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Robust Portfolio Selection with Nearest Optimal Centering (NOC):

Agenda:

Theoretical Overview: Research, Mean Variance, NOC

Results(MV vs NOC): Overview, Asset Allocation, Back-testing, Scenario Analysis(VaR & ES)

Research

MSc- Economic Engineering
Author: Riskfolio-Lib

Robust Portfolio Selection with Near Optimal Centering

Dany Cajas*

[First version: October 2019] [Latest version: December 2019]

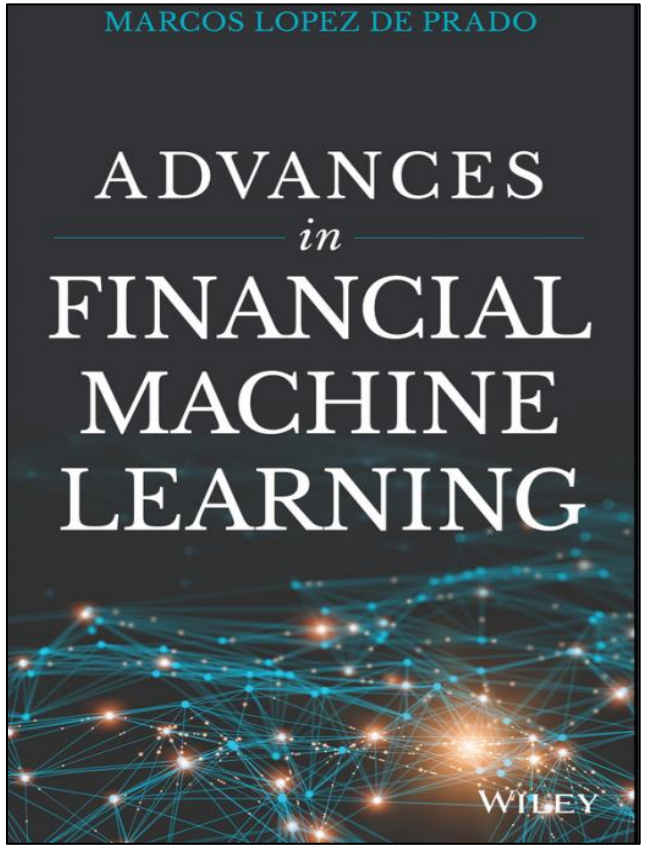
Abstract

Quantitative asset allocation models have not been widely adopted by practitioners because they suffer from two problems: the lack of robustness and diversification of portfolios obtained through these models. To solve these problems, I developed a new portfolio selection method that can be applied to any convex risk measure. The procedure begins selecting an optimal portfolio in the efficient frontier, then I define a near optimal region and finally I define the analytic center as the new optimal portfolio. I compare 30 portfolio optimization models for 4 asset samples, and the results suggest that the new method overcomes traditional methods in robustness and diversification.

Keywords: mean variance portfolio, MAD portfolio, CVaR portfolio, robust optimization, portfolio selection, near optimal portfolios.

JEL Codes: C61, G11

Global Head - Quantitative Research
& Development at ABU DHABI



Researcher: de Graaf

Convex Optimization

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University of California, Los Angeles

