

GROUP 3:

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INTQUANT

INTENSIVE PROGRAMME - UBS CASE STUDY



Uniwersytet
Ekonomiczny
w Katowicach



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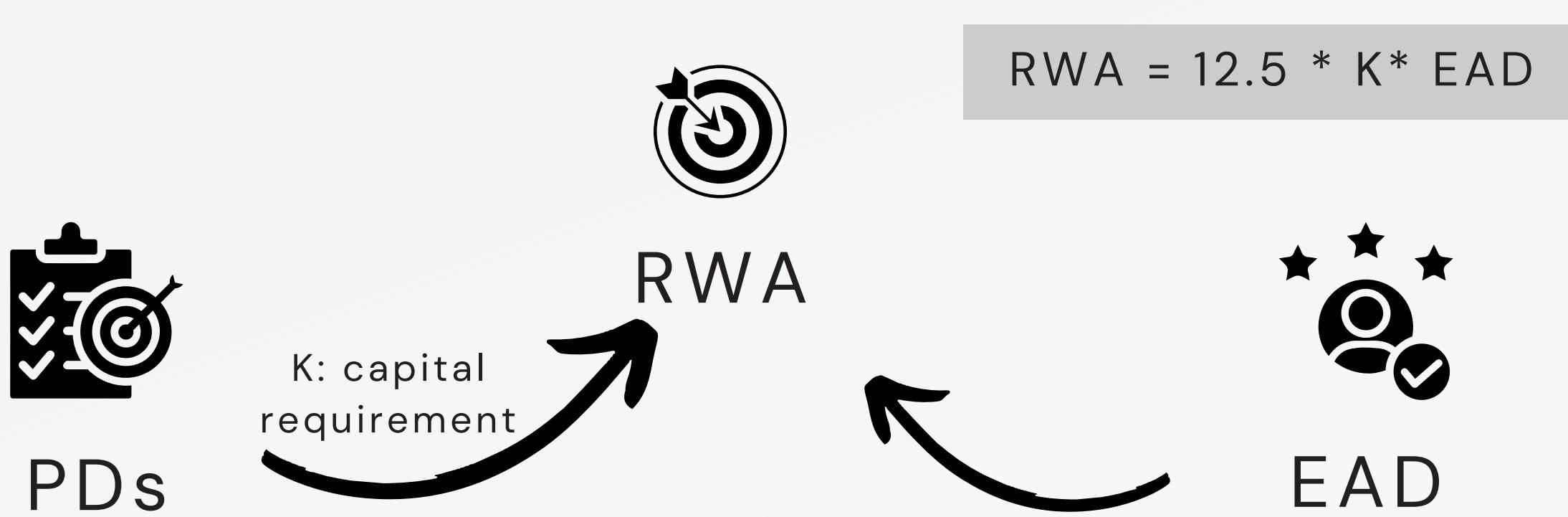
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INTRODUCTION



- Data Exploration
- Model Choice
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- Modeling of the underlying
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DATA EXPLORATION

The **dataset** provided:

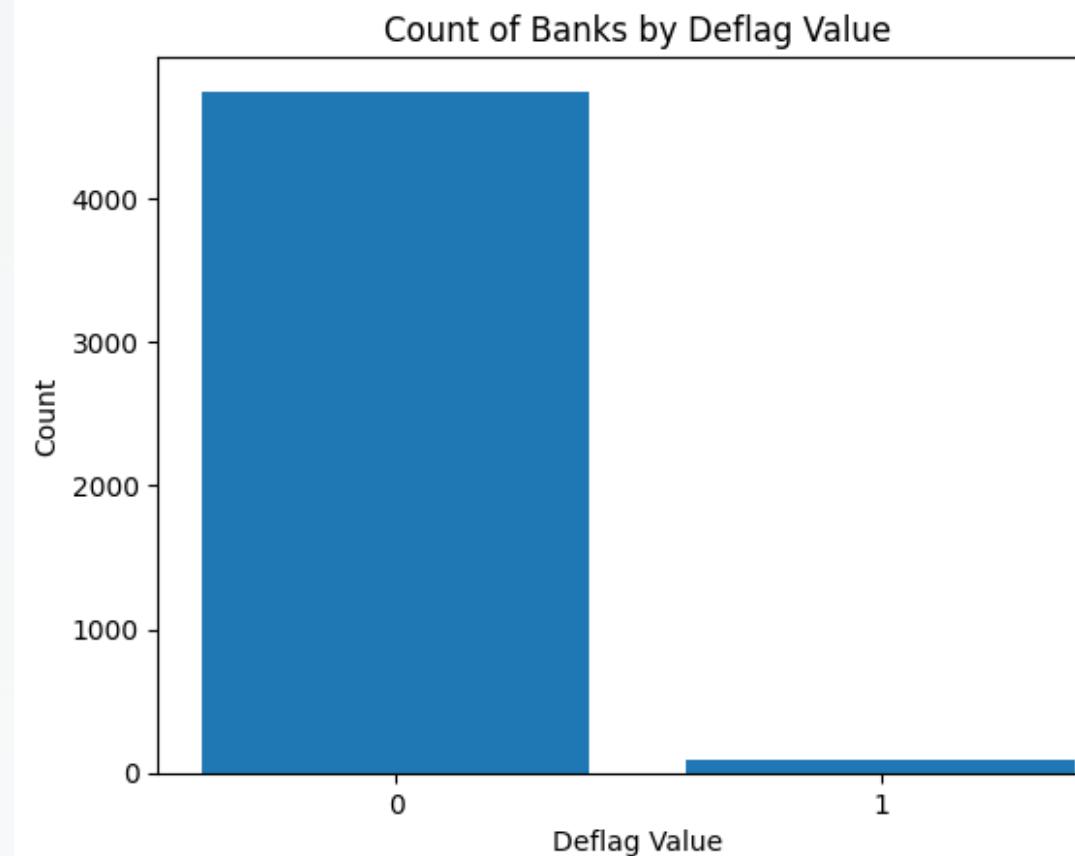
- **30.000** banks,
- The variable '**default flag**' is binary. It is not possible to assess whether it has missing values.
- **26 variables**:
- variables are **financial ratios** describing the performance of the banks.

For the detailed data exploration we used various methods;

- starting with descriptive statistics,
- assessment of Pandas ProfileReport by Ydata,
- visual assessment: **boxplots, violin plots**

The three major **problems** with the data set were;

- the **missing values** of around 9.4% of total data,
- many **outliers** that vary between variables.
- Also, the small **amount of defaults** indicated in the *deflag* variable 524 out of 30,000 turned out to be a difficulty when modeling.



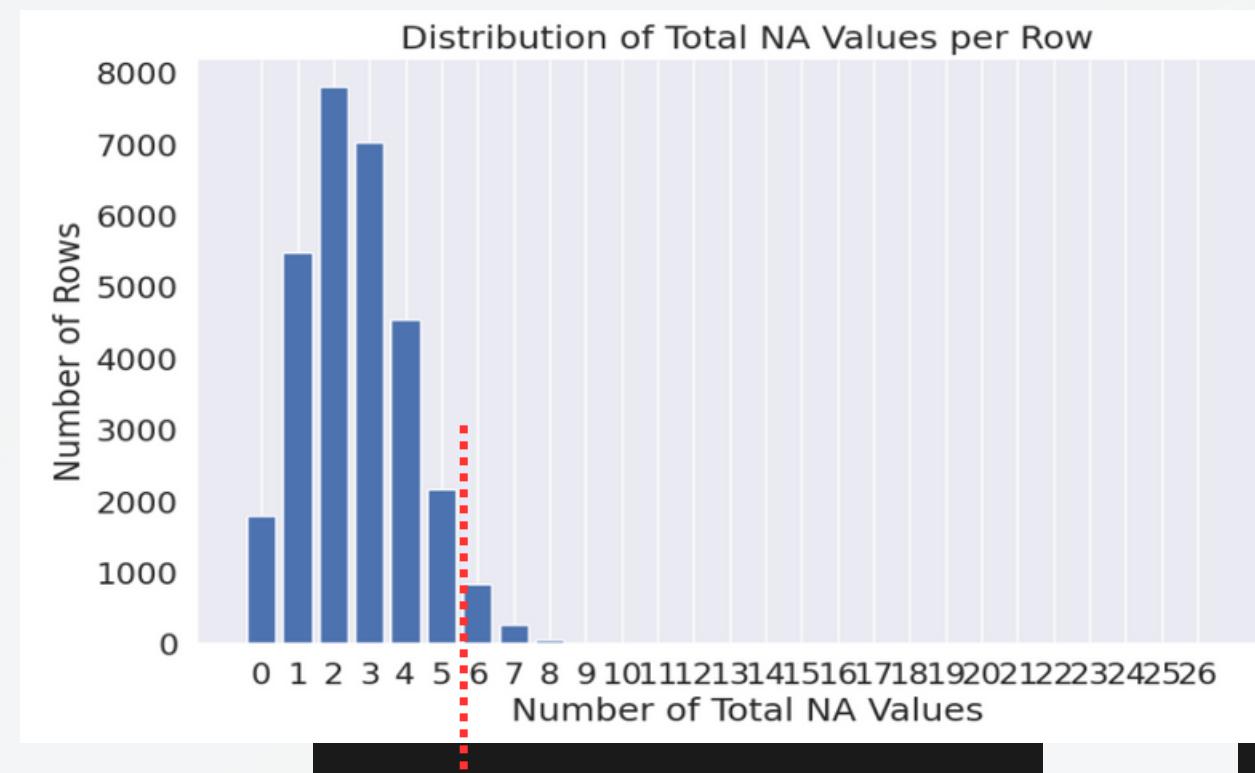
Missings

Outliers

524 Defaults

MISSING VALUES AND OUTLIERS

Following numerous experiments and testing various methods with the data, we have chosen to move forward with the following approach:

