3.206000e-01	1.336600e+00	-0.8313	-3.830000e-02	9.400000e-02	2.815000e-01	2.815000e-01	4.636900e+01
nca_gr1_x	2183067.0	3.950000e-01	1.682300e+00	-0.8737	-1.530000e-02	8.250000e-02	2.844000e-01	2.844000e-01	5.781320e+01
lt_gr1_x	2408077.0	3.042000e-01	9.791000e-01	-0.8021	-2.990000e-02	8.560000e-02	2.894000e-01	2.894000e-01	1.783760e+01
cl_gr1_x	2190296.0	2.996000e-01	8.898000e-01	-0.8494	-6.490000e-02	1.114000e-01	3.701000e-01	3.701000e-01	1.634630e+01

ncl_gr1_x	2075342.0	9.926000e-01	5.509500e+00	-1.0000	-1.023000e-01	3.970000e-02	3.376000e-01	1.990000e+02
be_gr1_x	2311345.0	3.178000e-01	1.301000e+00	-0.9166	5.900000e-03	9.660000e-02	2.271000e-01	3.373330e+01
debt_gr1_x	2158693.0	7.838000e-01	4.707200e+00	-1.0000	-1.456000e-01	1.900000e-02	3.292000e-01	1.090000e+02
sale_gr1_x	2362404.0	2.228000e-01	6.711000e-01	-0.9960	5.000000e-03	1.032000e-01	2.478000e-01	1.370570e+01
cogs_gr1_x	2358805.0	2.142000e-01	6.122000e-01	-0.9619	-4.700000e-03	1.032000e-01	2.613000e-01	1.190030e+01
sga_gr1_x	1997437.0	1.844000e-01	3.963000e-01	-1.0000	1.340000e-02	1.044000e-01	2.389000e-01	6.765800e+00
opex_gr1_x	2387208.0	1.949000e-01	4.470000e-01	-0.7668	7.900000e-03	1.058000e-01	2.505000e-01	7.187400e+00
capx_gr1_x	2147147.0	6.016000e-01	2.183000e+00	-1.3370	-2.236000e-01	1.144000e-01	6.251000e-01	3.425000e+01
inv_gr1_x	1910333.0	2.595000e-01	9.931000e-01	-1.0000	-6.850000e-02	8.260000e-02	2.909000e-01	1.698080e+01
at_gr3_x	2114339.0	9.104000e-01	2.670800e+00	-0.8797	8.870000e-02	3.426000e-01	8.167000e-01	6.899070e+01
ca_gr3_x	1898998.0	9.832000e-01	3.187300e+00	-0.9099	2.890000e-02	3.230000e-01	8.289000e-01	7.748590e+01
nca_gr3_x	1897746.0	1.592100e+00	6.786800e+00	-0.9628	4.280000e-02	3.455000e-01	1.005000e+00	1.792615e+02
lt_gr3_x	2091277.0	1.135900e+00	3.376000e+00	-0.8936	3.580000e-02	3.474000e-01	9.457000e-01	5.633890e+01
cl_gr3_x	1906078.0	9.845000e-01	2.656400e+00	-0.9194	9.000000e-03	3.652000e-01	9.754000e-01	4.535460e+01
ncl_gr3_x	1803330.0	4.168200e+00	2.242620e+01	-1.0000	-1.231000e-01	2.914000e-01	1.285200e+00	8.323333e+02
be_gr3_x	1998122.0	1.009400e+00	3.275200e+00	-0.9384	7.210000e-02	3.326000e-01	7.902000e-01	6.699660e+01
debt_gr3_x	1882647.0	3.622500e+00	2.086590e+01	-1.0000	-2.165000e-01	2.251000e-01	1.145100e+00	4.310000e+02
sale_gr3_x	2063618.0	8.605000e-01	2.814400e+00	-1.0000	7.210000e-02	3.286000e-01	7.527000e-01	8.620390e+01
cogs_gr3_x	2052669.0	7.935000e-01	2.179500e+00	-1.0000	4.870000e-02	3.267000e-01	7.894000e-01	4.537560e+01
sga_gr3_x	1713690.0	6.540000e-01	1.324200e+00	-1.0000	9.470000e-02	3.366000e-01	7.294000e-01	2.400000e+01
opex_gr3_x	2073541.0	7.171000e-01	1.625000e+00	-0.8979	7.650000e-02	3.367000e-01	7.689000e-01	2.833740e+01
capx_gr3_x	1846897.0	1.692700e+00	5.902400e+00	-1.2088	-2.368000e-01	3.214000e-01	1.355700e+00	1.128462e+02
cash_gr1a_x	2396920.0	1.480000e-02	1.380000e-01	-1.1898	-1.600000e-02	2.800000e-03	3.520000e-02	8.303000e-01
inv_gr1a_x	2351255.0	1.250000e-02	5.090000e-02	-0.3723	-7.000000e-04	7.000000e-04	2.250000e-02	2.978000e-01
rec_gr1a_x	2363716.0	2.190000e-02	6.430000e-02	-0.4405	-2.700000e-03	1.190000e-02	4.270000e-02	3.340000e-01
ppeg_gr1a_x	2178200.0	5.240000e-02	1.039000e-01	-0.8431	8.900000e-03	3.670000e-02	8.330000e-02	5.756000e-01
lti_gr1a_x	2205853.0	5.400000e-03	4.060000e-02	-0.4964	0.000000e+00	0.000000e+00	1.100000e-03	3.478000e-01
intan_gr1a_x	2110874.0	1.080000e-02	6.690000e-02	-0.9608	-7.000000e-04	0.000000e+00	1.700000e-03	5.336000e-01
debtst_gr1a_x	2395084.0	3.900000e-03	6.220000e-02	-0.5236	-5.000000e-03	0.000000e+00	1.320000e-02	4.847000e-01
ap_gr1a_x	2267822.0	1.460000e-02	4.890000e-02	-0.2766	-3.900000e-03	6.100000e-03	2.540000e-02	2.945000e-01
txp_gr1a_x	2057276.0	9.000000e-04	1.130000e-02	-0.0902	-9.000000e-04	0.000000e+00	2.200000e-03	9.250000e-02
debtlt_gr1a_x	2411829.0	1.770000e-02	9.970000e-02	-0.6085	-1.080000e-02	0.000000e+00	3.540000e-02	5.760000e-01
txdlitc_gr1a_x	2135161.0	2.300000e-03	1.280000e-02	-0.1302	0.000000e+00	0.000000e+00	4.800000e-03	8.330000e-02
coa_gr1a_x	2167569.0	3.450000e-02	1.005000e-01	-0.7908	-4.200000e-03	2.200000e-02	7.140000e-02	4.923000e-01
col_gr1a_x	2191221.0	1.980000e-02	6.480000e-02	-0.4855	-5.500000e-03	1.350000e-02	4.240000e-02	3.834000e-01
cowc_gr1a_x	2146736.0	1.440000e-02	8.680000e-02	-0.6052	-1.810000e-02	9.000000e-03	4.750000e-02	4.185000e-01
ncoa_gr1a_x	2185140.0	4.890000e-02	1.438000e-01	-1.8841	-5.500000e-03	2.970000e-02	9.040000e-02	7.494000e-01