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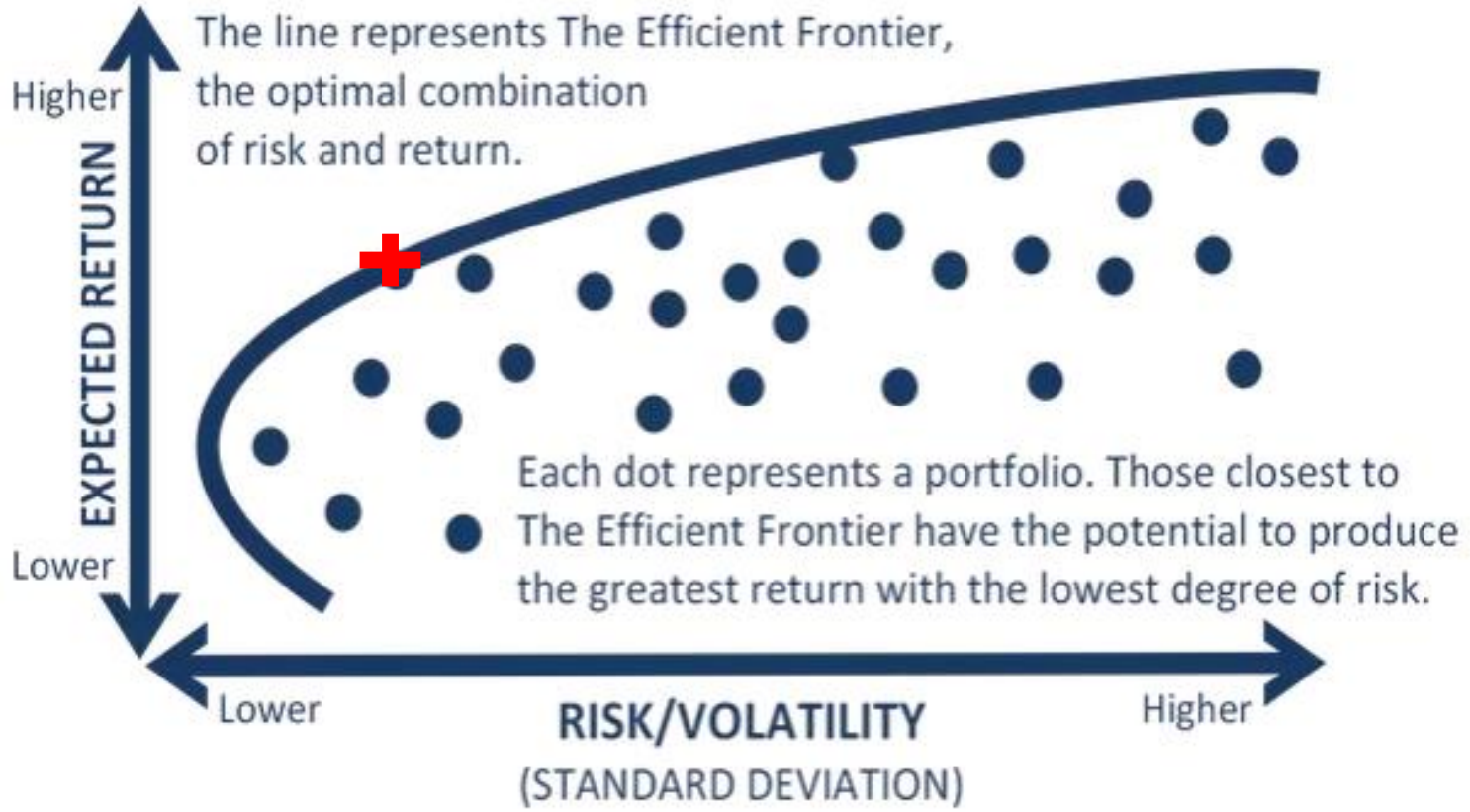
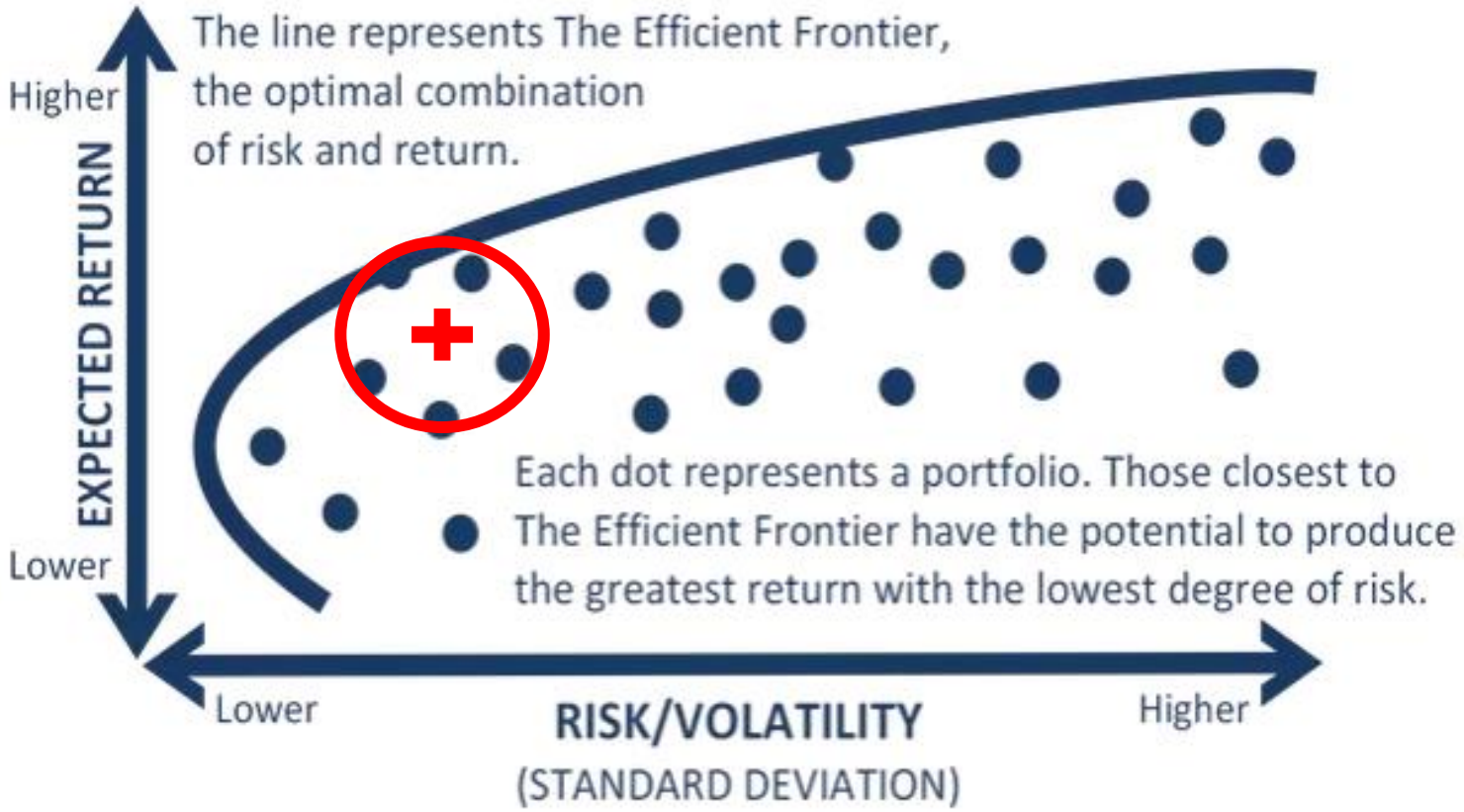
Case Study: Markowitz or Mean Variance **Curse**