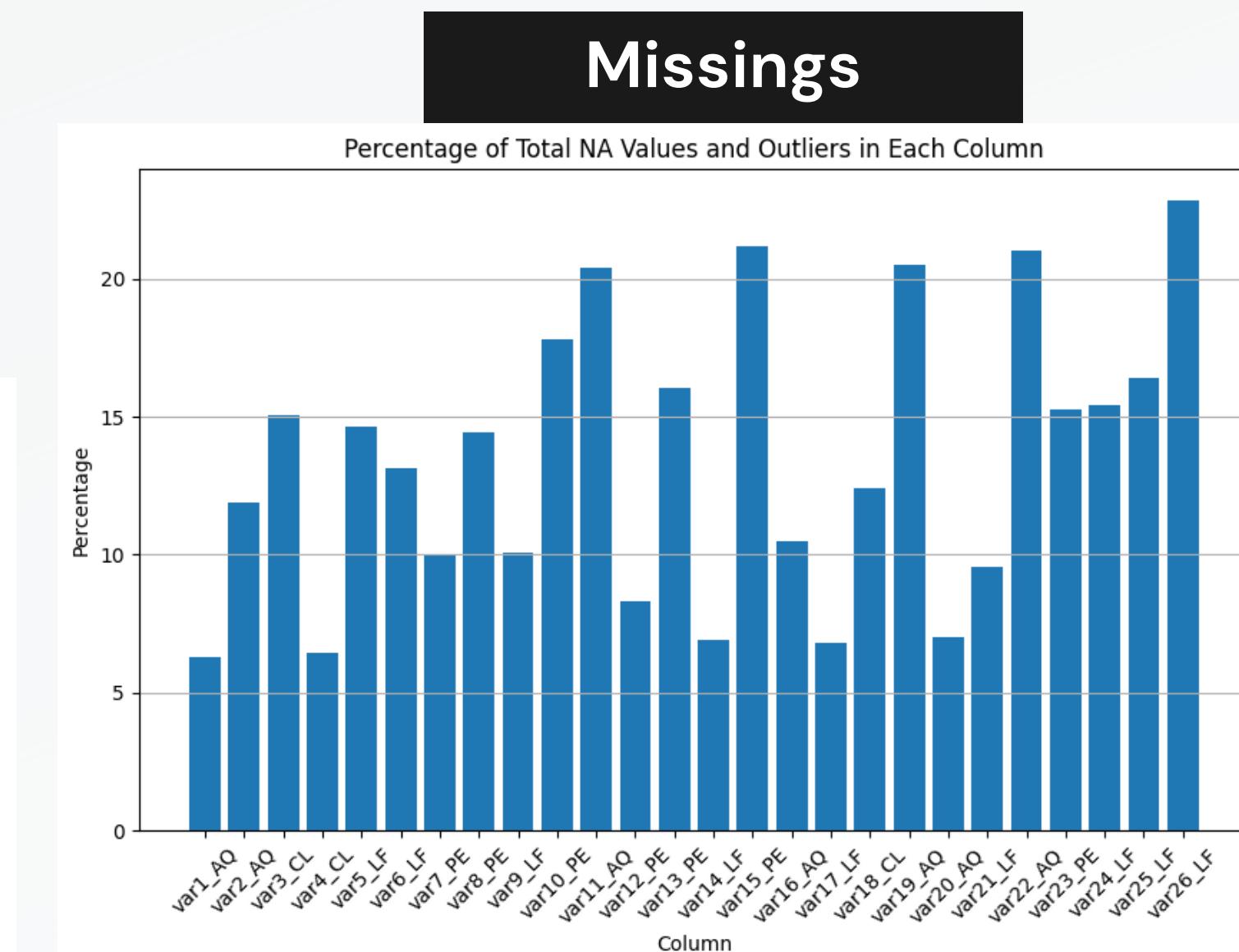
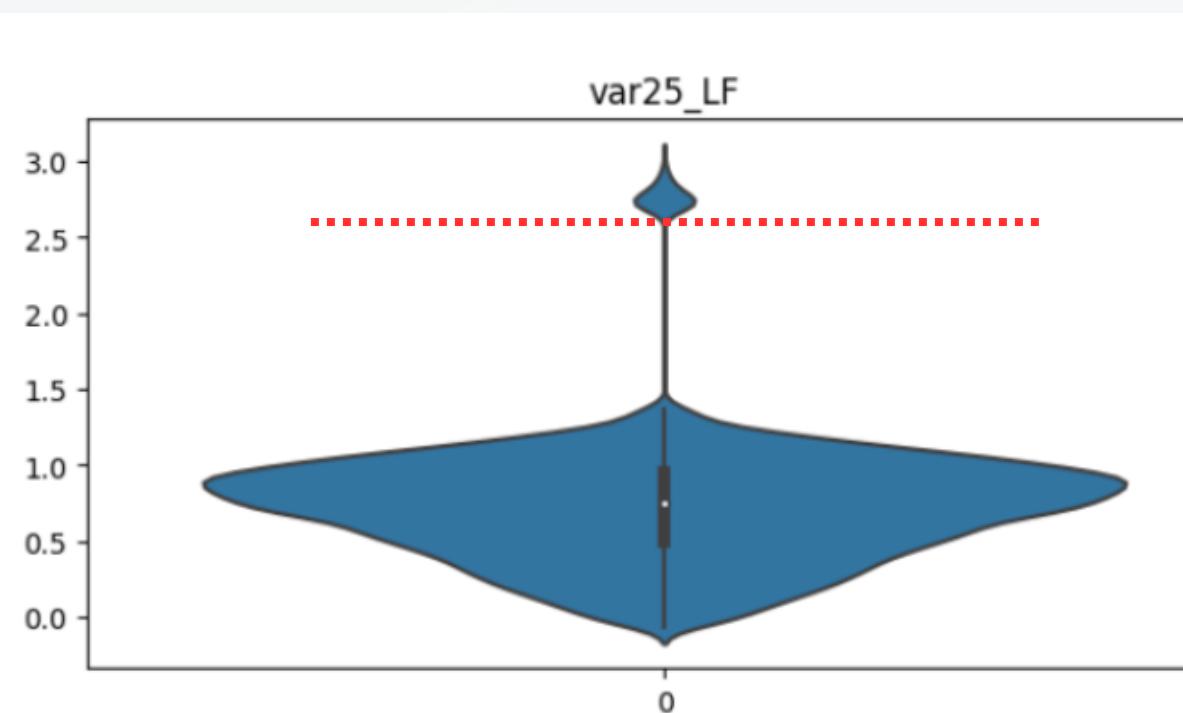


$$\text{lower_fence} = q1 - 1.5 * \text{iqr}$$

$$\text{upper_fence} = q3 + 1.5 * \text{iqr}$$

Evaluation of fundamental descriptive statistics following the implementation of changes, in comparison to the outcomes prior to the adjustments

Outliers



PD MODELS

- See different models
- Different approaches to dealing with data
- How it influences the model's performance and outcomes.
- Initially, we cleared data just by windsor sizing outliers and filling NAs with the median. RobustScaler for standardization.

	Acc_train	Acc_test	AUC_train	AUC_test	F1_train	F1_test	false_positive	false_negative	true_positive	recall	precision
Regresja logistyczna	0.982333	0.983333	0.873961	0.873590	0.045045	0.056604	1	99	3	0.029412	0.750000
Lasy losowe	1.000000	0.983167	1.000000	0.868912	1.000000	0.019417	0	101	1	0.009804	1.000000
XGBoost	1.000000	0.983333	1.000000	0.911823	1.000000	0.122807	5	95	7	0.068627	0.583333
Bagging (naiwny bayes)	0.956292	0.956500	0.882042	0.875957	0.255500	0.243478	201	60	42	0.411765	0.172840
Bagging (drzewo decyzyjne)	0.996500	0.983000	0.999846	0.744169	0.889764	0.037736	2	100	2	0.019608	0.500000

= Unsatisfactory, bad results

- 
- Going to the previously described data cleaning
 - Logistic Regression model

CHOICE OF VARIABLES

Excluded:

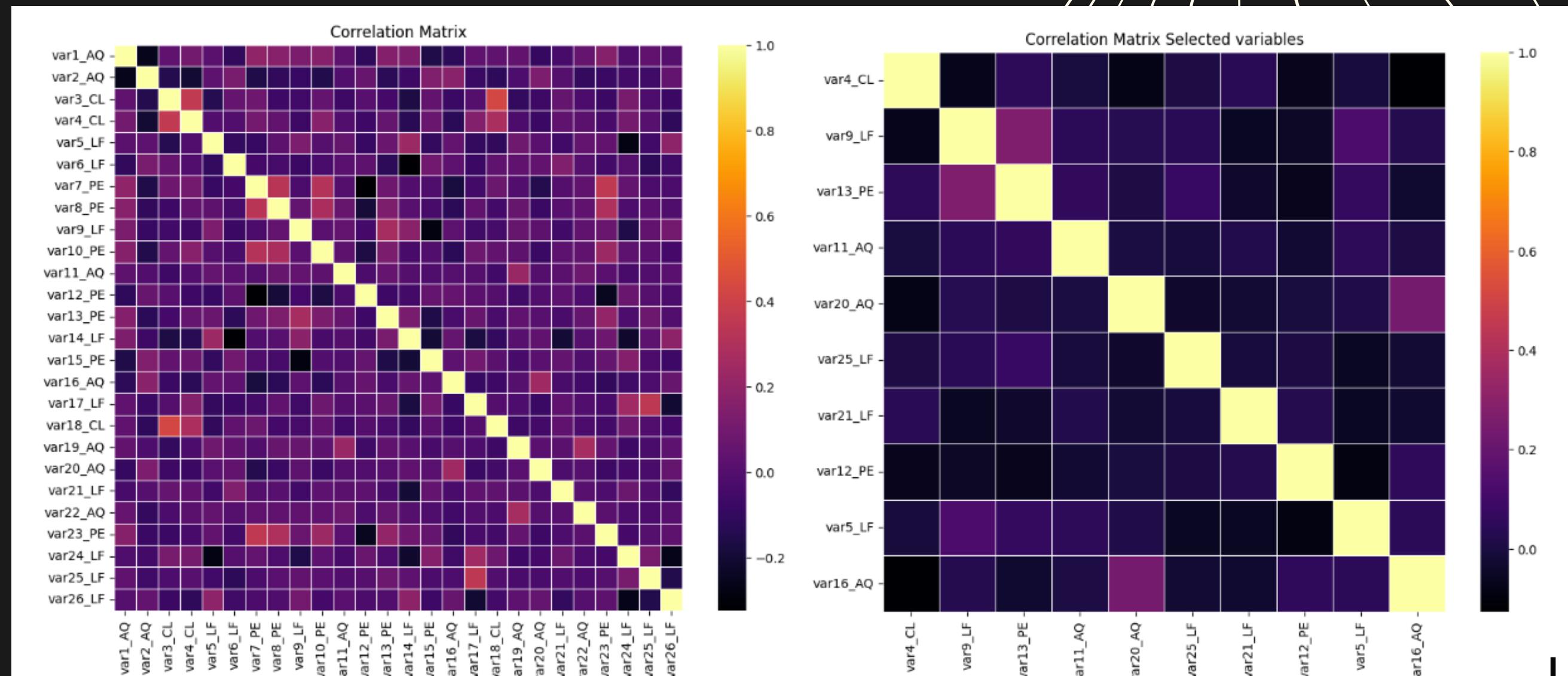
- high anomalous values:
 - 15,19,22,26
- relative lack of importance:
 - 13, 14, 24

Included:

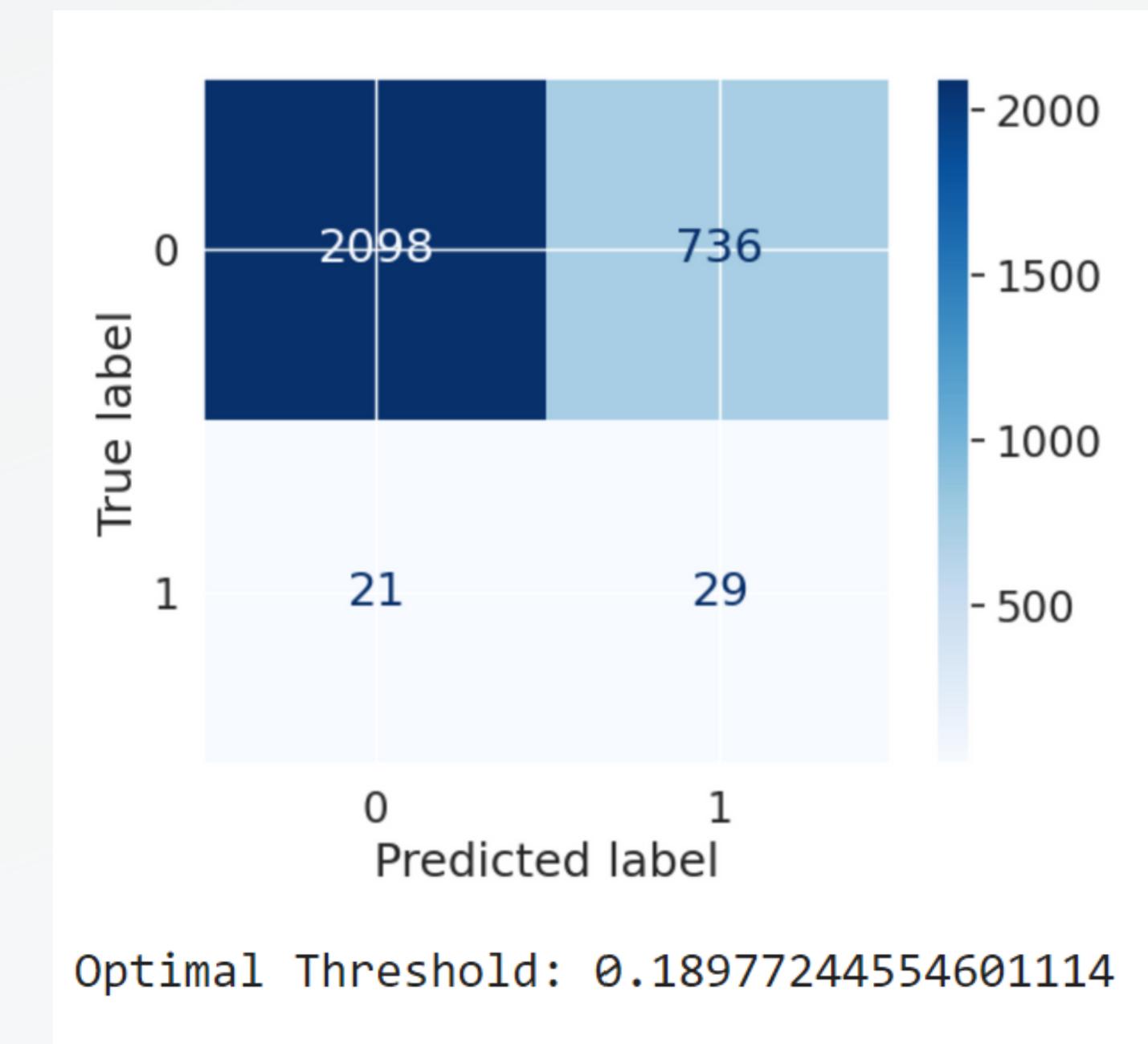
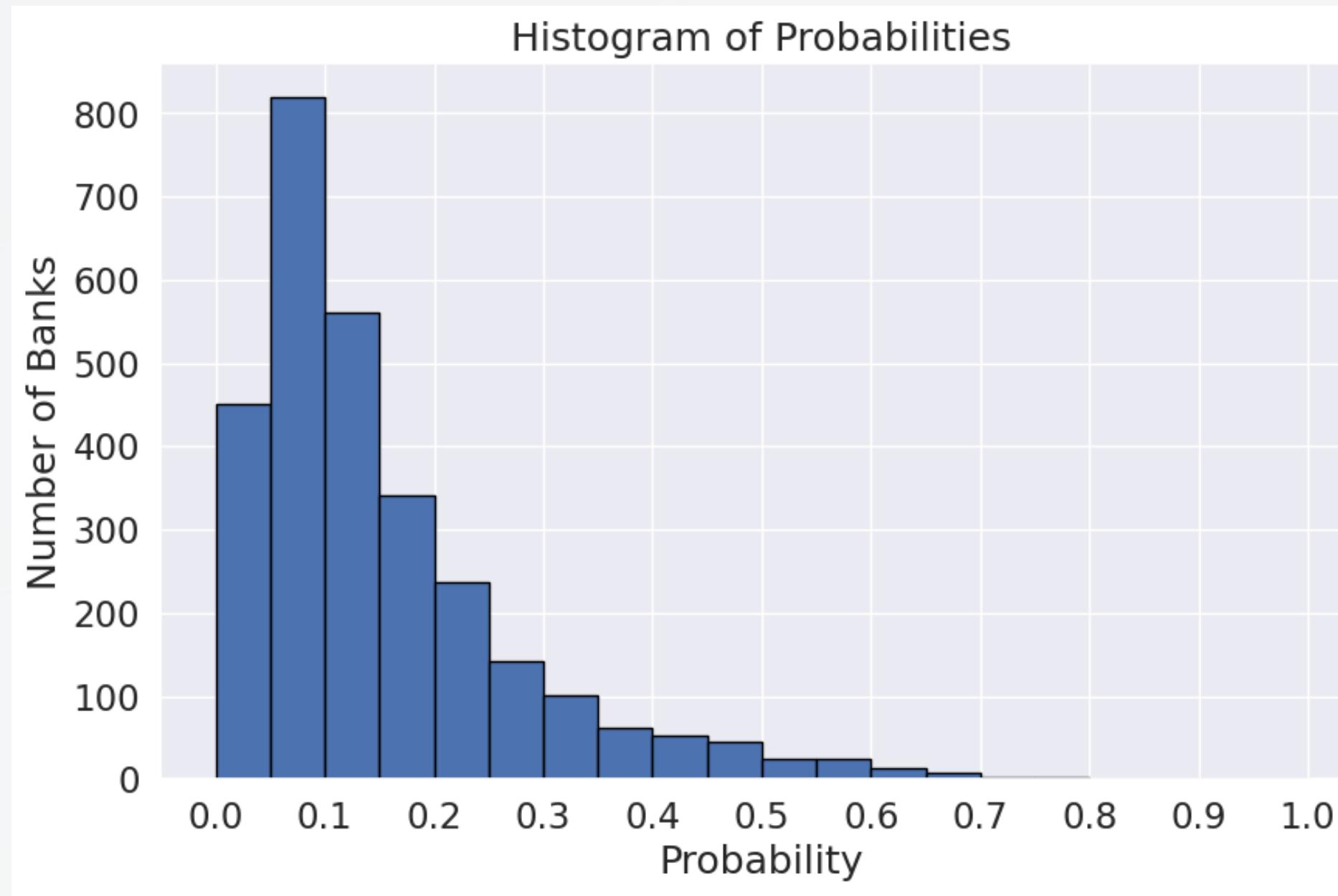
- considered important:
 - 9,
- and low anomalous values
 - 4,13