ncol_gr1a_x	2174709.0	6.300000e-03	3.310000e-02	-0.3605	-1.100000e-03	1.900000e-03	1.180000e-02	3.338000e-01
mcoa_gr1a_x	2147813.0	4.270000e-02	1.424000e-01	-1.8841	-9.700000e-03	2.500000e-02	8.290000e-02	7.692000e-01
oa_gr1a_x	2167557.0	8.310000e-02	2.025000e-01	-2.5884	-3.400000e-03	6.800000e-02	1.668000e-01	8.176000e-01
ol_gr1a_x	2174709.0	2.620000e-02	8.090000e-02	-0.6433	-4.900000e-03	2.070000e-02	5.460000e-02	5.422000e-01
fna_gr1a_x	2497393.0	5.700000e-03	6.030000e-02	-0.7055	0.000000e+00	0.000000e+00	0.000000e+00	6.896000e-01
ful_gr1a_x	2418391.0	2.150000e-02	1.353000e-01	-1.2296	-1.620000e-02	1.000000e-04	5.400000e-02	1.130300e+00
nfna_gr1a_x	2418391.0	-1.580000e-02	1.552000e-01	-1.1078	-5.900000e-02	-9.000000e-04	2.760000e-02	1.384100e+00
gp_gr1a_x	2387365.0	3.580000e-02	1.161000e-01	-0.8663	-2.200000e-03	2.080000e-02	7.290000e-02	1.372100e+00
ebitda_gr1a_x	2390711.0	9.700000e-03	9.740000e-02	-0.8685	-1.050000e-02	9.300000e-03	3.840000e-02	1.237100e+00
ebit_gr1a_x	2392217.0	5.200000e-03	9.760000e-02	-0.8536	-1.310000e-02	6.700000e-03	3.280000e-02	1.345400e+00
ope_gr1a_x	2056758.0	9.400000e-03	1.005000e-01	-0.9869	-1.390000e-02	1.090000e-02	3.950000e-02	1.233300e+00
ni_gr1a_x	2402691.0	8.000000e-04	1.303000e-01	-1.6889	-1.340000e-02	3.900000e-03	2.430000e-02	2.739400e+00
nix_gr1a_x	2402691.0	6.000000e-04	1.422000e-01	-1.8549	-1.540000e-02	3.800000e-03	2.570000e-02	2.791300e+00
dp_gr1a_x	2309627.0	3.900000e-03	1.560000e-02	-0.3935	-0.000000e+00	2.500000e-03	7.500000e-03	1.932000e-01
fincf_gr1a_x	2053075.0	1.220000e-02	2.465000e-01	-2.0255	-5.480000e-02	2.700000e-03	7.330000e-02	1.485100e+00
ocf_gr1a_x	2334713.0	1.000000e-04	1.397000e-01	-0.9941	-4.190000e-02	2.900000e-03	4.640000e-02	1.151200e+00
fcf_gr1a_x	2181931.0	-7.300000e-03	1.637000e-01	-1.1368	-6.050000e-02	-4.000000e-04	5.020000e-02	1.202900e+00
nwc_gr1a_x	2164316.0	2.640000e-02	1.763000e-01	-1.4272	-2.650000e-02	1.650000e-02	7.240000e-02	9.090000e-01
eqnetis_gr1a_x	2052797.0	1.170000e-02	2.127000e-01	-1.9975	-1.000000e-02	0.000000e+00	1.380000e-02	1.207600e+00
dltnetis_gr1a_x	2373431.0	-3.100000e-03	1.313000e-01	-0.7874	-2.580000e-02	0.000000e+00	2.250000e-02	7.003000e-01
dstnetis_gr1a_x	2290818.0	7.000000e-04	8.970000e-02	-0.8063	-1.090000e-02	0.000000e+00	1.870000e-02	7.197000e-01
dbnetis_gr1a_x	2374474.0	-2.600000e-03	1.670000e-01	-1.0269	-4.130000e-02	0.000000e+00	4.330000e-02	1.017900e+00
netis_gr1a_x	2052412.0	8.700000e-03	2.717000e-01	-2.0764	-6.040000e-02	1.700000e-03	7.550000e-02	1.539900e+00
eqnpo_gr1a_x	2047069.0	-1.040000e-02	2.148000e-01	-1.1821	-1.480000e-02	0.000000e+00	1.310000e-02	1.940900e+00
tax_gr1a_x	2398103.0	3.100000e-03	2.840000e-02	-0.2157	-3.800000e-03	1.000000e-03	1.140000e-02	2.047000e-01
eqbb_gr1a_x	1893504.0	1.700000e-03	3.370000e-02	-0.3806	0.000000e+00	0.000000e+00	3.000000e-04	2.809000e-01
eqis_gr1a_x	2000469.0	1.360000e-02	2.117000e-01	-2.0255	-2.500000e-03	0.000000e+00	5.700000e-03	1.226200e+00
div_gr1a_x	2382722.0	1.100000e-03	1.270000e-02	-0.2183	0.000000e+00	0.000000e+00	1.200000e-03	2.439000e-01
eqpo_gr1a_x	1891334.0	2.900000e-03	4.380000e-02	-0.4620	-1.000000e-04	0.000000e+00	4.100000e-03	3.915000e-01
capx_gr1a_x	2184434.0	7.400000e-03	5.440000e-02	-0.4868	-7.300000e-03	2.300000e-03	1.940000e-02	4.471000e-01
be_gr1a_x	2311289.0	4.620000e-02	1.699000e-01	-2.0718	1.600000e-03	3.510000e-02	8.970000e-02	8.561000e-01
cash_gr3a_x	2081646.0	2.960000e-02	1.755000e-01	-2.5781	-1.260000e-02	9.500000e-03	6.320000e-02	9.052000e-01
inv_gr3a_x	2033267.0	2.900000e-02	8.700000e-02	-0.6971	0.000000e+00	6.800000e-03	5.550000e-02	4.115000e-01
rec_gr3a_x	2047864.0	4.970000e-02	1.082000e-01	-0.7795	1.400000e-03	3.280000e-02	8.960000e-02	4.887000e-01
ppeg_gr3a_x	1890568.0	1.277000e-01	2.118000e-01	-2.1282	3.190000e-02	1.080000e-01	2.163000e-01	9.231000e-01
lti_gr3a_x	1864897.0	1.290000e-02	7.040000e-02	-0.6566	0.000000e+00	0.000000e+00	8.800000e-03	4.683000e-01
intan_gr3a_x	1784074.0	2.520000e-02	1.171000e-01	-1.7938	-0.000000e+00	0.000000e+00	2.360000e-02	6.632000e-01

debtst_gr3a_x	2078323.0	8.500000e-03	7.970000e-02	-0.8315	-6.500000e-03	3.000000e-04	2.440000e-02	5.514000e-01
ap_gr3a_x	1936459.0	3.440000e-02	8.510000e-02	-0.4973	-3.000000e-04	1.600000e-02	4.880000e-02	4.801000e-01
txp_gr3a_x	1751204.0	1.900000e-03	1.400000e-02	-0.0976	-1.200000e-03	0.000000e+00	4.400000e-03	1.079000e-01
debtlt_gr3a_x	2098723.0	4.090000e-02	1.579000e-01	-1.1700	-1.120000e-02	1.060000e-02	1.011000e-01	7.496000e-01
txdlc_gr3a_x	1843283.0	6.200000e-03	2.480000e-02	-0.2172	0.000000e+00	0.000000e+00	1.330000e-02	1.273000e-01
coa_gr3a_x	1880953.0	7.660000e-02	1.701000e-01	-1.4412	6.100000e-03	6.190000e-02	1.549000e-01	6.791000e-01
col_gr3a_x	1907173.0	4.420000e-02	9.650000e-02	-0.9653	4.300000e-03	3.750000e-02	8.380000e-02	4.559000e-01
cowc_gr3a_x	1861920.0	3.210000e-02	1.338000e-01	-1.0405	-2.130000e-02	2.260000e-02	9.140000e-02	5.604000e-01
ncoa_gr3a_x	1899708.0	1.091000e-01	2.575000e-01	-4.5815	1.230000e-02	1.026000e-01	2.250000e-01	8.112000e-01
ncol_gr3a_x	1887939.0	1.640000e-02	5.970000e-02	-0.5782	-0.000000e+00	9.000000e-03	3.080000e-02	4.104000e-01
nncoa_gr3a_x	1861492.0	9.300000e-02	2.474000e-01	-3.9391	1.200000e-03	8.690000e-02	2.030000e-01	8.094000e-01
oa_gr3a_x	1880920.0	1.840000e-01	3.641000e-01	-5.1474	4.560000e-02	2.082000e-01	3.829000e-01	9.247000e-01
ol_gr3a_x	1887939.0	6.020000e-02	1.295000e-01	-1.1795	1.270000e-02	5.900000e-02	1.138000e-01	6.233000e-01
fna_gr3a_x	2302373.0	1.560000e-02	8.920000e-02	-1.1421	0.000000e+00	0.000000e+00	0.000000e+00	7.162000e-01
fnl_gr3a_x	2105333.0	4.560000e-02	2.040000e-01	-1.8999	-1.910000e-02	2.600000e-02	1.304000e-01	8.753000e-01
nfna_gr3a_x	2105333.0	-3.150000e-02	2.282000e-01	-1.3255	-1.318000e-01	-2.310000e-02	4.440000e-02	2.048000e+00
gp_gr3a_x	2074121.0	7.850000e-02	1.870000e-01	-1.2858	4.200000e-03	5.550000e-02	1.554000e-01	1.274100e+00
ebitda_gr3a_x	2079592.0	2.410000e-02	1.330000e-01	-1.0362	-8.600000e-03	2.410000e-02	7.360000e-02	1.478800e+00
ebit_gr3a_x	2081034.0	1.490000e-02	1.346000e-01	-1.1637	-1.460000e-02	1.620000e-02	6.010000e-02	1.985300e+00
ope_gr3a_x	1772515.0	2.290000e-02	1.350000e-01	-1.1140	-1.410000e-02	2.540000e-02	7.260000e-02	1.382600e+00
ni_gr3a_x	2095331.0	5.500000e-03	1.607000e-01	-2.0040	-1.480000e-02	8.900000e-03	4.110000e-02	3.365400e+00
nix_gr3a_x	2095331.0	5.200000e-03	1.722000e-01	-2.2144	-1.670000e-02	8.800000e-03	4.270000e-02	3.330500e+00
dp_gr3a_x	1998657.0	9.200000e-03	2.780000e-02	-0.6566	5.000000e-04	7.400000e-03	1.760000e-02	3.627000e-01
ocf_gr3a_x	2026157.0	1.030000e-02	1.536000e-01	-0.9623	-3.950000e-02	1.100000e-02	6.680000e-02	1.459300e+00
fcf_gr3a_x	1875380.0	-2.300000e-03	1.806000e-01	-0.9594	-6.520000e-02	3.500000e-03	6.430000e-02	1.668700e+00
nwc_gr3a_x	1880705.0	5.470000e-02	2.333000e-01	-3.1433	-2.400000e-02	4.470000e-02	1.438000e-01	9.475000e-01
dltntetis_gr3a_x	2057295.0	-7.000000e-03	1.381000e-01	-0.9437	-3.150000e-02	0.000000e+00	2.360000e-02	8.602000e-01
dstnetis_gr3a_x	1975805.0	-1.000000e-04	7.960000e-02	-0.7776	-1.420000e-02	0.000000e+00	1.680000e-02	6.541000e-01
dbnetis_gr3a_x	2058325.0	-7.400000e-03	1.681000e-01	-1.2437	-4.610000e-02	0.000000e+00	4.140000e-02	1.075700e+00
tax_gr3a_x	2090131.0	6.500000e-03	3.600000e-02	-0.2190	-4.800000e-03	2.700000e-03	1.970000e-02	2.106000e-01
div_gr3a_x	2069485.0	2.200000e-03	1.420000e-02	-0.2110	0.000000e+00	0.000000e+00	4.200000e-03	2.609000e-01
capx_gr3a_x	1877910.0	1.340000e-02	6.720000e-02	-0.6838	-6.700000e-03	6.500000e-03	3.240000e-02	3.679000e-01
capx_at_x	2305667.0	6.630000e-02	7.300000e-02	-0.0305	1.920000e-02	4.470000e-02	8.570000e-02	6.092000e-01
spi_at_x	2376699.0	-1.010000e-02	4.960000e-02	-1.3123	-2.700000e-03	0.000000e+00	0.000000e+00	1.961000e-01
xido_at_x	2513016.0	-5.000000e-04	1.800000e-02	-0.4152	0.000000e+00	0.000000e+00	0.000000e+00	1.762000e-01
nri_at_x	2375825.0	-1.080000e-02	6.070000e-02	-1.5759	-4.600000e-03	0.000000e+00	0.000000e+00	2.675000e-01
gp_sale_x	2468341.0	8.440000e-02	3.062100e+00	-124.7476	2.080000e-01	3.345000e-01	5.045000e-01	9.763000e-01