Case Study: Robust Portfolio Selection with Near Optimal Centering



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Robust Portfolio Selection with Nearest Optimal Centering (NOC):

Agenda:

~~Theoretical Overview:~~ ~~Research, Explanation~~

Model Results: Overview, Asset Allocation, Back-testing, Scenario Analysis(VaR & ES)

Stocks Analytics (JSE Listed)

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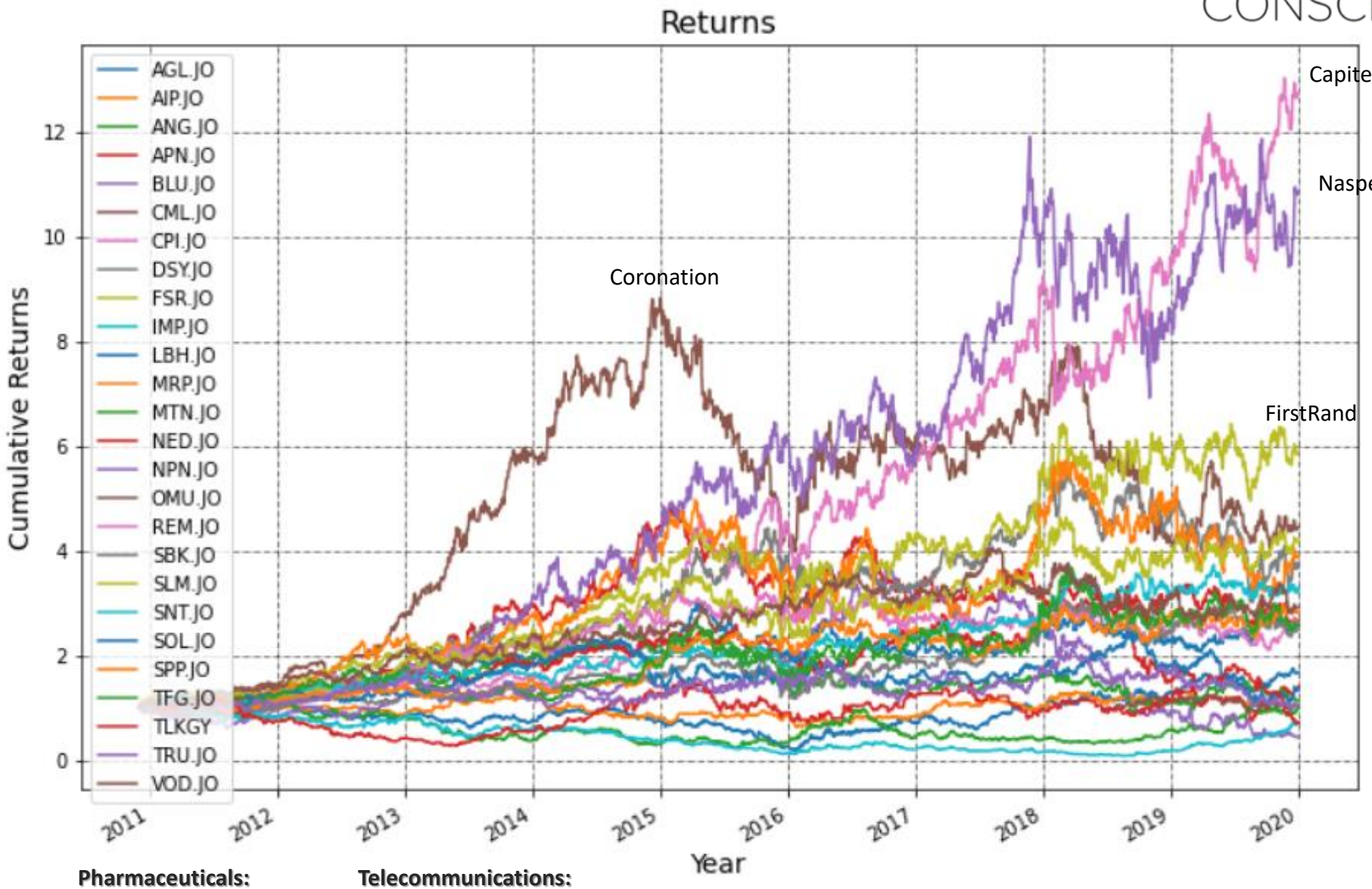
Finance
NASPERS-N
Remgro
liberty holdings
Coronation Fund

Insurance:
Sanlam
Old Mutual
Santam
Discovery

Consumer Goods/Services
Truworths International
The Foschini Group
Mr Price Group
The SPAR Group