Final choice (10):

```
['var4_CL', 'var9_LF',
 'var13_PE', 'var11_AQ',
 'var20_AQ', 'var25_LF',
 'var21_LF', 'var12_PE',
 'var5_LF', 'var16_AQ']
```



RESULTS



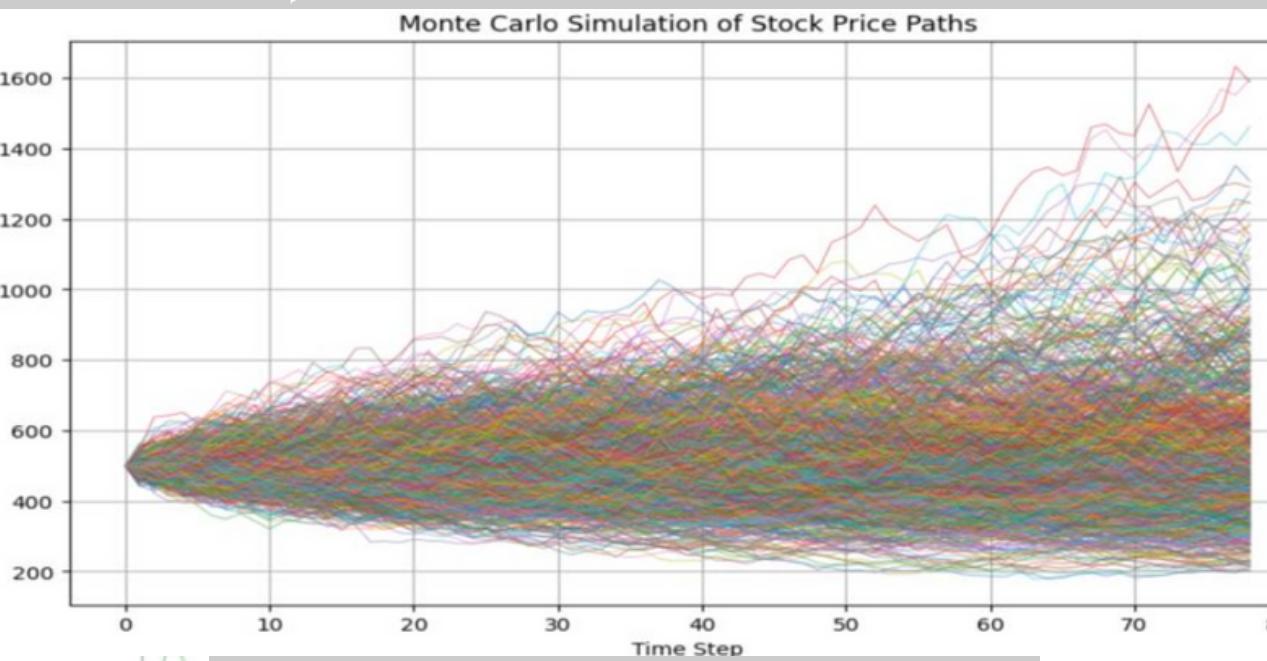
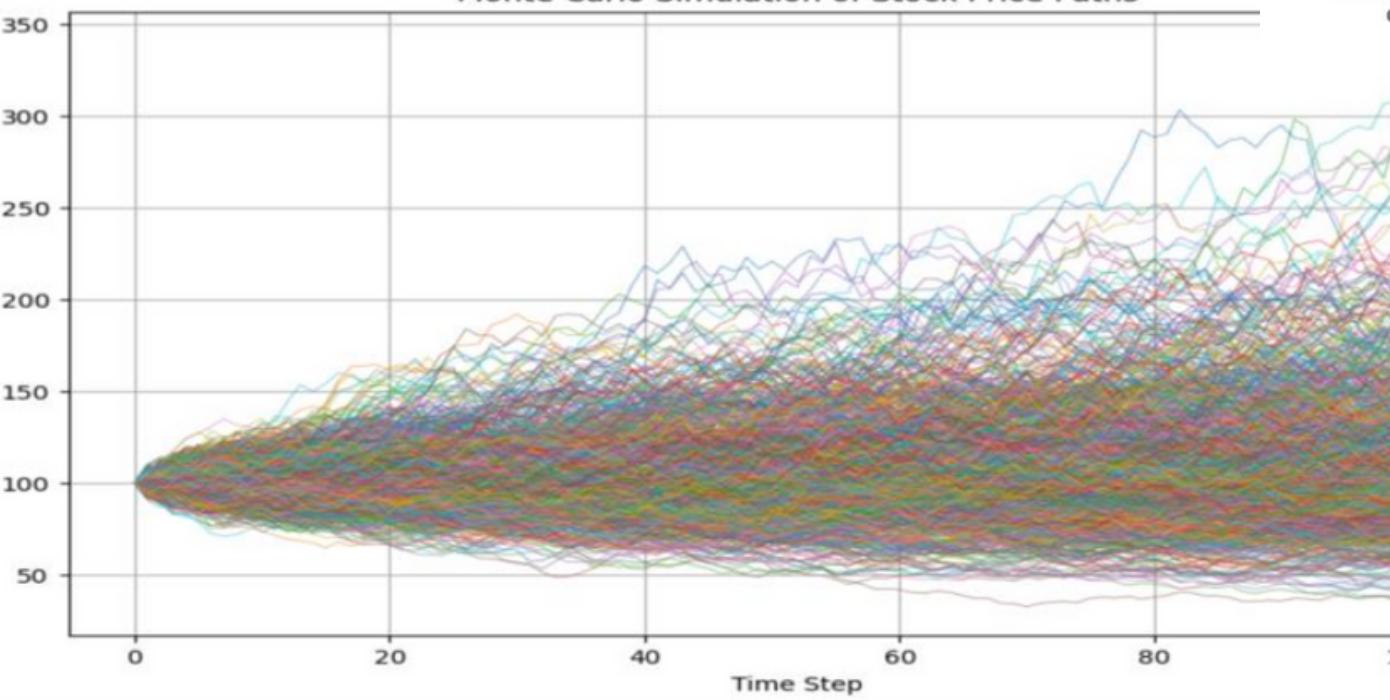
RESULTS

Bank ID	PD (Decimal)	PD (%)	Credit Rating
Bank 484	0.049261867	4.93%	AA
Bank 47	0.265954696	26.60%	CCC
Bank 2741	0.121063634	12.11%	BBB