ebitda_sale_x	2470375.0	-3.073000e-01	4.409900e+00	-171.6176	5.970000e-02	1.272000e-01	2.277000e-01	7.373000e-01
ebit_sale_x	2470818.0	-3.840000e-01	4.578500e+00	-185.0447	3.170000e-02	8.990000e-02	1.721000e-01	6.154000e-01
pi_sale_x	2473639.0	-4.469000e-01	4.876400e+00	-184.2990	1.190000e-02	7.260000e-02	1.445000e-01	7.101000e-01
ni_sale_x	2474362.0	-4.693000e-01	4.796100e+00	-184.2990	7.200000e-03	4.550000e-02	9.440000e-02	5.566000e-01
mix_sale_x	2472905.0	-4.745000e-01	4.848700e+00	-184.2990	6.200000e-03	4.620000e-02	9.640000e-02	6.508000e-01
ocf_sale_x	2414346.0	-3.439000e-01	3.755000e+00	-140.2577	-1.520000e-02	5.800000e-02	1.448000e-01	1.412300e+00
fcf_sale_x	2267091.0	-5.418000e-01	4.134400e+00	-125.9694	-1.053000e-01	-1.100000e-03	6.670000e-02	1.210500e+00
gp_at_x	2503159.0	3.011000e-01	2.895000e-01	-1.2660	1.023000e-01	2.659000e-01	4.563000e-01	1.412300e+00
ebitda_at_x	2505194.0	7.710000e-02	1.992000e-01	-2.1076	2.950000e-02	1.080000e-01	1.699000e-01	5.122000e-01
ebit_at_x	2506116.0	4.100000e-02	1.986000e-01	-2.1142	1.820000e-02	7.130000e-02	1.269000e-01	4.730000e-01
fi_at_x	2185678.0	1.660000e-02	2.114000e-01	-2.6041	2.010000e-02	6.410000e-02	9.800000e-02	3.716000e-01
cop_at_x	2259456.0	1.333000e-01	1.925000e-01	-1.1882	3.940000e-02	1.365000e-01	2.302000e-01	1.940400e+00
ni_at_x	2514966.0	-5.000000e-03	2.045000e-01	-2.8828	3.400000e-03	3.510000e-02	7.410000e-02	3.332000e-01
ope_be_x	2108352.0	1.569000e-01	5.427000e-01	-8.8149	9.490000e-02	2.136000e-01	3.261000e-01	3.725100e+00
ni_be_x	2444347.0	-1.990000e-02	5.962000e-01	-10.7541	1.720000e-02	9.500000e-02	1.504000e-01	1.450500e+00
mix_be_x	2444347.0	-2.270000e-02	6.187000e-01	-11.9515	1.490000e-02	9.590000e-02	1.526000e-01	1.558300e+00
ocf_be_x	2375509.0	4.150000e-02	5.350000e-01	-7.2459	-3.990000e-02	1.089000e-01	2.199000e-01	4.068700e+00
fcf_be_x	2219533.0	-1.352000e-01	6.520000e-01	-9.8959	-2.117000e-01	-4.000000e-03	1.206000e-01	2.895100e+00
gp_be_v_x	2404319.0	6.940000e-01	1.236500e+00	-11.0645	2.172000e-01	4.625000e-01	8.366000e-01	1.753110e+01
ebitda_be_v_x	2406313.0	5.730000e-02	1.310800e+00	-38.6063	9.750000e-02	1.837000e-01	2.972000e-01	3.290900e+00
ebit_be_v_x	2406990.0	-2.510000e-02	1.386000e+00	-41.0563	5.220000e-02	1.282000e-01	2.282000e-01	2.800000e+00
fi_be_v_x	2116451.0	-8.600000e-02	1.345800e+00	-38.5103	4.190000e-02	9.910000e-02	1.608000e-01	2.274200e+00
cop_be_v_x	2188818.0	3.139000e-01	8.344000e-01	-8.9448	8.920000e-02	2.259000e-01	4.111000e-01	1.607970e+01
gp_ppen_x	2466653.0	2.766900e+00	6.510900e+00	-130.5385	4.559000e-01	1.518900e+00	3.353000e+00	1.035052e+02
ebitda_ppen_x	2468488.0	-1.134000e-01	1.280070e+01	-558.0000	1.689000e-01	4.726000e-01	1.116300e+00	3.389320e+01
fcf_ppen_x	2270795.0	-8.658000e-01	1.104610e+01	-423.4211	-3.778000e-01	-1.180000e-02	3.338000e-01	3.272670e+01
fncl_at_x	2181057.0	6.050000e-02	2.270000e-01	-0.9085	-4.100000e-02	1.800000e-03	8.120000e-02	1.643700e+00
netis_at_x	2180970.0	2.900000e-02	2.576000e-01	-1.3681	-4.860000e-02	0.000000e+00	5.940000e-02	1.592800e+00
eqnetis_at_x	2181226.0	5.680000e-02	1.918000e-01	-0.3507	-8.000000e-04	6.000000e-04	1.520000e-02	1.488800e+00
eqis_at_x	2142004.0	7.050000e-02	1.912000e-01	-0.1034	0.000000e+00	3.200000e-03	2.280000e-02	1.535600e+00
dbnetis_at_x	2487875.0	-2.120000e-02	1.573000e-01	-1.3624	-3.980000e-02	-8.000000e-04	2.270000e-02	6.456000e-01
dltnetis_at_x	2487184.0	-2.430000e-02	1.364000e-01	-1.2268	-3.180000e-02	-2.200000e-03	1.200000e-03	5.184000e-01
dstnetis_at_x	2428021.0	3.500000e-03	6.050000e-02	-0.4789	-5.100000e-03	0.000000e+00	1.130000e-02	4.836000e-01
eqnpo_at_x	2177364.0	-4.470000e-02	1.949000e-01	-1.4673	-1.110000e-02	8.000000e-04	2.020000e-02	4.462000e-01
eqbb_at_x	2059717.0	1.250000e-02	3.500000e-02	-0.0026	0.000000e+00	0.000000e+00	5.300000e-03	4.018000e-01
div_at_x	2500964.0	1.160000e-02	2.170000e-02	0.0000	0.000000e+00	1.900000e-03	1.660000e-02	3.183000e-01
oaccruals_at_x	2261617.0	-1.580000e-02	1.522000e-01	-2.2637	-7.200000e-02	-1.830000e-02	4.760000e-02	6.719000e-01