Banks:
FirstRand
Standard Bank
Nedbank Group
Capitec

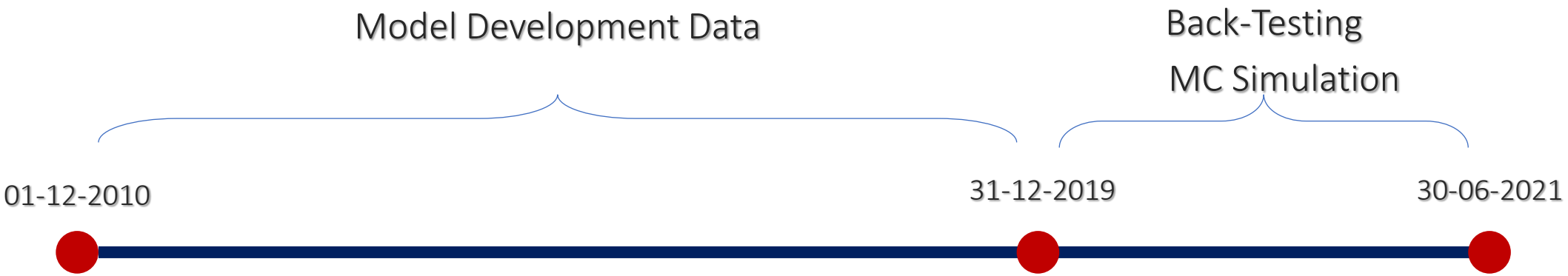
Mining & Energy:
Sasol
ANGGOLD
Anglo
Impala Holding



Pharmaceuticals:
Aspen
Adcock Ingram

Telecommunications:
MTN Group
Telekom
Vodacom
Blue Label Telecommunications

Model Development and Back-Testing



Date	AGL.JO	AIP.JO	ANG.JO	APN.JO	BLU.JO	CML.JO	CPI.JO	DSY.JO	FSR.JO	IMP.JO	LBH.JO	MRP.JO	MTN.JO	NED.JO
2018-07-31	-0.031422	0.068163	0.025330	-0.012470	-0.111646	0.020580	0.096233	0.152542	0.084207	-0.037531	-0.007050	0.039247	0.061168	0.093277
2018-08-31	0.018692	0.109105	0.025574	0.142823	-0.224269	-0.032936	0.053829	0.030647	0.020644	-0.081580	0.031427	-0.041677	-0.210191	0.018764
2018-09-30	0.077714	-0.105472	0.038168	-0.418777	-0.268156	-0.063597	0.021431	-0.029736	-0.040028	0.536313	-0.031183	0.012958	-0.015845	-0.022727
2018-10-31	-0.013008	-0.087496	0.166748	-0.061656	-0.009542	-0.088328	-0.026604	-0.064597	-0.030901	-0.010909	-0.042472	0.011873	-0.023750	-0.059366
2018-11-30	-0.122422	0.011158	-0.025769	-0.057179	0.011561	-0.090983	0.110360	-0.025518	0.038719	0.213235	-0.009168	0.043469	0.021988	0.067853