Rating	AAA	AA	A	BBB	BB	B	CCC	CC	C
PD	< 1%	< 5%	< 10%	< 15%	< 20%	< 25%	< 40%	< 60%	> 60%

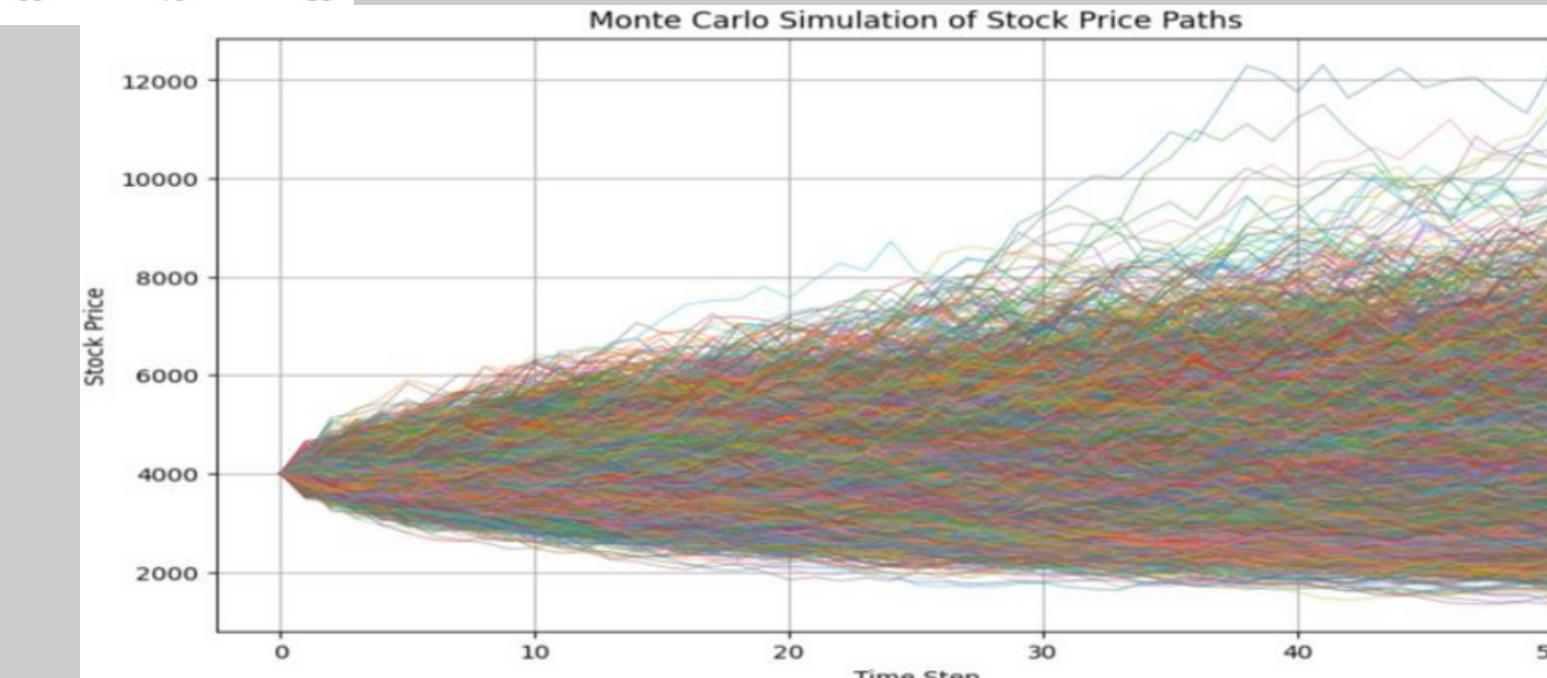
03 THE OPTIMAL SIGMA FOR ACCURATE SIMULATION OF THE UNDERLYING DYNAMICS

SALZBURG BANK(SPDRM)
0.242568

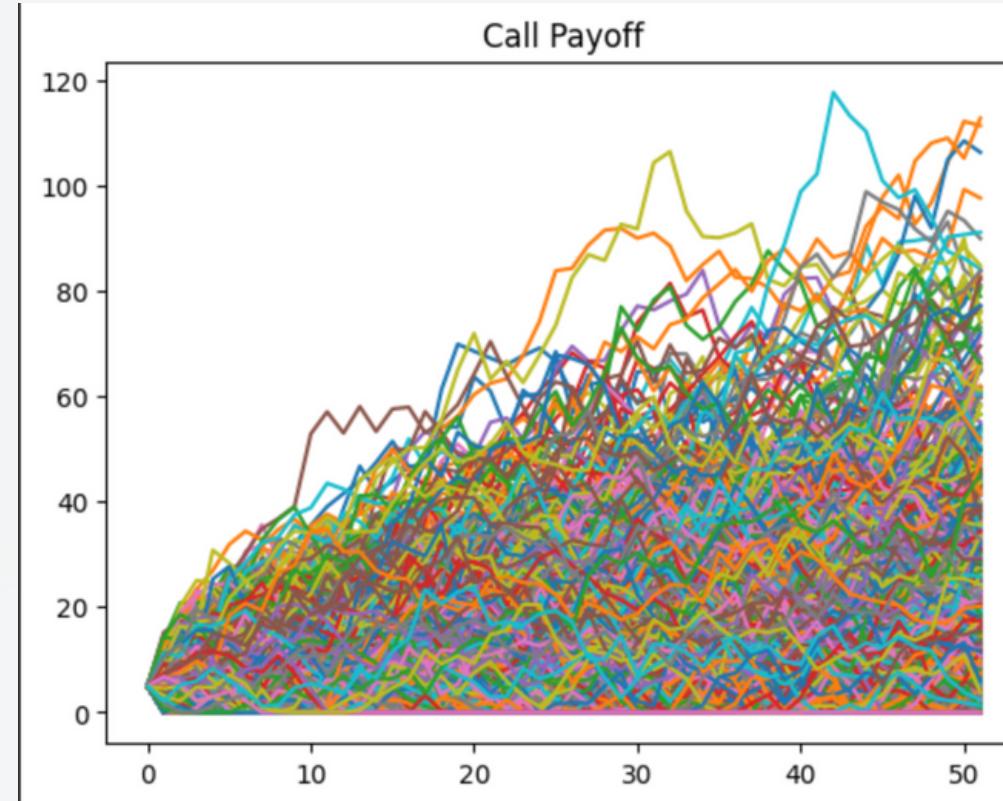


BANK OF
CLUJ(IRNM)