oaccruals_ni_x	2260635.0	-5.853000e-01	6.180500e+00	-71.4418	-1.208700e+00	-2.712000e-01	6.967000e-01	8.515790e+01
taccruals_at_x	2240180.0	-3.100000e-02	2.045000e-01	-2.4802	-9.100000e-02	-1.180000e-02	4.930000e-02	1.294200e+00
taccruals_ni_x	2238904.0	-1.448100e+00	8.683400e+00	-131.5096	-1.516600e+00	-1.946000e-01	7.622000e-01	6.728570e+01
noa_at_x	2142866.0	6.816000e-01	4.649000e-01	-1.1515	4.896000e-01	6.884000e-01	8.418000e-01	1.038840e+01
be_bev_x	2368048.0	1.343100e+00	2.666700e+00	0.0326	5.543000e-01	8.086000e-01	1.190400e+00	6.053070e+01
debt_bev_x	2416506.0	4.732000e-01	6.162000e-01	0.0000	1.399000e-01	3.804000e-01	6.012000e-01	1.276120e+01
cash_bev_x	2397575.0	8.357000e-01	3.110100e+00	0.0000	3.800000e-02	1.245000e-01	4.276000e-01	8.007360e+01
pstk_bev_x	2418755.0	2.720000e-02	1.704000e-01	0.0000	0.000000e+00	0.000000e+00	0.000000e+00	7.089400e+00
debtlt_bev_x	2412477.0	3.446000e-01	4.482000e-01	0.0000	5.390000e-02	2.671000e-01	4.815000e-01	9.026500e+00
debtst_bev_x	2403343.0	1.233000e-01	2.903000e-01	0.0000	3.200000e-03	3.390000e-02	1.172000e-01	5.633000e+00
int_debt_x	1959042.0	1.258000e-01	3.153000e-01	0.0000	5.310000e-02	7.610000e-02	1.063000e-01	7.750000e+00
int_debtlt_x	1874541.0	3.393000e-01	1.552500e+00	0.0000	6.360000e-02	9.400000e-02	1.485000e-01	4.145000e+01
ebitda_debt_x	2242375.0	2.161600e+00	2.312980e+01	-362.2105	1.666000e-01	3.959000e-01	9.501000e-01	5.562212e+02
profit_cl_x	2270271.0	4.298000e-01	1.566600e+00	-11.9038	2.114000e-01	5.648000e-01	1.016300e+00	6.155300e+00
ocf_cl_x	2269486.0	5.390000e-02	1.456200e+00	-14.9568	-1.363000e-01	2.183000e-01	5.993000e-01	5.976400e+00
ocf_debt_x	2189764.0	1.253200e+00	1.968000e+01	-264.1167	7.590000e-02	1.564000e-01	5.185000e-01	4.307215e+02
cash_lt_x	2487462.0	7.781000e-01	2.113200e+00	0.0000	4.150000e-02	1.312000e-01	5.084000e-01	2.990910e+01
inv_act_x	2124755.0	2.719000e-01	2.276000e-01	0.0000	4.860000e-02	2.538000e-01	4.448000e-01	9.113000e-01
rec_act_x	2130411.0	3.499000e-01	2.071000e-01	0.0000	1.990000e-01	3.479000e-01	4.754000e-01	9.455000e-01
debtst_debt_x	2235158.0	2.916000e-01	3.181000e-01	0.0000	3.900000e-02	1.578000e-01	4.582000e-01	1.000000e+00
cl_lt_x	2271050.0	5.408000e-01	2.822000e-01	0.0172	3.033000e-01	5.188000e-01	7.861000e-01	1.000000e+00
debtlt_debt_x	2251637.0	7.215000e-01	3.158000e-01	0.0000	5.637000e-01	8.571000e-01	9.724000e-01	1.000000e+00
lt_ppen_x	2467297.0	1.413180e+01	4.095230e+01	0.0809	1.032300e+00	2.019600e+00	5.768200e+00	7.630447e+02
debtlt_be_x	2439883.0	7.140000e-01	1.464700e+00	0.0000	3.360000e-02	3.025000e-01	7.618000e-01	2.225160e+01
opex_at_x	2503218.0	9.413000e-01	8.196000e-01	0.0029	3.295000e-01	7.872000e-01	1.304500e+00	7.158500e+00
nwc_at_x	2253296.0	2.724000e-01	2.457000e-01	-0.7924	8.520000e-02	2.536000e-01	4.349000e-01	9.547000e-01
debt_at_x	2514980.0	2.331000e-01	2.095000e-01	0.0000	5.090000e-02	1.957000e-01	3.591000e-01	1.428700e+00
debt_be_x	2444508.0	9.825000e-01	1.972300e+00	0.0000	9.520000e-02	4.426000e-01	1.023800e+00	3.440000e+01
ebit_int_x	2038745.0	1.266250e+01	1.784445e+02	-3702.0000	1.253300e+00	4.003000e+00	1.124330e+01	3.302250e+03
inv_days_x	2394275.0	8.869850e+01	1.683021e+02	0.0000	9.009300e+00	5.392190e+01	1.091676e+02	3.574195e+03
rec_days_x	2403668.0	3.602296e+02	9.967740e+02	0.0000	3.863530e+01	5.827670e+01	8.822010e+01	7.354934e+03
ap_days_x	2314657.0	1.459695e+03	7.489965e+03	0.7812	2.587680e+01	4.209780e+01	7.865320e+01	1.412089e+05
cash_conversion_x	1836443.0	1.256743e+02	2.122532e+02	0.0000	4.172550e+01	8.193360e+01	1.398610e+02	3.521431e+03
cash_cl_x	2262167.0	1.419800e+00	3.231200e+00	0.0000	1.124000e-01	3.726000e-01	1.177400e+00	3.650000e+01
caliq_cl_x	2241081.0	2.487700e+00	3.827100e+00	0.0581	9.004000e-01	1.378900e+00	2.376600e+00	4.066670e+01
ca_cl_x	2252774.0	3.162200e+00	3.912700e+00	0.0824	1.372500e+00	2.102000e+00	3.307100e+00	4.119530e+01
inv_turnover_x	1990611.0	1.861590e+01	4.951140e+01	0.0438	2.956600e+00	5.130900e+00	1.205000e+01	7.307939e+02

at_turnover_x	2482416.0	1.084900e+00	9.318000e-01	0.0000	3.768000e-01	9.269000e-01	1.525100e+00	9.298300e+00
rec_turnover_x	2400338.0	1.234110e+01	2.636800e+01	0.0000	4.039600e+00	6.187900e+00	9.236800e+00	2.787135e+02
ap_turnover_x	2229997.0	1.163840e+01	1.238900e+01	-0.1258	4.826800e+00	8.918500e+00	1.434510e+01	1.336129e+02
sale_bev_x	2408388.0	2.269200e+00	2.923100e+00	0.0000	7.623000e-01	1.580300e+00	2.598800e+00	3.887110e+01
sale_be_x	2437063.0	2.732600e+00	3.718300e+00	0.0000	9.001000e-01	1.758000e+00	3.096000e+00	5.438940e+01
div_ni_x	1963756.0	3.126000e-01	5.775000e-01	0.0000	0.000000e+00	1.650000e-01	4.135000e-01	1.293670e+01
sale_nwc_x	2017664.0	9.746900e+00	2.267620e+01	0.0000	2.066900e+00	3.971600e+00	7.750900e+00	3.110241e+02
tax_pi_x	1999061.0	3.279000e-01	3.117000e-01	-7.2981	2.705000e-01	3.654000e-01	4.329000e-01	5.548900e+00
cash_at_x	2496082.0	1.581000e-01	2.035000e-01	0.0000	2.580000e-02	7.260000e-02	2.026000e-01	9.799000e-01
ni_emp_x	2332173.0	-1.044570e+01	1.898294e+02	-3810.3810	4.055000e-01	4.200600e+00	1.703640e+01	1.438498e+03
sale_emp_x	2328826.0	2.691786e+02	5.003031e+02	0.0000	6.301400e+01	1.411000e+02	2.763478e+02	7.782523e+03
sale_emp_gr1_x	2120715.0	1.123000e-01	4.553000e-01	-0.9563	-3.330000e-02	5.300000e-02	1.513000e-01	7.027000e+00
emp_gr1_x	2048454.0	7.670000e-02	2.504000e-01	-1.3333	-3.060000e-02	4.520000e-02	1.538000e-01	1.483100e+00
ni_inc8q_x	1837805.0	3.116800e+00	3.262400e+00	0.0000	0.000000e+00	2.000000e+00	7.000000e+00	8.000000e+00
noa_gr1a_x	2130139.0	1.277000e-01	4.002000e-01	-0.7366	-1.750000e-02	4.940000e-02	1.574000e-01	1.075230e+01
ppeinv_gr1a_x	2130674.0	1.104000e-01	2.282000e-01	-0.5663	9.400000e-03	5.870000e-02	1.436000e-01	3.078700e+00
lnoa_gr1a_x	2042945.0	3.180000e-02	9.170000e-02	-0.5778	-3.800000e-03	1.370000e-02	4.740000e-02	7.544000e-01
capx_gr2_x	1996106.0	1.219100e+00	4.305300e+00	-1.4277	-2.477000e-01	2.272000e-01	1.043000e+00	7.697220e+01
saleq_gr1_x	2256822.0	2.428000e-01	8.315000e-01	-1.0000	-1.270000e-02	9.890000e-02	2.606000e-01	1.574840e+01
niq_be_x	2153966.0	5.000000e-04	1.393000e-01	-2.0216	1.600000e-03	2.420000e-02	4.290000e-02	6.993000e-01
niq_at_x	2218680.0	-2.200000e-03	6.080000e-02	-0.6672	0.000000e+00	8.200000e-03	2.060000e-02	1.818000e-01
niq_be_chg1_x	1961181.0	-7.700000e-03	1.339000e-01	-2.0038	-1.650000e-02	-6.000000e-04	1.090000e-02	1.227600e+00
niq_at_chg1_x	2044996.0	3.000000e-04	5.400000e-02	-0.4547	-7.100000e-03	-0.000000e+00	5.600000e-03	8.413000e-01
dsale_dinv_x	1796036.0	-4.380000e-02	8.780000e-01	-19.4778	-1.460000e-01	2.150000e-02	1.949000e-01	5.598300e+00
dsale_drec_x	2136436.0	-3.080000e-02	6.202000e-01	-7.3996	-1.418000e-01	1.500000e-03	1.418000e-01	7.637700e+00
dgp_dsale_x	2120443.0	2.720000e-02	5.405000e-01	-5.9700	-7.530000e-02	2.300000e-03	8.380000e-02	1.201120e+01
dsale_dsga_x	1827645.0	2.310000e-02	3.643000e-01	-2.2251	-8.920000e-02	-1.000000e-04	9.360000e-02	6.963700e+00
saleq_su_x	1944544.0	1.618000e-01	1.699500e+00	-16.0960	-8.666000e-01	1.532000e-01	1.125000e+00	3.358810e+01
niq_su_x	1972831.0	-1.123000e-01	1.940400e+00	-50.8463	-7.565000e-01	5.100000e-03	7.529000e-01	2.019490e+01
capex_abn_x	1806456.0	1.173000e-01	9.626000e-01	-1.1469	-3.685000e-01	-6.920000e-02	2.932000e-01	1.196350e+01
op_atll_x	2415570.0	1.320000e-01	2.472000e-01	-6.9463	4.860000e-02	1.355000e-01	2.227000e-01	1.125400e+00
gp_atll_x	2413733.0	3.639000e-01	3.763000e-01	-1.9036	1.162000e-01	3.032000e-01	5.356000e-01	2.788000e+00
ope_bell_x	2010286.0	2.202000e-01	6.575000e-01	-13.6285	1.063000e-01	2.425000e-01	3.880000e-01	4.617600e+00
cop_atll_x	2237311.0	1.409000e-01	2.863000e-01	-3.8344	4.500000e-02	1.505000e-01	2.563000e-01	1.923400e+00
pi_nix_x	1959639.0	1.615000e+00	6.861000e-01	0.1059	1.340700e+00	1.572900e+00	1.777900e+00	1.989360e+01
ocf_at_x	2449158.0	1.150000e-02	1.872000e-01	-1.8184	-2.140000e-02	4.090000e-02	1.033000e-01	5.979000e-01
op_at_x	2505194.0	1.113000e-01	1.575000e-01	-1.2330	4.200000e-02	1.205000e-01	1.892000e-01	5.662000e-01