Portfolio Diversification

Near Optimal Centering

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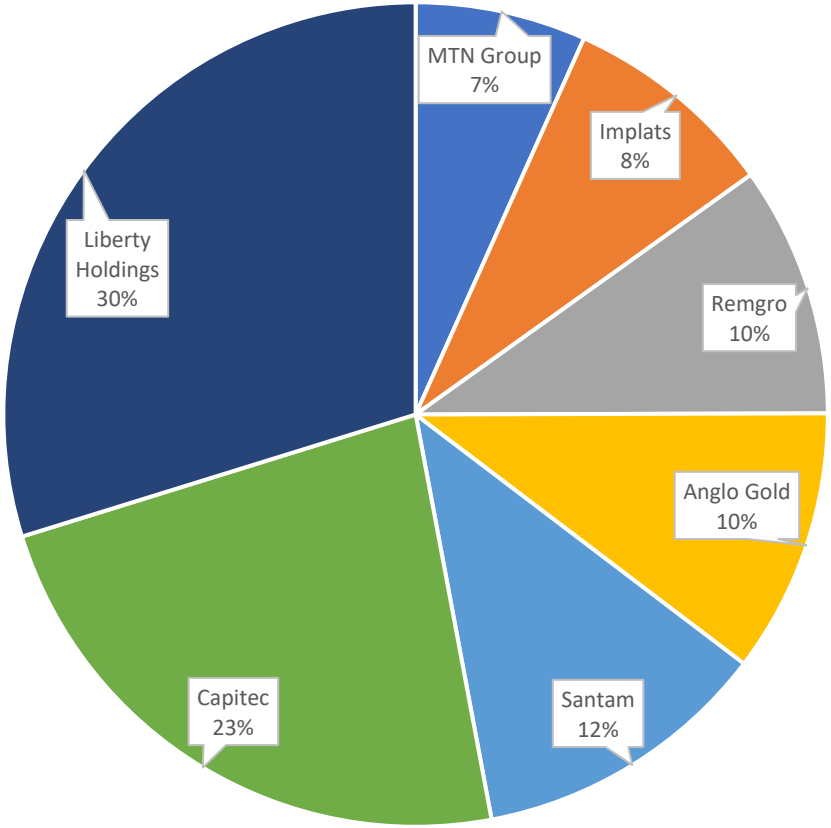
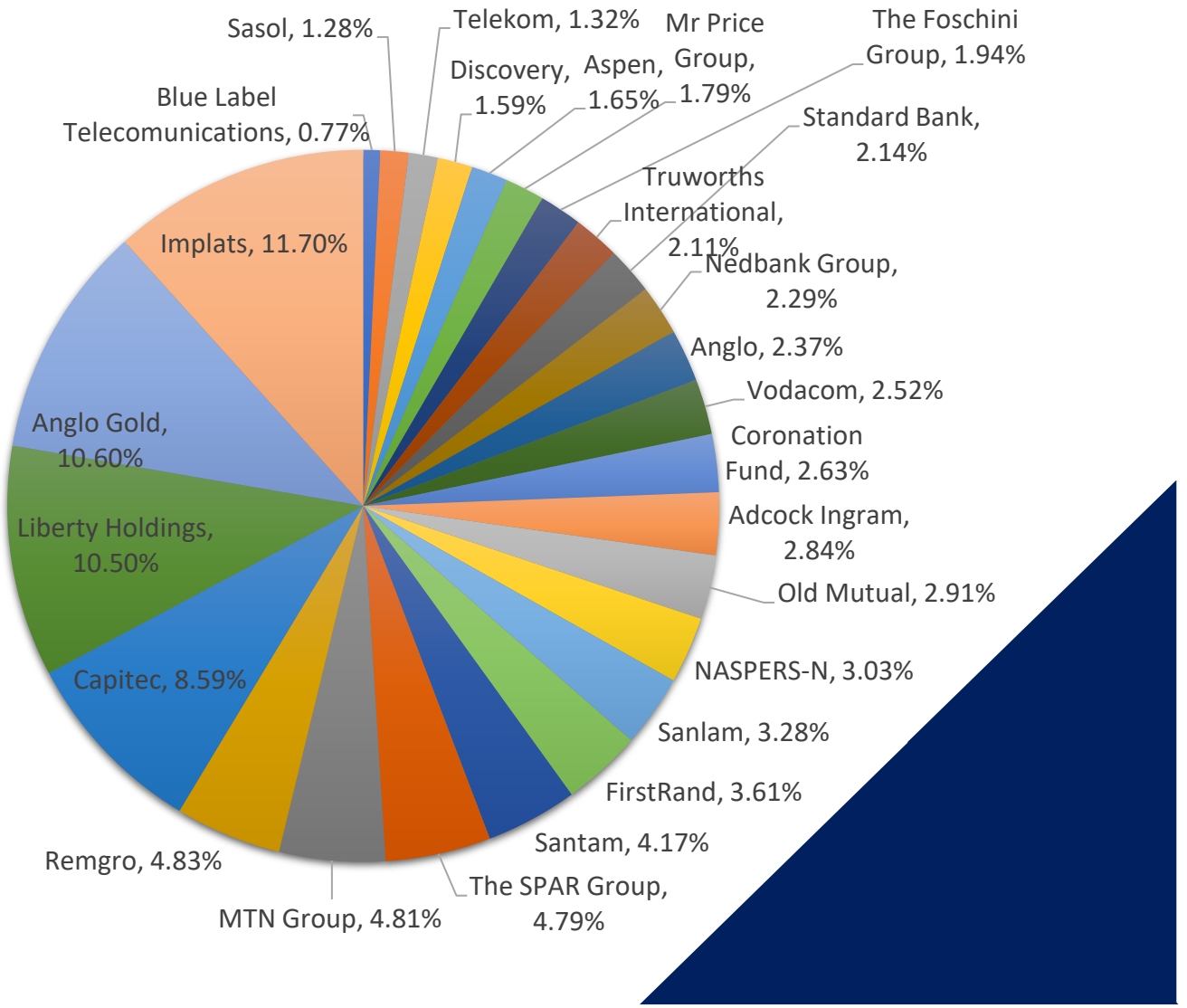
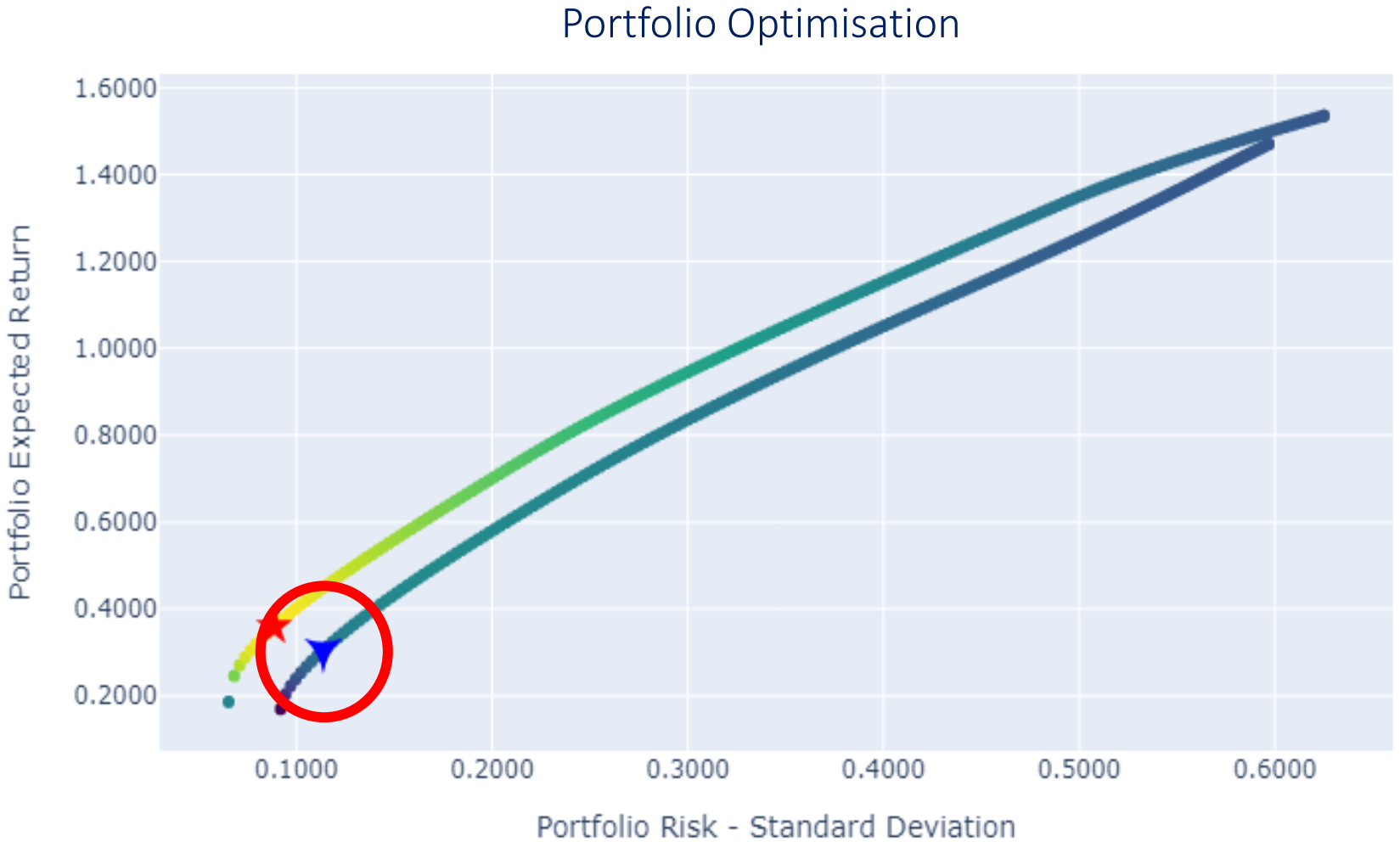
Mean Variance