0.2830218

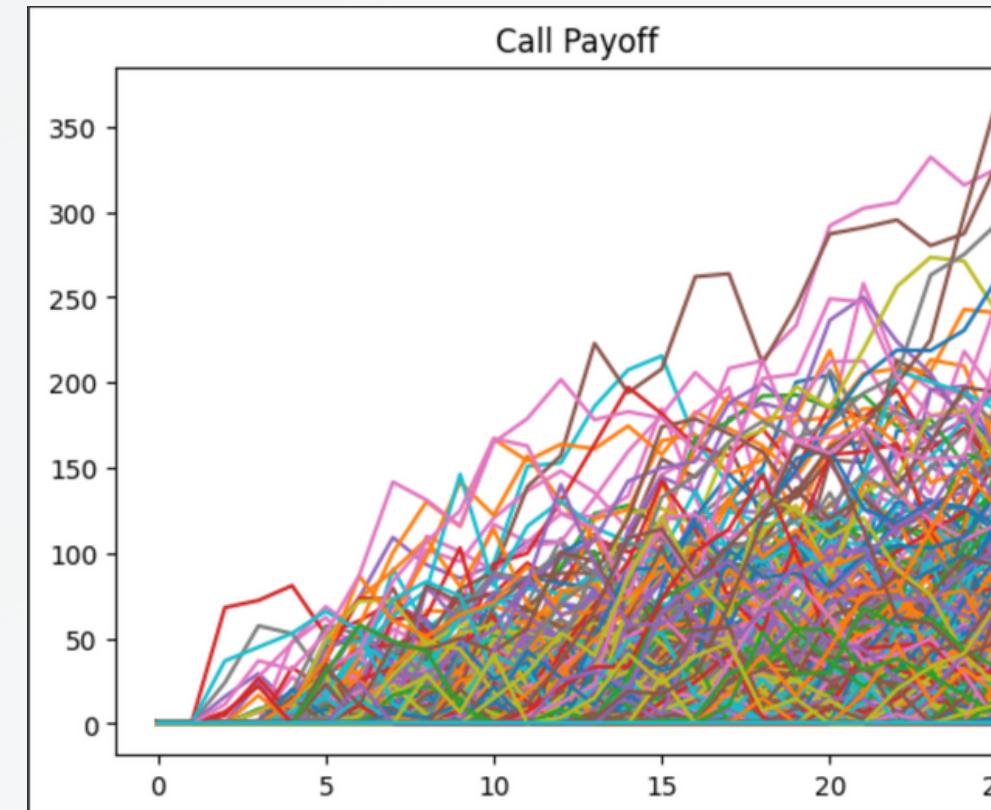
BANK OF MAZOWSZE(AVNG)
0.334981



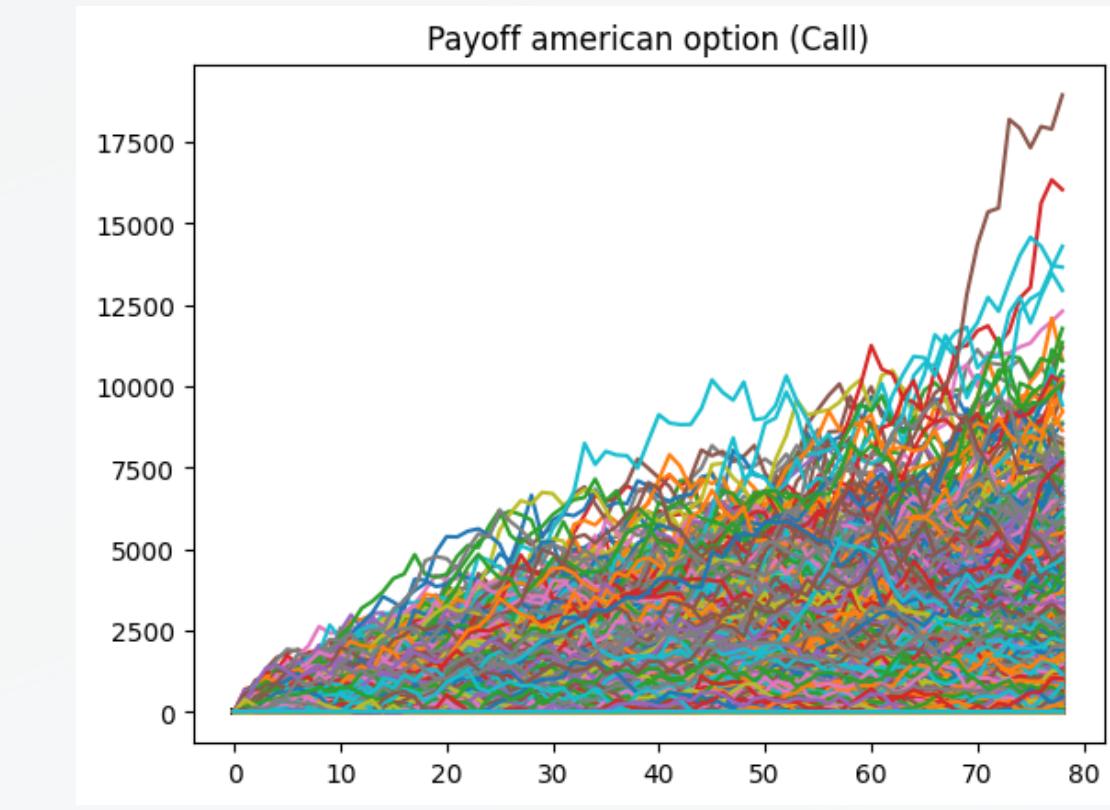
PRICING THE OPTIONS



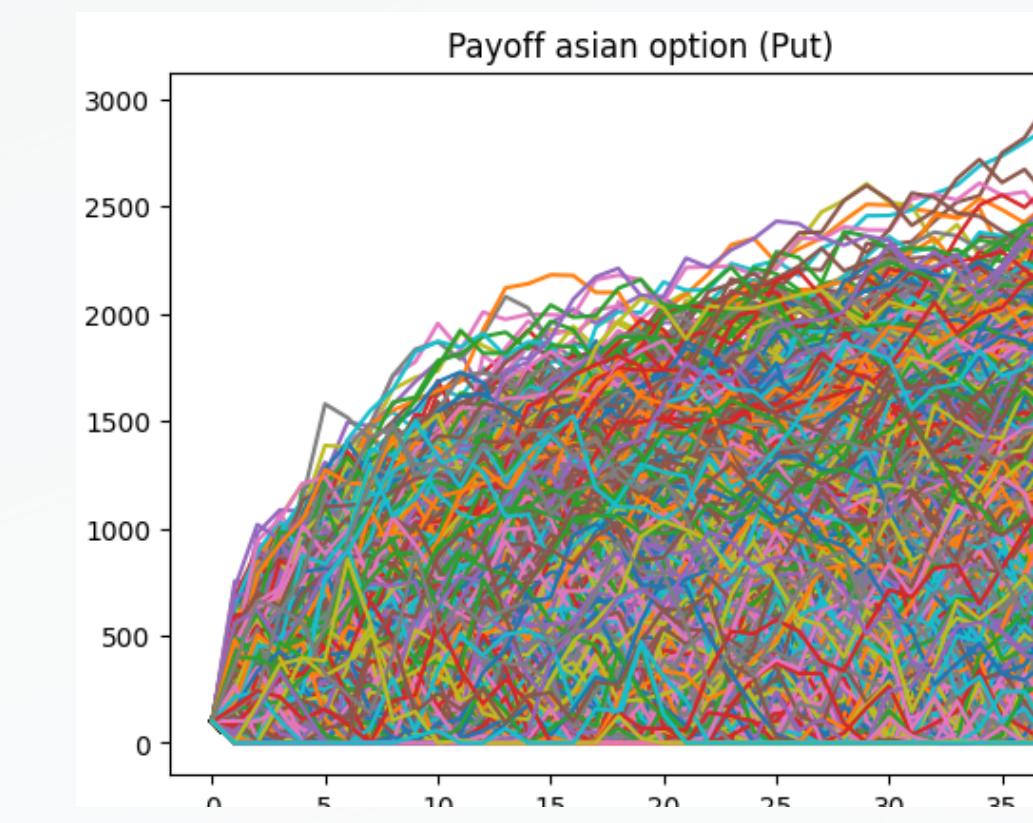
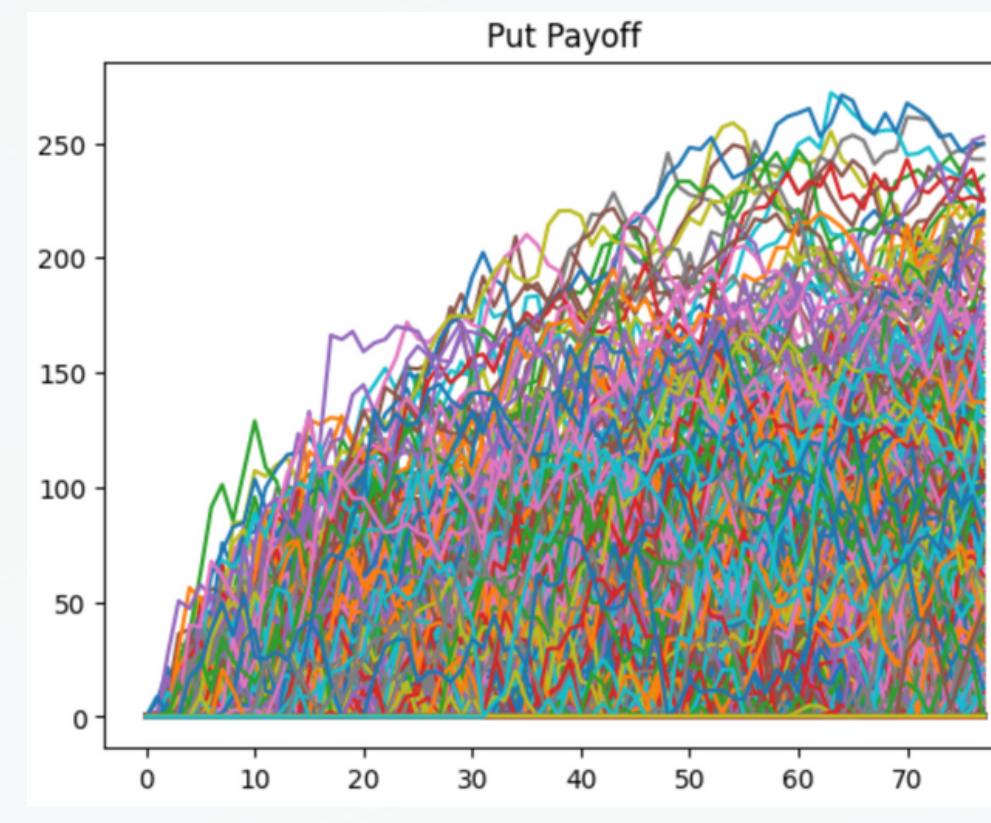
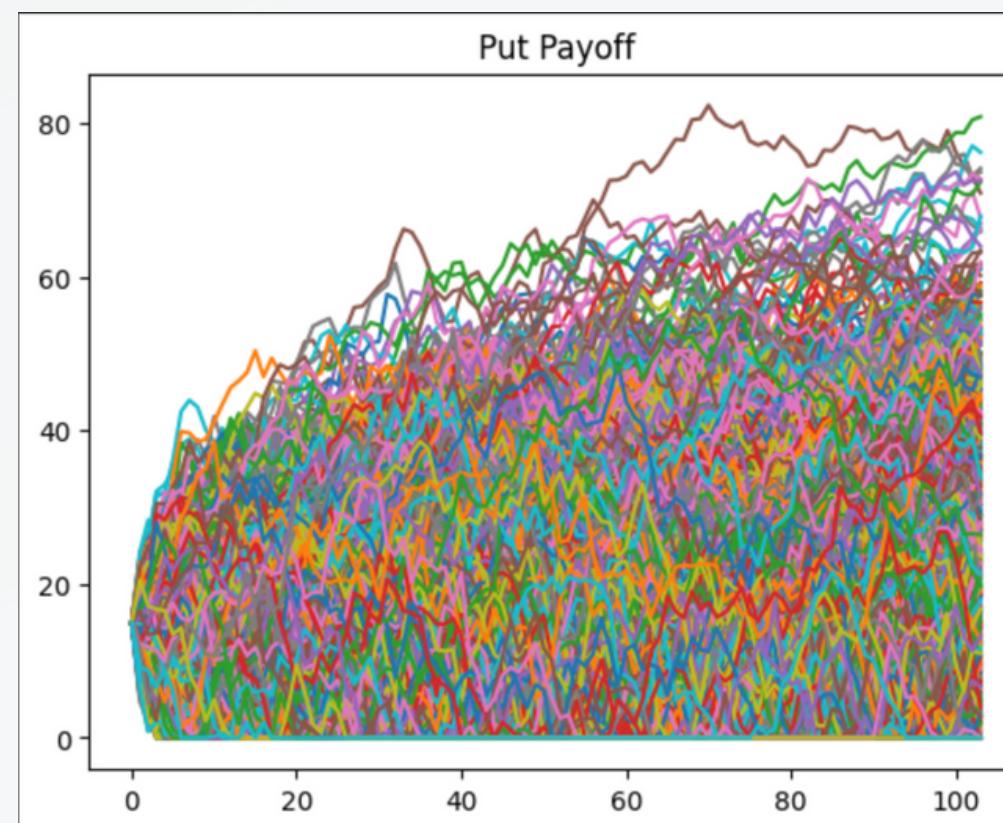
Plain Vanilla