ocf_at_chg1_x	2333855.0	2.300000e-03	1.627000e-01	-1.0782	-4.770000e-02	-1.000000e-04	4.630000e-02	1.390100e+00
at_be_x	2452393.0	3.714900e+00	4.779700e+00	1.0000	1.469000e+00	2.029600e+00	3.240900e+00	5.963100e+01
niq_saleq_std_x	1902197.0	1.360600e+00	1.149800e+01	0.0008	1.930000e-02	4.260000e-02	1.236000e-01	3.177766e+02
roe_be_std_x	1799259.0	1.611000e-01	4.732000e-01	0.0021	2.230000e-02	4.760000e-02	1.133000e-01	9.225400e+00
tangibility_x	2201788.0	6.502000e-01	1.916000e-01	0.0025	5.540000e-01	6.638000e-01	7.614000e-01	1.684700e+00
earnings_variability_x	1752776.0	8.639000e-01	1.037400e+00	0.0243	2.577000e-01	5.765000e-01	1.052900e+00	1.145280e+01
aliq_at_x	2174808.0	8.263000e-01	8.005000e-01	0.1044	5.792000e-01	6.946000e-01	8.423000e-01	2.803980e+01
f_score_x	1978727.0	4.911500e+00	1.728500e+00	0.0000	4.000000e+00	5.000000e+00	6.000000e+00	9.000000e+00
o_score_x	2127585.0	-1.902100e+00	3.035200e+00	-9.3872	-3.598500e+00	-2.309000e+00	-8.857000e-01	2.287030e+01
z_score_x	2126989.0	5.526800e+00	9.357000e+00	-37.3359	1.992200e+00	3.446700e+00	5.637300e+00	1.744239e+02
intrinsic_value_x	1899809.0	1.317903e+03	5.258077e+03	0.0982	3.489040e+01	1.295681e+02	5.706605e+02	1.130984e+05
kz_index_x	2167838.0	-1.126290e+01	5.190800e+01	-1723.5716	-6.936600e+00	-1.467200e+00	5.962000e-01	8.903350e+01
gpoa_ch5_x	1799428.0	-5.000000e-03	1.939000e-01	-1.1201	-7.080000e-02	-2.900000e-03	5.560000e-02	1.669700e+00
roe_ch5_x	1718355.0	-1.400000e-02	5.543000e-01	-7.5143	-7.570000e-02	-6.100000e-03	5.400000e-02	7.791500e+00
roa_ch5_x	1824336.0	4.900000e-03	1.917000e-01	-1.6595	-3.640000e-02	-1.800000e-03	2.650000e-02	3.283900e+00
cfoa_ch5_x	1759171.0	1.520000e-02	1.825000e-01	-0.9610	-5.570000e-02	2.500000e-03	7.100000e-02	2.175100e+00
gmar_ch5_x	1777826.0	4.200000e-02	9.593000e-01	-24.3597	-4.330000e-02	2.700000e-03	5.140000e-02	3.059480e+01
ni_ar1_x	1798398.0	2.127000e-01	6.110000e-01	-3.9640	-1.463000e-01	1.674000e-01	5.078000e-01	9.144200e+00
ni_ivol_x	1798398.0	5.090000e-02	1.054000e-01	0.0003	7.900000e-03	1.910000e-02	4.640000e-02	1.756800e+00
at_me_x	2522907.0	2.710400e+00	4.953100e+00	0.0086	5.788000e-01	1.230200e+00	2.687400e+00	1.923122e+02
be_me_x	2452453.0	7.411000e-01	7.141000e-01	0.0050	3.072000e-01	5.729000e-01	9.557000e-01	2.516310e+01
debt_me_x	2515141.0	7.136000e-01	1.647800e+00	0.0000	3.610000e-02	2.333000e-01	7.145000e-01	6.550580e+01
netdebt_me_x	2515141.0	4.707000e-01	1.480500e+00	-3.4965	-6.240000e-02	1.146000e-01	5.472000e-01	5.866260e+01
cash_me_x	2496218.0	2.459000e-01	5.843000e-01	0.0000	3.340000e-02	9.500000e-02	2.301000e-01	1.478940e+01
sale_me_x	2509790.0	1.848400e+00	3.088100e+00	0.0000	3.854000e-01	9.080000e-01	2.049100e+00	7.507530e+01
gp_me_x	2504145.0	4.729000e-01	6.845000e-01	-5.3506	1.503000e-01	2.955000e-01	5.587000e-01	1.896990e+01
ebitda_me_x	2506237.0	1.594000e-01	2.707000e-01	-5.8474	5.650000e-02	1.331000e-01	2.363000e-01	5.597900e+00
ebit_me_x	2507305.0	9.600000e-02	2.455000e-01	-7.4186	3.000000e-02	9.500000e-02	1.716000e-01	3.506600e+00
ope_me_x	2183835.0	1.085000e-01	2.516000e-01	-8.0248	3.920000e-02	1.084000e-01	1.911000e-01	3.793500e+00
ni_me_x	2517298.0	1.200000e-03	3.459000e-01	-18.9294	5.500000e-03	4.900000e-02	8.530000e-02	9.917000e-01
nix_me_x	2517298.0	-1.200000e-03	3.693000e-01	-20.3694	4.100000e-03	4.920000e-02	8.650000e-02	1.036200e+00
cop_me_x	2259562.0	2.183000e-01	5.014000e-01	-3.5452	4.550000e-02	1.406000e-01	2.768000e-01	2.124680e+01
ocf_me_x	2450553.0	4.280000e-02	2.747000e-01	-5.6691	-1.830000e-02	5.360000e-02	1.205000e-01	5.711200e+00
fcf_me_x	2303306.0	-7.030000e-02	3.536000e-01	-8.5448	-1.065000e-01	-2.600000e-03	5.530000e-02	4.202300e+00
div_me_x	2501593.0	1.780000e-02	2.950000e-02	0.0000	0.000000e+00	3.900000e-03	2.660000e-02	1.049700e+00
eqbb_me_x	2059868.0	1.380000e-02	3.780000e-02	-0.0037	0.000000e+00	0.000000e+00	7.800000e-03	8.704000e-01
eqis_me_x	2142182.0	4.550000e-02	1.388000e-01	-0.1339	1.000000e-04	3.500000e-03	1.830000e-02	5.839400e+00

eqpo_me_x	2058263.0	3.150000e-02	5.660000e-02	-0.0013	0.000000e+00	1.120000e-02	4.150000e-02	1.725500e+00
eqnp_me_x	2177501.0	-1.430000e-02	1.450000e-01	-6.1142	-8.100000e-03	1.200000e-03	3.130000e-02	1.442900e+00
eqnetis_me_x	2181408.0	3.130000e-02	1.401000e-01	-0.6866	-1.400000e-03	7.000000e-04	1.260000e-02	5.679700e+00
at_me_v_x	2480516.0	1.759600e+00	3.280300e+00	0.0085	5.638000e-01	1.008000e+00	1.587100e+00	6.916660e+01
bev_me_v_x	2404633.0	6.919000e-01	5.487000e-01	0.0009	3.194000e-01	6.308000e-01	9.482000e-01	1.692550e+01
ppen_me_v_x	2459710.0	3.322000e-01	3.872000e-01	0.0000	5.950000e-02	1.893000e-01	4.753000e-01	6.654400e+00
be_me_v_x	2410201.0	6.153000e-01	8.336000e-01	0.0050	2.513000e-01	4.357000e-01	7.057000e-01	2.914710e+01
cash_me_v_x	2460357.0	2.333000e-01	6.611000e-01	0.0000	2.350000e-02	6.940000e-02	1.825000e-01	1.486960e+01
sale_me_v_x	2472091.0	1.265200e+00	1.765600e+00	0.0000	3.146000e-01	7.343000e-01	1.550900e+00	3.775600e+01
gp_me_v_x	2467238.0	3.453000e-01	4.647000e-01	-2.4081	1.209000e-01	2.305000e-01	4.284000e-01	1.314000e+01
ebitda_me_v_x	2469299.0	1.012000e-01	2.101000e-01	-5.5869	5.090000e-02	1.060000e-01	1.669000e-01	2.711700e+00
ebit_me_v_x	2470075.0	6.010000e-02	2.226000e-01	-6.8743	2.670000e-02	7.470000e-02	1.222000e-01	2.601300e+00
cop_me_v_x	2243652.0	1.516000e-01	2.798000e-01	-2.3844	4.200000e-02	1.203000e-01	2.126000e-01	8.747500e+00
ocf_me_v_x	2431339.0	3.150000e-02	1.968000e-01	-4.7377	-1.650000e-02	4.340000e-02	9.350000e-02	2.334400e+00
fcf_me_v_x	2286863.0	-3.800000e-02	2.261000e-01	-6.0410	-8.630000e-02	-2.300000e-03	4.670000e-02	1.728000e+00
debt_me_v_x	2480615.0	3.008000e-01	3.502000e-01	0.0000	4.020000e-02	2.106000e-01	4.607000e-01	7.224300e+00
pstk_me_v_x	2479267.0	1.480000e-02	5.860000e-02	0.0000	0.000000e+00	0.000000e+00	0.000000e+00	1.220500e+00
debtlt_me_v_x	2476104.0	2.224000e-01	2.443000e-01	0.0000	1.400000e-02	1.446000e-01	3.542000e-01	2.411300e+00
debtst_me_v_x	2461067.0	8.090000e-02	2.125000e-01	0.0000	9.000000e-04	1.690000e-02	7.010000e-02	5.292900e+00
dltnetis_me_v_x	2453443.0	-3.150000e-02	1.853000e-01	-3.5613	-3.440000e-02	-1.900000e-03	1.200000e-03	6.324000e-01
dstnetis_me_v_x	2393968.0	4.100000e-03	9.390000e-02	-1.0163	-4.800000e-03	0.000000e+00	1.110000e-02	1.122900e+00
dbnetis_me_v_x	2454176.0	-2.880000e-02	2.223000e-01	-4.4848	-4.210000e-02	-6.000000e-04	2.280000e-02	1.188800e+00
netis_me_v_x	2164671.0	-8.300000e-03	2.729000e-01	-4.6395	-5.040000e-02	0.000000e+00	5.030000e-02	5.358400e+00
fincl_me_v_x	2164802.0	3.700000e-02	2.405000e-01	-2.3006	-4.040000e-02	1.300000e-03	7.090000e-02	6.822000e+00
aliqu_mat_x	2036506.0	5.016000e-01	2.661000e-01	0.0270	3.052000e-01	4.793000e-01	6.504000e-01	3.973200e+00
eq_dur_x	2193667.0	1.598720e+01	5.630900e+00	0.2861	1.413720e+01	1.612420e+01	1.764670e+01	3.430355e+02
beta_60m_x	2090801.0	1.153800e+00	6.856000e-01	-1.7467	6.897000e-01	1.081600e+00	1.528500e+00	4.912400e+00
ivol_capm_60m_x	2090801.0	1.172000e-01	6.560000e-02	0.0288	7.050000e-02	1.002000e-01	1.454000e-01	5.392000e-01
resff3_12_1_x	2274040.0	-2.210000e-02	2.736000e-01	-1.1550	-1.908000e-01	-8.900000e-03	1.610000e-01	7.899000e-01
resff3_6_1_x	2273172.0	-5.420000e-02	5.396000e-01	-2.9537	-3.435000e-01	-2.040000e-02	2.734000e-01	1.925800e+00
mispricing_mgmt_x	2414716.0	4.896000e-01	1.856000e-01	0.0147	3.610000e-01	5.047000e-01	6.284000e-01	9.427000e-01
mispricing_perf_x	2649116.0	5.208000e-01	2.065000e-01	0.0099	3.773000e-01	5.270000e-01	6.749000e-01	9.881000e-01
zero_trades_21d_x	2568596.0	9.102000e-01	2.670500e+00	0.0000	1.800000e-03	3.700000e-03	7.200000e-03	2.100980e+01
dolvol_126d_x	2527407.0	1.272436e+07	5.041472e+07	36.1000	6.023594e+04	3.756701e+05	3.493927e+06	1.038495e+09
dolvol_var_126d_x	2527340.0	1.275800e+00	7.751000e-01	0.2622	7.587000e-01	1.088500e+00	1.545100e+00	8.289100e+00
turnover_126d_x	2527415.0	4.300000e-03	6.800000e-03	0.0000	9.000000e-04	2.200000e-03	5.300000e-03	2.857000e-01
turnover_var_126d_x	2527348.0	1.251900e+00	7.609000e-01	0.2796	7.459000e-01	1.058700e+00	1.509700e+00	7.678300e+00