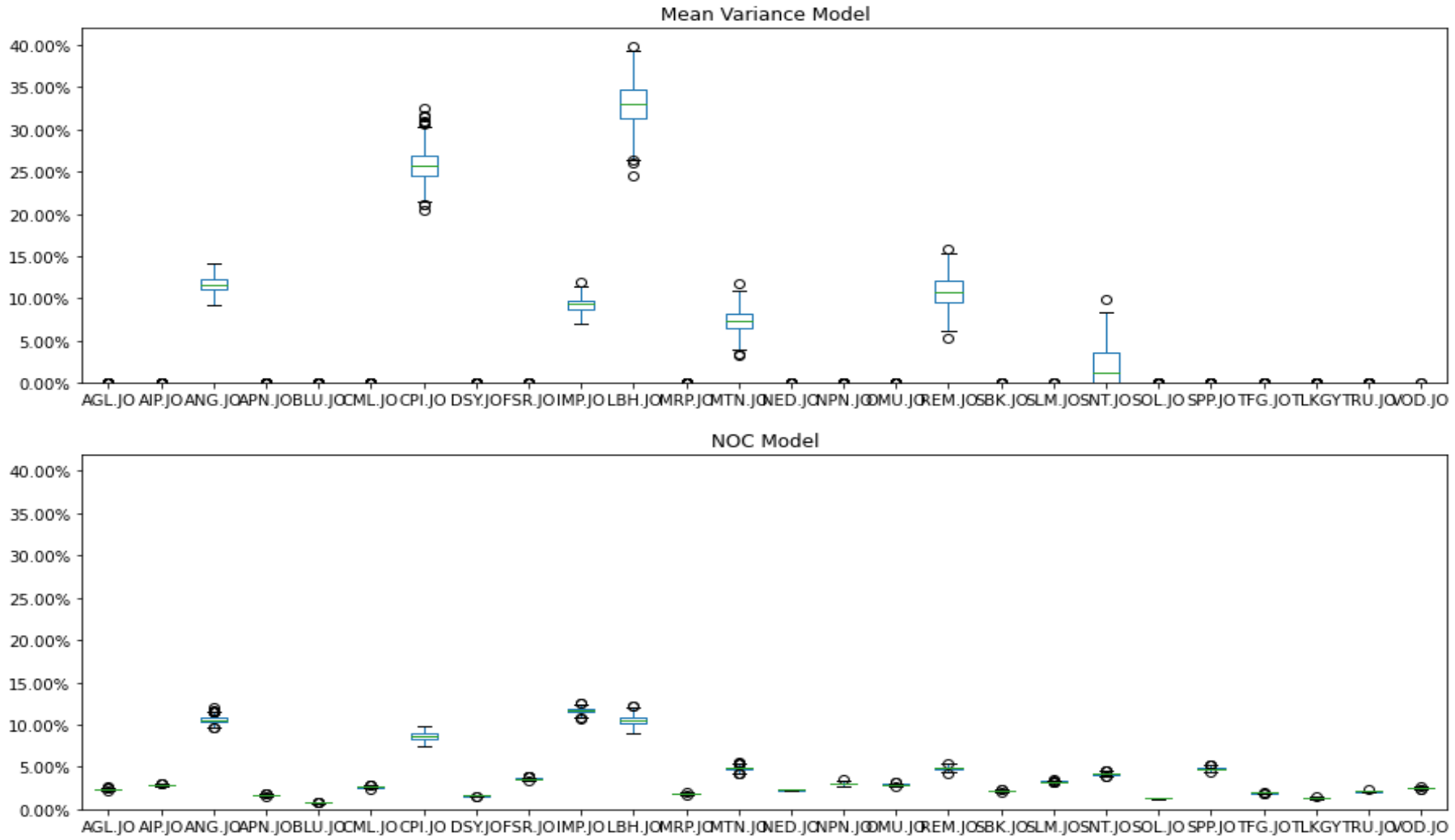
MV vs NOC Efficient Frontier



Mean Variance:
Portfolio Expected Return: 35.95%
Portfolio Std: 8.87%
Sharpe Ratio: 4.05556

NOC:
Portfolio Expected Return: 30.52%
Portfolio Std: 11.37%
Sharpe Ratio: 2.68335

Weights Sensitivity to Parameter Changes



Mean Variance:
Avg Distance: 3.09%
Std Distance: 1.23

NOC
Avg Distance: 0.67%
Std Distance: 0.22%

Back-testing Portfolio Performance on unseen data

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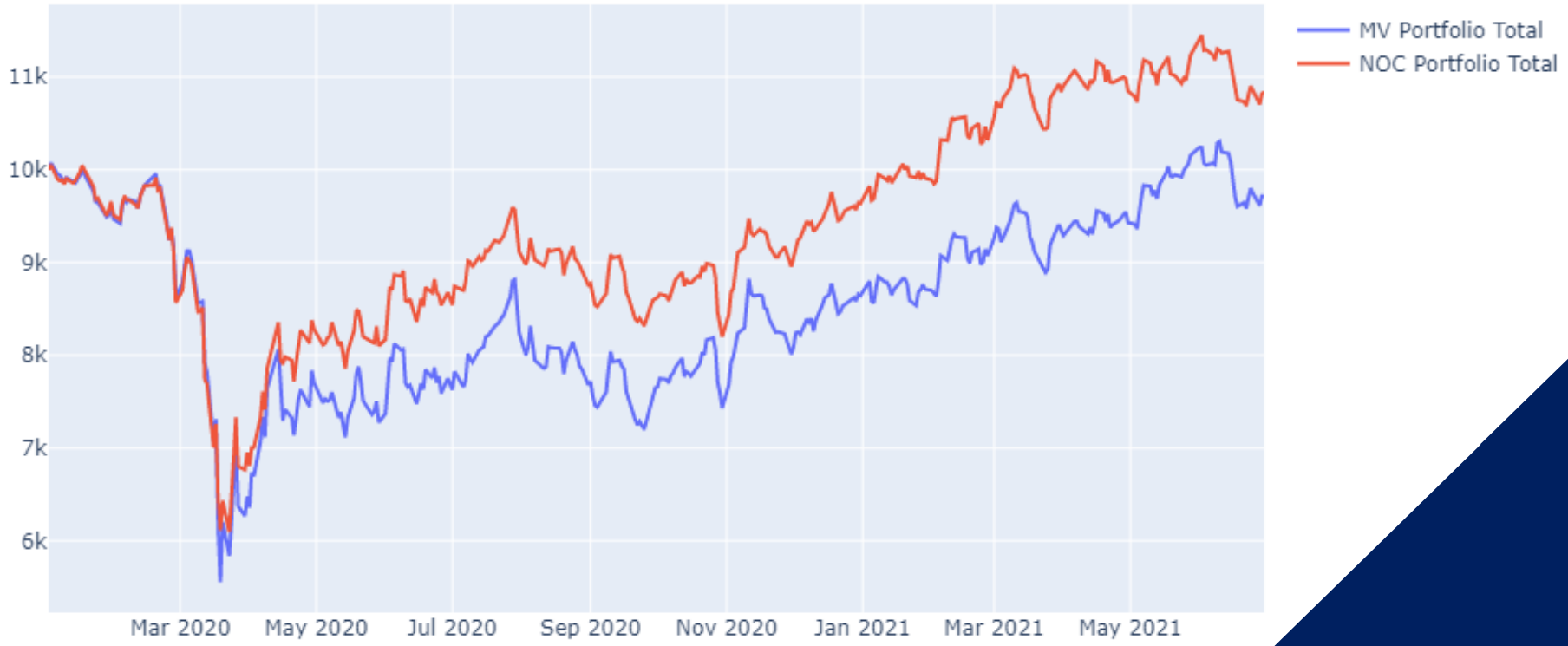
01-12-2010 — Model Development Data — 31-12-2019 — Back-Testing — 30-06-2021