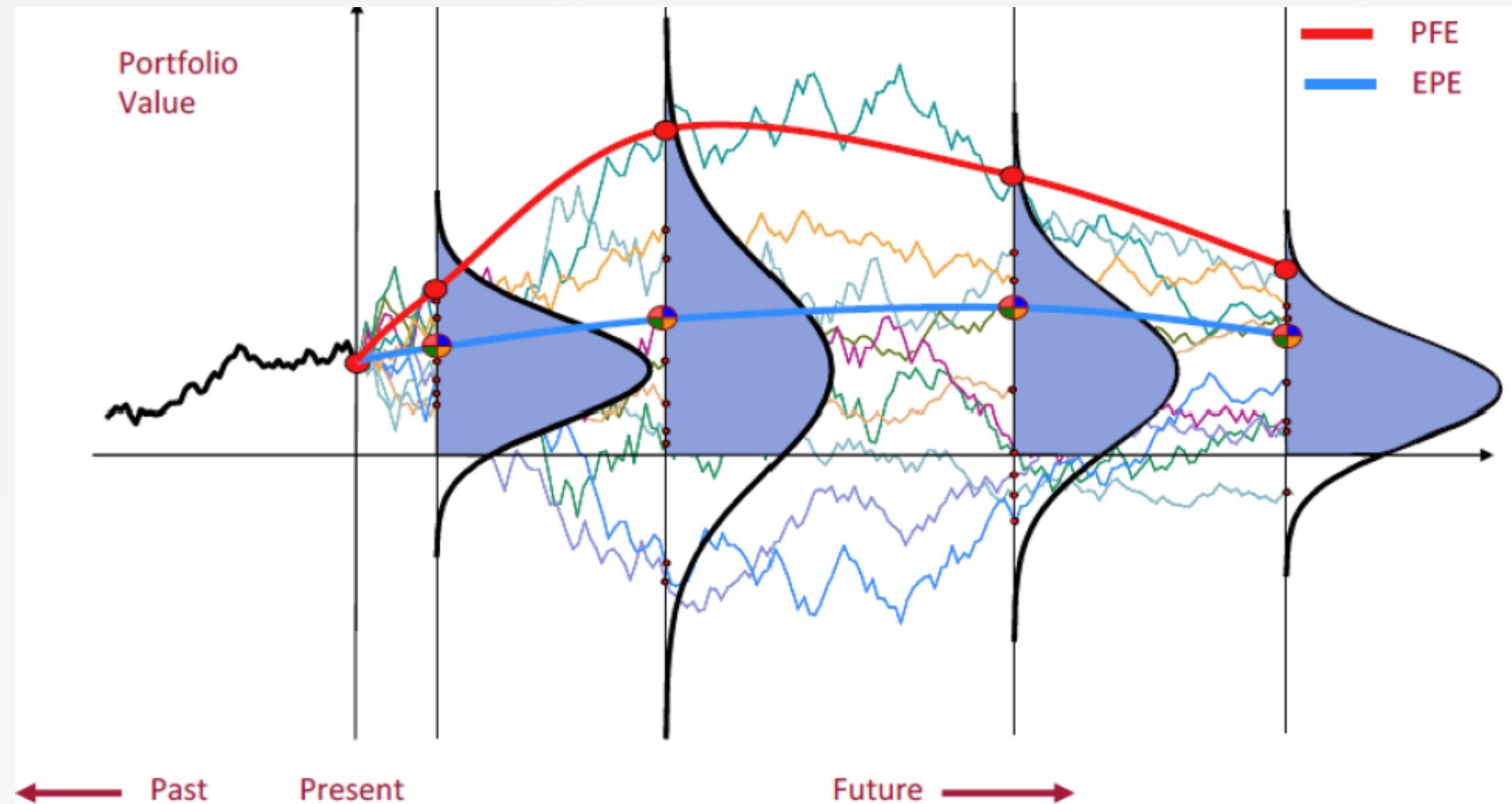
Asian Options



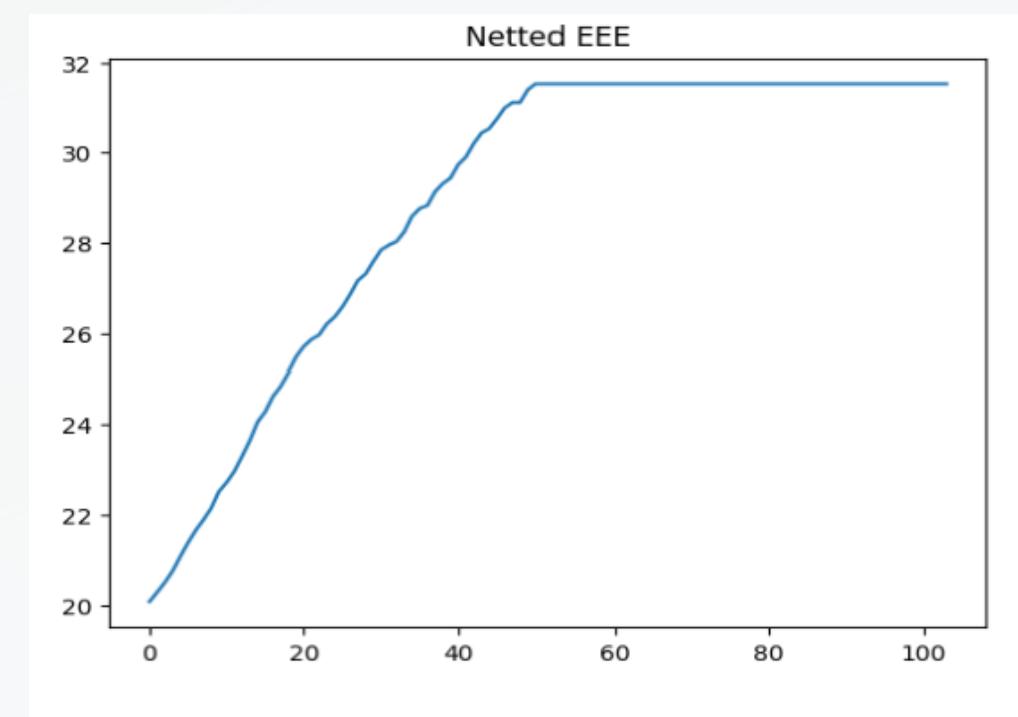
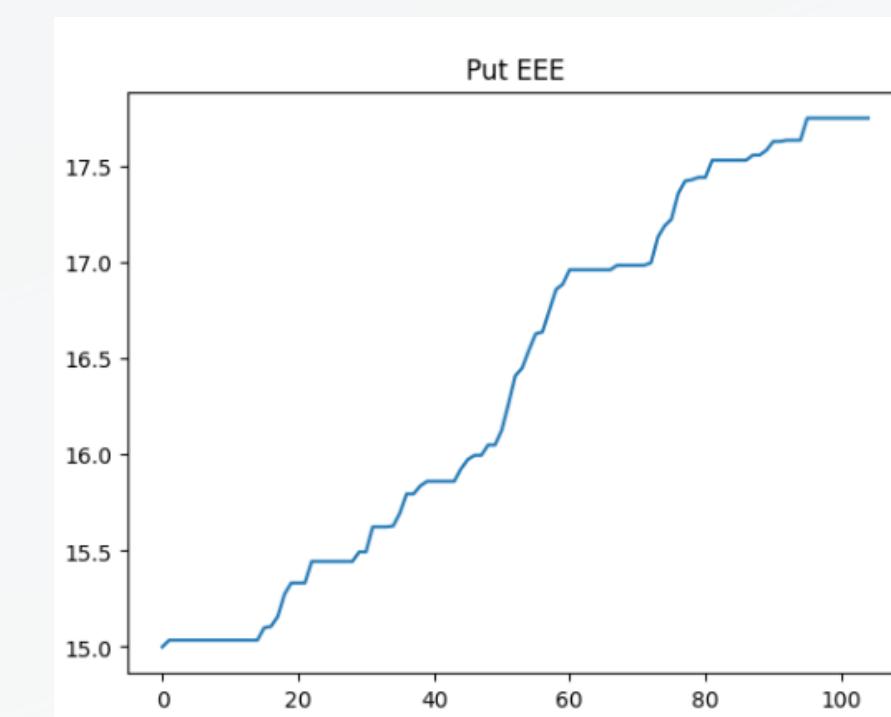
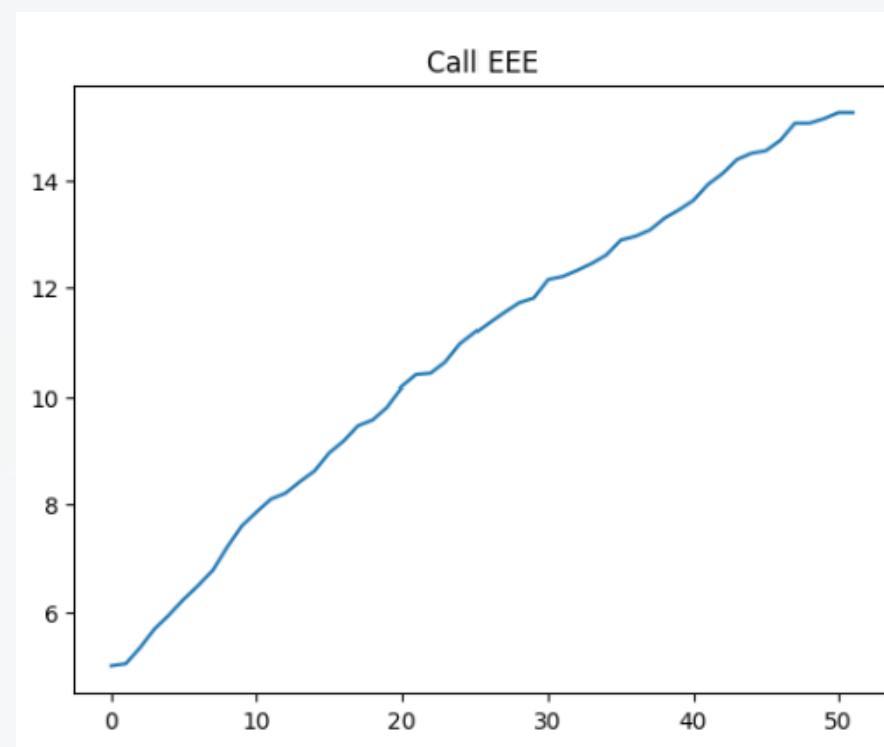
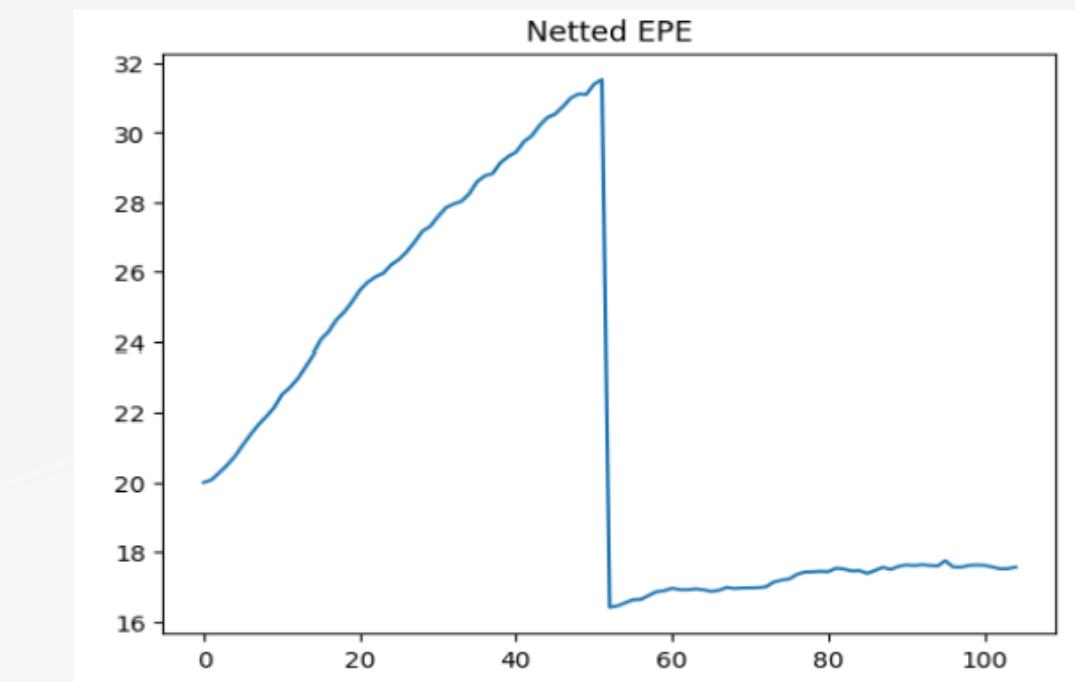
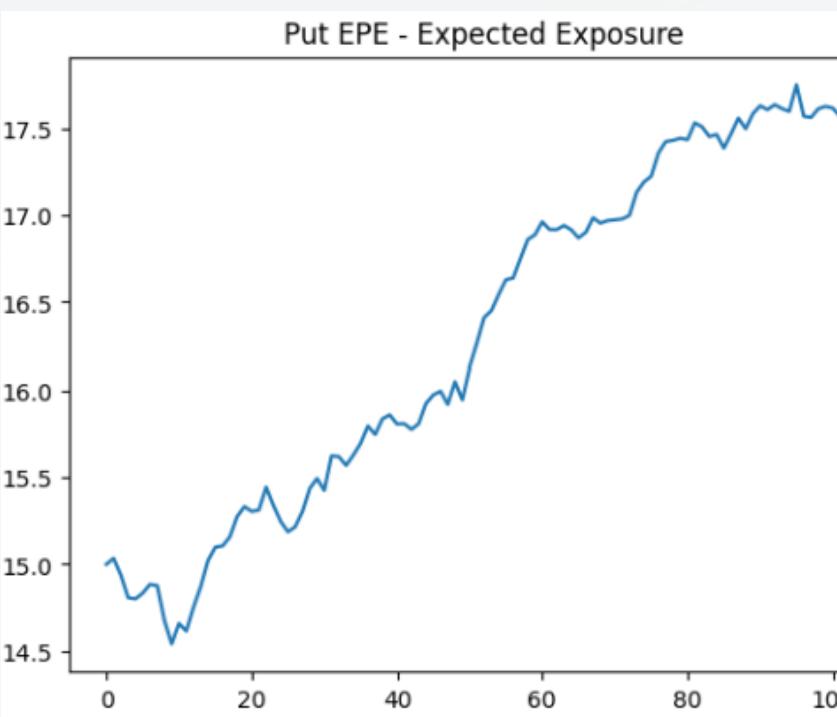
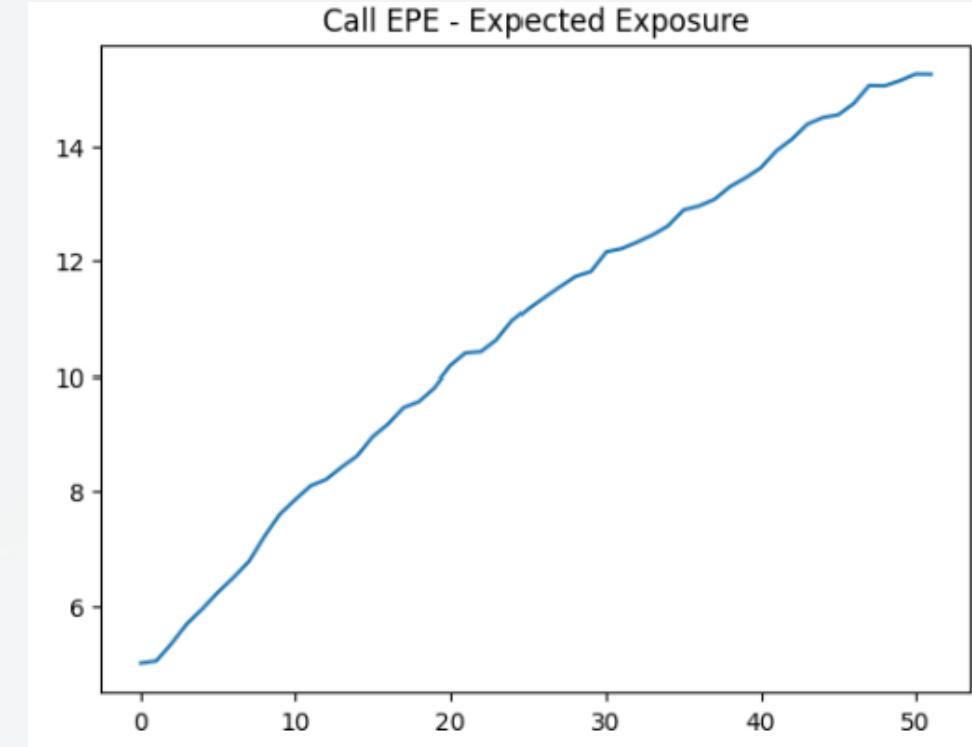
American and Asian Option