zero_trades.126d.x	2527415.0	9.170000e-01	2.511100e+00	0.0000	1.900000e-03	4.000000e-03	1.771000e-01	1.949730e+01
zero_trades.252d.x	2472485.0	9.236000e-01	2.470600e+00	0.0001	2.000000e-03	4.300000e-03	2.625000e-01	1.910030e+01
bidaskhl.21d.x	2474735.0	1.470000e-02	1.810000e-02	0.0011	5.600000e-03	9.400000e-03	1.710000e-02	5.318000e-01
rvolhl.21d.x	2474735.0	2.130000e-02	1.570000e-02	0.0000	1.100000e-02	1.720000e-02	2.680000e-02	1.854000e-01
beta.21d.x	2469080.0	8.736000e-01	1.205700e+00	-11.1429	2.238000e-01	8.042000e-01	1.458000e+00	1.276490e+01
ivol_capm.21d.x	2469080.0	2.710000e-02	1.960000e-02	0.0018	1.400000e-02	2.160000e-02	3.380000e-02	2.415000e-01
iskew_capm.21d.x	2469046.0	2.407000e-01	8.745000e-01	-3.5665	-2.542000e-01	2.053000e-01	7.097000e-01	3.715300e+00
coskew.21d.x	2469074.0	-1.530000e-02	3.111000e-01	-1.4678	-2.232000e-01	-2.070000e-02	1.886000e-01	1.347500e+00
beta_dimson.21d.x	2469080.0	9.503000e-01	1.950600e+00	-19.3713	4.290000e-02	8.515000e-01	1.798400e+00	2.341690e+01
ivol_ff3.21d.x	2469080.0	2.640000e-02	1.930000e-02	0.0018	1.360000e-02	2.100000e-02	3.300000e-02	2.340000e-01
iskew_ff3.21d.x	2469068.0	1.990000e-01	7.943000e-01	-3.1203	-2.632000e-01	1.696000e-01	6.344000e-01	3.455800e+00
ivol_hxz4.21d.x	2332649.0	2.680000e-02	1.960000e-02	0.0018	1.370000e-02	2.130000e-02	3.350000e-02	2.397000e-01
iskew_hxz4.21d.x	2332643.0	1.777000e-01	7.585000e-01	-3.0805	-2.681000e-01	1.513000e-01	6.005000e-01	3.275600e+00
rmax5.21d.x	2469033.0	3.860000e-02	2.910000e-02	0.0022	1.960000e-02	3.050000e-02	4.810000e-02	3.544000e-01
rmax1.21d.x	2469033.0	6.730000e-02	5.830000e-02	0.0035	3.110000e-02	5.000000e-02	8.280000e-02	8.996000e-01
rvol.21d.x	2469080.0	2.970000e-02	2.060000e-02	0.0018	1.590000e-02	2.400000e-02	3.690000e-02	2.515000e-01
rskew.21d.x	2469038.0	2.439000e-01	8.740000e-01	-3.5810	-2.529000e-01	2.077000e-01	7.136000e-01	3.808400e+00
ami.126d.x	2427976.0	2.294900e+00	1.277990e+01	0.0000	6.300000e-03	8.310000e-02	7.621000e-01	7.242321e+02
beta.252d.x	2434576.0	8.972000e-01	6.011000e-01	-1.8325	4.682000e-01	8.481000e-01	1.259200e+00	4.013900e+00
ivol_capm.252d.x	2434576.0	2.910000e-02	1.710000e-02	0.0050	1.700000e-02	2.480000e-02	3.650000e-02	1.684000e-01
betadown.252d.x	2406390.0	1.001300e+00	7.817000e-01	-3.9821	5.127000e-01	9.352000e-01	1.414000e+00	5.699200e+00
prc_highprc.252d.x	2434268.0	7.724000e-01	1.997000e-01	0.0167	6.610000e-01	8.272000e-01	9.318000e-01	1.000000e+00
rvol.252d.x	2434576.0	3.110000e-02	1.740000e-02	0.0052	1.870000e-02	2.680000e-02	3.870000e-02	1.690000e-01
corr.1260d.x	1904407.0	3.603000e-01	1.650000e-01	-0.0374	2.362000e-01	3.573000e-01	4.786000e-01	8.219000e-01
betabab.1260d.x	1893789.0	1.075600e+00	5.871000e-01	-0.3259	6.475000e-01	1.000500e+00	1.410600e+00	4.274900e+00
rmax5_rvol.21d.x	2343331.0	1.232900e+00	5.049000e-01	0.1125	8.720000e-01	1.159900e+00	1.512600e+00	4.328700e+00
age.x	2739928.0	2.184690e+02	1.888040e+02	1.0000	7.900000e+01	1.590000e+02	3.000000e+02	1.115000e+03
qmj.x	1825615.0	8.990000e-02	9.763000e-01	-1.7027	-7.318000e-01	1.204000e-01	9.350000e-01	1.701100e+00
qmj_prof.x	2502382.0	9.110000e-02	9.846000e-01	-1.7036	-7.339000e-01	1.300000e-01	9.456000e-01	1.698800e+00
qmj_growth.x	1825622.0	3.610000e-02	9.739000e-01	-1.7018	-7.911000e-01	4.900000e-02	8.716000e-01	1.702100e+00
qmj_safety.x	2579701.0	8.730000e-02	9.713000e-01	-1.7012	-7.189000e-01	1.215000e-01	9.239000e-01	1.708800e+00
r	2739928.0	6.400000e-03	1.555000e-01	-1.0113	-6.530000e-02	-1.400000e-03	6.680000e-02	1.988170e+01
ri	2739928.0	1.770830e+01	6.890425e+02	-0.2196	6.348000e-01	1.290100e+00	3.413100e+00	1.527087e+05
r_f001m	2717410.0	-3.000000e-04	1.452874e+03	-11994.7451	-6.730875e+02	-6.488730e+01	5.622922e+02	1.975796e+05
r_f002m	2694932.0	-4.000000e-04	1.453405e+03	-12093.2324	-6.719280e+02	-6.400750e+01	5.623110e+02	1.340182e+05
r_f003m	2672377.0	-5.000000e-04	1.452500e+03	-12181.5869	-6.704744e+02	-6.279780e+01	5.626841e+02	1.023323e+05
r_f004m	2649956.0	3.000000e-04	1.467237e+03	-12221.2090	-6.701777e+02	-6.287600e+01	5.621040e+02	1.259151e+05