Initial Investment N$ 10 000

Portfolio Performance



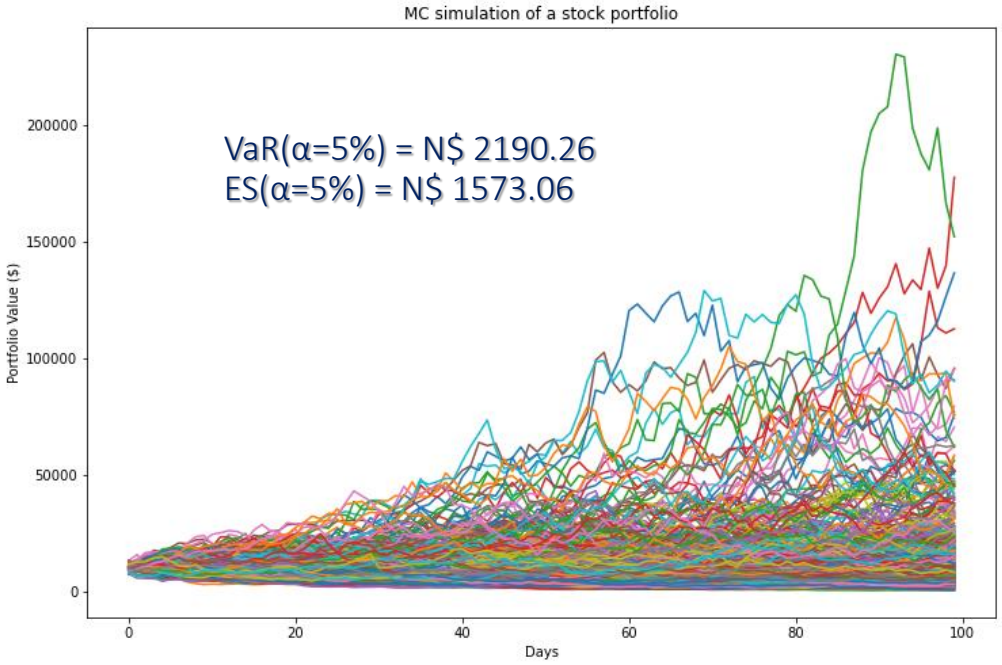
Scenario Analysis: Monte Carlo Simulation

01-12-2010 — Model Development Data — 31-12-2019 — MC Simulation — 30-06-2021

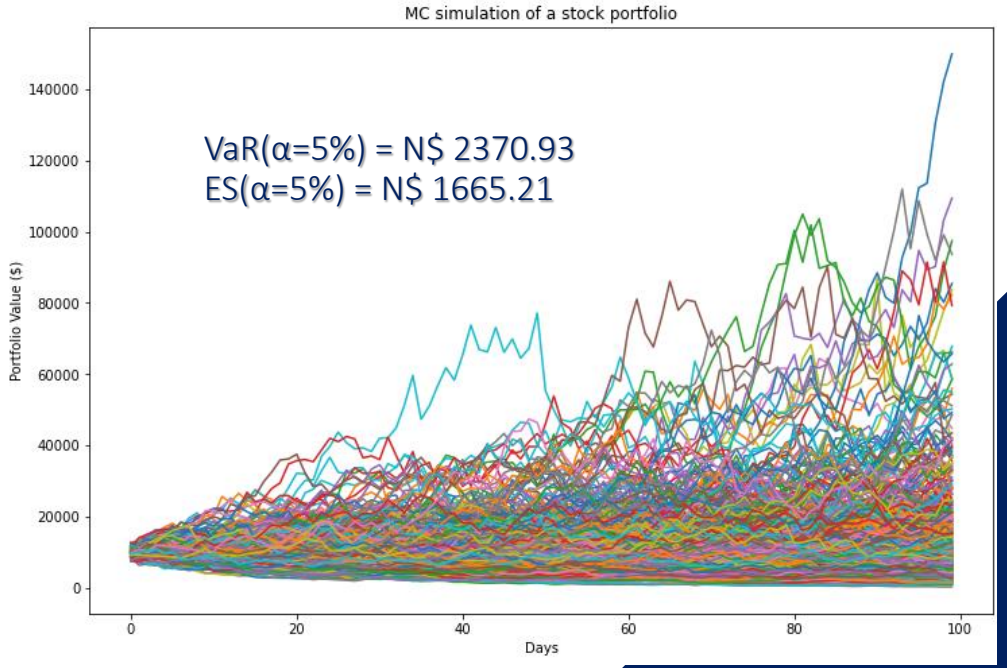
Initial Investment N$ 10 000

VaR(α=5%): MV-NOC = -180.67
ES(α=5%): MV-NOC = -92.15

Mean Variance



NOC



Software Stack

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Software

python

Packages