r_f005m	2627466.0	1.000000e-04	1.471883e+03	-12192.0312	-6.696848e+02	-6.289280e+01	5.614439e+02	1.259212e+05
r_f006m	2604896.0	3.000000e-04	1.479795e+03	-12242.7471	-6.699737e+02	-6.314070e+01	5.606614e+02	1.259316e+05
r_f007m	2582271.0	6.000000e-04	1.481432e+03	-12249.9131	-6.683008e+02	-6.239580e+01	5.602472e+02	1.895877e+05
r_f008m	2559645.0	-4.000000e-04	1.494461e+03	-12270.5273	-6.684138e+02	-6.289780e+01	5.595248e+02	1.975297e+05
r_f009m	2536940.0	-7.000000e-04	1.497932e+03	-12302.8760	-6.676816e+02	-6.255130e+01	5.583124e+02	1.975135e+05
r_f010m	2514233.0	0.000000e+00	1.505680e+03	-12306.7148	-6.674777e+02	-6.308580e+01	5.573524e+02	1.975094e+05
r_f011m	2491745.0	0.000000e+00	1.511348e+03	-12250.5898	-6.675006e+02	-6.366780e+01	5.557687e+02	1.975246e+05
r_f012m	2469229.0	-4.000000e-04	1.506349e+03	-12207.8350	-6.657420e+02	-6.324470e+01	5.550534e+02	1.975047e+05
r_f013m	2446715.0	-1.000000e-04	1.515108e+03	-12176.1465	-6.655490e+02	-6.377990e+01	5.530358e+02	1.974958e+05
r_f014m	2424394.0	2.000000e-04	1.510473e+03	-11440.9531	-6.651825e+02	-6.383700e+01	5.523057e+02	1.974974e+05
r_f015m	2402314.0	-1.000000e-04	1.512811e+03	-11449.6279	-6.642017e+02	-6.469670e+01	5.507740e+02	1.974900e+05
r_f016m	2380363.0	2.000000e-04	1.515042e+03	-11449.5361	-6.646672e+02	-6.581010e+01	5.496704e+02	1.974964e+05
r_f017m	2358474.0	-1.000000e-04	1.518632e+03	-11473.9346	-6.650385e+02	-6.704440e+01	5.478585e+02	1.974688e+05
r_f018m	2336696.0	1.000000e-04	1.522247e+03	-11924.3223	-6.646155e+02	-6.711870e+01	5.465416e+02	1.974814e+05
r_f019m	2315092.0	1.000000e-04	1.522928e+03	-11477.0908	-6.638971e+02	-6.765280e+01	5.454422e+02	1.974768e+05
r_f020m	2293683.0	-1.000000e-04	1.526165e+03	-11837.1934	-6.631345e+02	-6.773940e+01	5.443864e+02	1.974707e+05
r_f021m	2272416.0	-0.000000e+00	1.525184e+03	-11830.5957	-6.630684e+02	-6.768750e+01	5.435944e+02	1.974645e+05
r_f022m	2251211.0	1.000000e-04	1.521066e+03	-11822.4795	-6.620583e+02	-6.732170e+01	5.424589e+02	1.974786e+05
r_f023m	2230142.0	-0.000000e+00	1.521688e+03	-11815.7969	-6.616403e+02	-6.751140e+01	5.414223e+02	1.974742e+05
r_f024m	2209316.0	-0.000000e+00	1.520726e+03	-11948.9941	-6.596912e+02	-6.725050e+01	5.403683e+02	1.974745e+05
r_f025m	2188719.0	1.000000e-04	1.521428e+03	-11828.5732	-6.593975e+02	-6.767100e+01	5.392651e+02	1.974657e+05
r_f026m	2168242.0	0.000000e+00	1.522714e+03	-11837.6758	-6.583010e+02	-6.773110e+01	5.379360e+02	1.974702e+05
r_f027m	2147901.0	1.000000e-04	1.511179e+03	-11839.1934	-6.568350e+02	-6.728920e+01	5.372294e+02	1.895889e+05
r_f028m	2127702.0	1.000000e-04	1.507530e+03	-11834.7500	-6.557527e+02	-6.652340e+01	5.364533e+02	1.895897e+05
r_f029m	2107711.0	1.000000e-04	1.502109e+03	-11846.0547	-6.544728e+02	-6.637620e+01	5.357737e+02	1.896120e+05
r_f030m	2087915.0	-1.000000e-04	1.498496e+03	-11853.5107	-6.531980e+02	-6.626840e+01	5.346227e+02	1.896178e+05
r_f031m	2068400.0	0.000000e+00	1.492586e+03	-11866.2324	-6.525869e+02	-6.630400e+01	5.336425e+02	1.596513e+05
r_f032m	2049032.0	0.000000e+00	1.489238e+03	-11872.9951	-6.517037e+02	-6.576680e+01	5.334434e+02	1.596468e+05
r_f033m	2029771.0	1.000000e-04	1.488224e+03	-11889.0117	-6.510807e+02	-6.590900e+01	5.329744e+02	1.596441e+05
r_f034m	2010873.0	1.000000e-04	1.484454e+03	-11889.4648	-6.505530e+02	-6.600180e+01	5.321952e+02	1.339924e+05
r_f035m	1991985.0	0.000000e+00	1.481871e+03	-11888.5801	-6.497461e+02	-6.637680e+01	5.308284e+02	1.339871e+05
r_f036m	1973277.0	-0.000000e+00	1.480547e+03	-11901.7588	-6.487253e+02	-6.560970e+01	5.307343e+02	1.339843e+05
r_f037m	1954719.0	0.000000e+00	1.474733e+03	-11808.9707	-6.477959e+02	-6.532040e+01	5.303346e+02	1.105830e+05
r_f038m	1936335.0	0.000000e+00	1.470288e+03	-11795.4795	-6.465491e+02	-6.499620e+01	5.294399e+02	1.105891e+05
r_f039m	1918045.0	-0.000000e+00	1.466709e+03	-11661.7285	-6.456418e+02	-6.549740e+01	5.287186e+02	1.105892e+05
r_f040m	1900119.0	0.000000e+00	1.464523e+03	-11641.5117	-6.446006e+02	-6.542780e+01	5.281598e+02	1.105945e+05
r_f041m	1882204.0	-0.000000e+00	1.461618e+03	-11620.1201	-6.434552e+02	-6.541130e+01	5.274347e+02	1.105990e+05

r_f042m	1864406.0	0.000000e+00	1.461010e+03	-11649.9248	-6.426281e+02	-6.453170e+01	5.271555e+02	1.105945e+05
r_f043m	1846808.0	0.000000e+00	1.458799e+03	-11647.5039	-6.419841e+02	-6.478650e+01	5.264048e+02	1.105988e+05
r_f044m	1829434.0	1.000000e-04	1.456109e+03	-11657.0537	-6.405219e+02	-6.464430e+01	5.260392e+02	1.105983e+05
r_f045m	1812186.0	0.000000e+00	1.455769e+03	-11657.0459	-6.401905e+02	-6.447610e+01	5.255322e+02	1.105999e+05
r_f046m	1795157.0	-0.000000e+00	1.457390e+03	-11652.4551	-6.403130e+02	-6.455670e+01	5.250655e+02	1.105960e+05
r_f047m	1778282.0	-0.000000e+00	1.460243e+03	-11658.8438	-6.401207e+02	-6.554230e+01	5.242169e+02	1.105929e+05
r_f048m	1761604.0	-0.000000e+00	1.455848e+03	-11682.4463	-6.391160e+02	-6.477180e+01	5.234120e+02	1.105901e+05
r_f049m	1745155.0	1.000000e-04	1.455978e+03	-11670.7920	-6.382848e+02	-6.515990e+01	5.229612e+02	1.105818e+05
r_f050m	1728738.0	0.000000e+00	1.454388e+03	-11632.7188	-6.375092e+02	-6.496860e+01	5.226442e+02	1.105831e+05
r_f051m	1712469.0	1.000000e-04	1.452841e+03	-11632.8320	-6.363624e+02	-6.464440e+01	5.219601e+02	1.105796e+05
r_f052m	1696257.0	-0.000000e+00	1.447684e+03	-11634.2344	-6.354518e+02	-6.441250e+01	5.216530e+02	1.105797e+05
r_f053m	1680291.0	0.000000e+00	1.446640e+03	-11599.9922	-6.352231e+02	-6.461350e+01	5.207815e+02	1.105815e+05
r_f054m	1664527.0	-0.000000e+00	1.447881e+03	-11610.1670	-6.343800e+02	-6.448220e+01	5.200620e+02	1.105856e+05
r_f055m	1648942.0	-0.000000e+00	1.441350e+03	-11593.4238	-6.328156e+02	-6.362880e+01	5.197030e+02	1.105916e+05
r_f056m	1633612.0	0.000000e+00	1.439244e+03	-11559.6719	-6.322285e+02	-6.335630e+01	5.195420e+02	1.105924e+05
r_f057m	1618435.0	-0.000000e+00	1.437575e+03	-11520.1182	-6.320952e+02	-6.346460e+01	5.184686e+02	1.105943e+05
r_f058m	1603369.0	0.000000e+00	1.432364e+03	-11498.3047	-6.313463e+02	-6.371530e+01	5.178313e+02	1.105877e+05
r_f059m	1588459.0	0.000000e+00	1.432379e+03	-11524.8418	-6.294853e+02	-6.328710e+01	5.172325e+02	1.105811e+05
r_f060m	1573646.0	-1.000000e-04	1.425208e+03	-11522.6631	-6.281742e+02	-6.214360e+01	5.171097e+02	1.105770e+05
r_f061m	1558831.0	0.000000e+00	1.423086e+03	-11512.3076	-6.275454e+02	-6.188950e+01	5.169286e+02	1.105791e+05
r_f062m	1544091.0	0.000000e+00	1.421962e+03	-11506.7881	-6.266454e+02	-6.163530e+01	5.167087e+02	1.105750e+05
r_f063m	1529580.0	-0.000000e+00	1.421226e+03	-11490.2002	-6.257752e+02	-6.118430e+01	5.159457e+02	1.105775e+05
r_f064m	1515298.0	0.000000e+00	1.420464e+03	-11447.7783	-6.246249e+02	-6.092020e+01	5.155374e+02	1.105721e+05
r_f065m	1501145.0	0.000000e+00	1.414488e+03	-11448.2666	-6.226816e+02	-6.009660e+01	5.149099e+02	1.105906e+05
r_f066m	1487126.0	0.000000e+00	1.409900e+03	-11429.1436	-6.217508e+02	-6.041790e+01	5.136979e+02	1.105791e+05
r_f067m	1473347.0	-0.000000e+00	1.410359e+03	-11395.8105	-6.213913e+02	-5.986390e+01	5.135056e+02	1.105783e+05
r_f068m	1459783.0	-0.000000e+00	1.408494e+03	-11416.6279	-6.212914e+02	-5.952610e+01	5.132261e+02	1.105899e+05
r_f069m	1446378.0	-0.000000e+00	1.407508e+03	-11403.6064	-6.206971e+02	-6.046170e+01	5.120222e+02	1.105804e+05
r_f070m	1433053.0	-0.000000e+00	1.407457e+03	-11369.1240	-6.195969e+02	-6.033520e+01	5.112055e+02	1.105780e+05
r_f071m	1419806.0	-0.000000e+00	1.405462e+03	-11368.4258	-6.189065e+02	-6.046740e+01	5.107696e+02	1.105753e+05
r_f072m	1406604.0	-0.000000e+00	1.400772e+03	-11371.8594	-6.173835e+02	-5.969520e+01	5.105945e+02	1.105796e+05
r_f073m	1393602.0	-0.000000e+00	1.400693e+03	-11396.2529	-6.175958e+02	-6.000100e+01	5.098098e+02	1.105802e+05
r_f074m	1380833.0	0.000000e+00	1.402398e+03	-11372.6416	-6.169977e+02	-6.035980e+01	5.092791e+02	1.105740e+05
r_f075m	1368264.0	0.000000e+00	1.403089e+03	-11405.9805	-6.166624e+02	-6.033900e+01	5.087950e+02	1.105671e+05
r_f076m	1355788.0	0.000000e+00	1.397425e+03	-11382.0527	-6.149069e+02	-5.957630e+01	5.083461e+02	1.105749e+05
r_f077m	1343377.0	0.000000e+00	1.395999e+03	-11382.4336	-6.135413e+02	-5.895680e+01	5.081946e+02	1.105644e+05
r_f078m	1331081.0	0.000000e+00	1.391616e+03	-11378.7529	-6.125250e+02	-5.866520e+01	5.075152e+02	1.105711e+05

r_f079m	1318964.0	-0.000000e+00	1.388824e+03	-11362.2051	-6.116483e+02	-5.816850e+01	5.073903e+02	1.105640e+05
r_f080m	1307052.0	-0.000000e+00	1.386874e+03	-11357.9014	-6.107534e+02	-5.763730e+01	5.068637e+02	1.105745e+05
r_f081m	1295317.0	0.000000e+00	1.381056e+03	-11383.5312	-6.103754e+02	-5.766870e+01	5.064513e+02	1.105647e+05
r_f082m	1283667.0	0.000000e+00	1.383347e+03	-11365.5000	-6.103617e+02	-5.777960e+01	5.060737e+02	1.105658e+05
r_f083m	1272047.0	-0.000000e+00	1.374520e+03	-11384.9004	-6.086416e+02	-5.797640e+01	5.042909e+02	1.105673e+05
r_f084m	1260498.0	0.000000e+00	1.373337e+03	-11363.2959	-6.076294e+02	-5.762950e+01	5.040967e+02	1.105768e+05
r_f085m	1249073.0	-0.000000e+00	1.374082e+03	-11402.5264	-6.065834e+02	-5.695480e+01	5.032051e+02	1.105750e+05
r_f086m	1237781.0	0.000000e+00	1.370850e+03	-11400.8906	-6.059218e+02	-5.657530e+01	5.023136e+02	1.105727e+05
r_f087m	1226562.0	-1.000000e-04	1.370446e+03	-11414.5410	-6.048359e+02	-5.619380e+01	5.021124e+02	1.105748e+05
r_f088m	1215483.0	0.000000e+00	1.369352e+03	-11404.8936	-6.043073e+02	-5.630440e+01	5.014727e+02	1.105904e+05
r_f089m	1204483.0	0.000000e+00	1.370709e+03	-11400.6182	-6.037288e+02	-5.706160e+01	5.004432e+02	1.105700e+05
r_f090m	1193700.0	0.000000e+00	1.367878e+03	-11385.3594	-6.028849e+02	-5.712190e+01	4.993200e+02	1.105744e+05
r_f091m	1183030.0	-0.000000e+00	1.363581e+03	-11358.1553	-6.016176e+02	-5.622980e+01	4.984420e+02	1.105727e+05
r_f092m	1172486.0	0.000000e+00	1.360579e+03	-11309.1123	-6.002883e+02	-5.573990e+01	4.975717e+02	1.105593e+05
r_f093m	1162055.0	0.000000e+00	1.358095e+03	-11357.9609	-5.987974e+02	-5.531470e+01	4.968514e+02	1.105644e+05
r_f094m	1151736.0	0.000000e+00	1.352453e+03	-11317.3789	-5.971700e+02	-5.476540e+01	4.963483e+02	1.105683e+05
r_f095m	1141522.0	0.000000e+00	1.348188e+03	-11309.7559	-5.962652e+02	-5.471390e+01	4.951203e+02	1.105691e+05
r_f096m	1131442.0	-0.000000e+00	1.342258e+03	-11309.1016	-5.944086e+02	-5.403380e+01	4.948370e+02	1.105662e+05
r_f097m	1121493.0	-0.000000e+00	1.338318e+03	-11247.9277	-5.932616e+02	-5.396110e+01	4.937179e+02	1.105643e+05
r_f098m	1111606.0	-0.000000e+00	1.338118e+03	-11261.6719	-5.919281e+02	-5.361060e+01	4.932585e+02	1.105735e+05
r_f099m	1101788.0	-0.000000e+00	1.334361e+03	-11223.1240	-5.905834e+02	-5.352240e+01	4.921118e+02	1.105733e+05
r_f100m	1092121.0	-0.000000e+00	1.331728e+03	-11206.9795	-5.900486e+02	-5.297250e+01	4.916311e+02	1.105714e+05
r_f101m	1082539.0	0.000000e+00	1.332157e+03	-11283.8125	-5.892725e+02	-5.268540e+01	4.909461e+02	1.105668e+05
r_f102m	1072947.0	-0.000000e+00	1.332334e+03	-11282.4170	-5.881101e+02	-5.258020e+01	4.907911e+02	1.105829e+05
r_f103m	1063428.0	0.000000e+00	1.329495e+03	-11285.6172	-5.869788e+02	-5.248610e+01	4.906705e+02	1.105661e+05
r_f104m	1053983.0	0.000000e+00	1.325444e+03	-11298.3848	-5.862903e+02	-5.239650e+01	4.899225e+02	1.105618e+05
r_f105m	1044601.0	0.000000e+00	1.323975e+03	-11301.4951	-5.851770e+02	-5.231380e+01	4.887940e+02	1.105658e+05
r_f106m	1035321.0	0.000000e+00	1.318717e+03	-11297.5840	-5.832391e+02	-5.184850e+01	4.882903e+02	1.105617e+05
r_f107m	1026131.0	-0.000000e+00	1.311274e+03	-11285.4033	-5.818715e+02	-5.133990e+01	4.878159e+02	1.105708e+05
r_f108m	1017036.0	0.000000e+00	1.305877e+03	-11274.5352	-5.799500e+02	-5.048810e+01	4.874828e+02	1.105686e+05
r_f109m	1007990.0	1.000000e-04	1.294919e+03	-11275.3604	-5.771514e+02	-4.921990e+01	4.869372e+02	1.105662e+05
r_f110m	999001.0	-0.000000e+00	1.289170e+03	-11268.4707	-5.755809e+02	-4.920890e+01	4.857903e+02	1.105673e+05
r_f111m	990052.0	-0.000000e+00	1.290836e+03	-11281.2275	-5.746790e+02	-4.955900e+01	4.840651e+02	1.105661e+05
r_f112m	981156.0	0.000000e+00	1.287458e+03	-11282.5312	-5.735778e+02	-4.994070e+01	4.832928e+02	1.105664e+05
r_f113m	972370.0	-1.000000e-04	1.284069e+03	-11264.9014	-5.725287e+02	-4.965830e+01	4.823773e+02	1.105705e+05
r_f114m	963718.0	0.000000e+00	1.278476e+03	-11253.8916	-5.716486e+02	-4.986240e+01	4.817620e+02	1.105646e+05
r_f115m	955145.0	0.000000e+00	1.275283e+03	-11264.3701	-5.702315e+02	-4.919280e+01	4.812133e+02	1.105725e+05

r_fl16m	946626.0	-0.000000e+00	1.272883e+03	-11263.4824	-5.686965e+02	-4.945870e+01	4.802682e+02	1.105707e+05
r_fl17m	938160.0	0.000000e+00	1.274644e+03	-11257.9434	-5.681894e+02	-5.015010e+01	4.790787e+02	1.105761e+05
r_fl18m	929764.0	0.000000e+00	1.270645e+03	-11259.9062	-5.671390e+02	-5.087480e+01	4.773846e+02	1.105775e+05
r_fl19m	921481.0	-0.000000e+00	1.270319e+03	-11240.6992	-5.655049e+02	-5.112130e+01	4.756199e+02	1.105739e+05
r_fl20m	913287.0	-0.000000e+00	1.257670e+03	-11251.2500	-5.629036e+02	-4.977740e+01	4.754564e+02	1.105857e+05
train	2739928.0	3.998000e-01	4.994000e-01	0.0000	0.000000e+00	0.000000e+00	1.000000e+00	1.000000e+00
test	2739928.0	6.002000e-01	4.994000e-01	0.0000	0.000000e+00	1.000000e+00	1.000000e+00	1.000000e+00
dev	2739928.0	3.998000e-01	4.994000e-01	0.0000	0.000000e+00	0.000000e+00	1.000000e+00	1.000000e+00

Table 2: Summary Statistics

## 10.2 Meeting Minutes

27/08/2021

Notes:

- Lagrangian
- KKT Theoretical
- Hobbyists Edition - Mathematica
- Raspberry PI:
- Can you predict returns, interrogate 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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