04 EXPOSURE METRICS



04 EXPOSURE METRICS: SALZBURG BANK



04 EXPOSURE AT DEFAULT AND RWA

$$EAD = \alpha EEP_E = 1.4 \times EEP_E$$

Table 5: Salzburg Bank

Measure	Value
EAD Call	15.1547
EAD Put	22.9404
EAD Portfolio	40.5665
RWA PUT	53.9009
RWA CALL	32.5219
RWA PORTFOLIO	87.0555

Table 6: Bank of Cluj

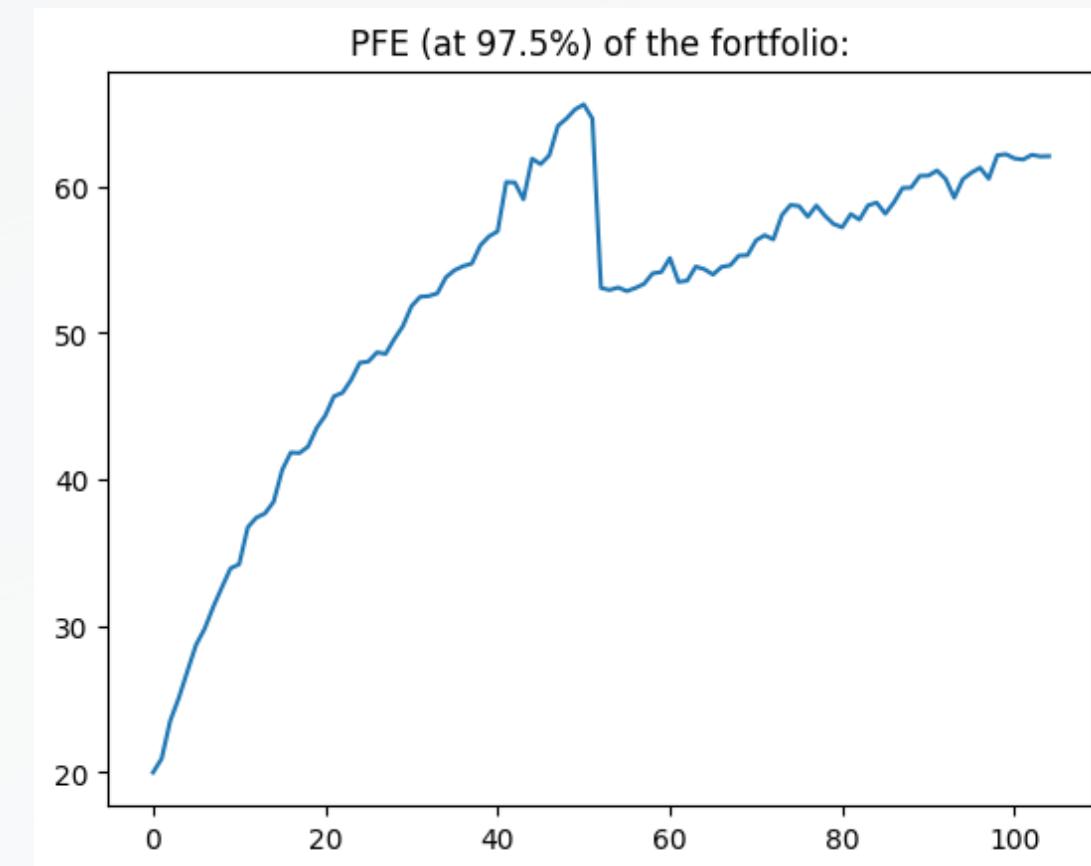
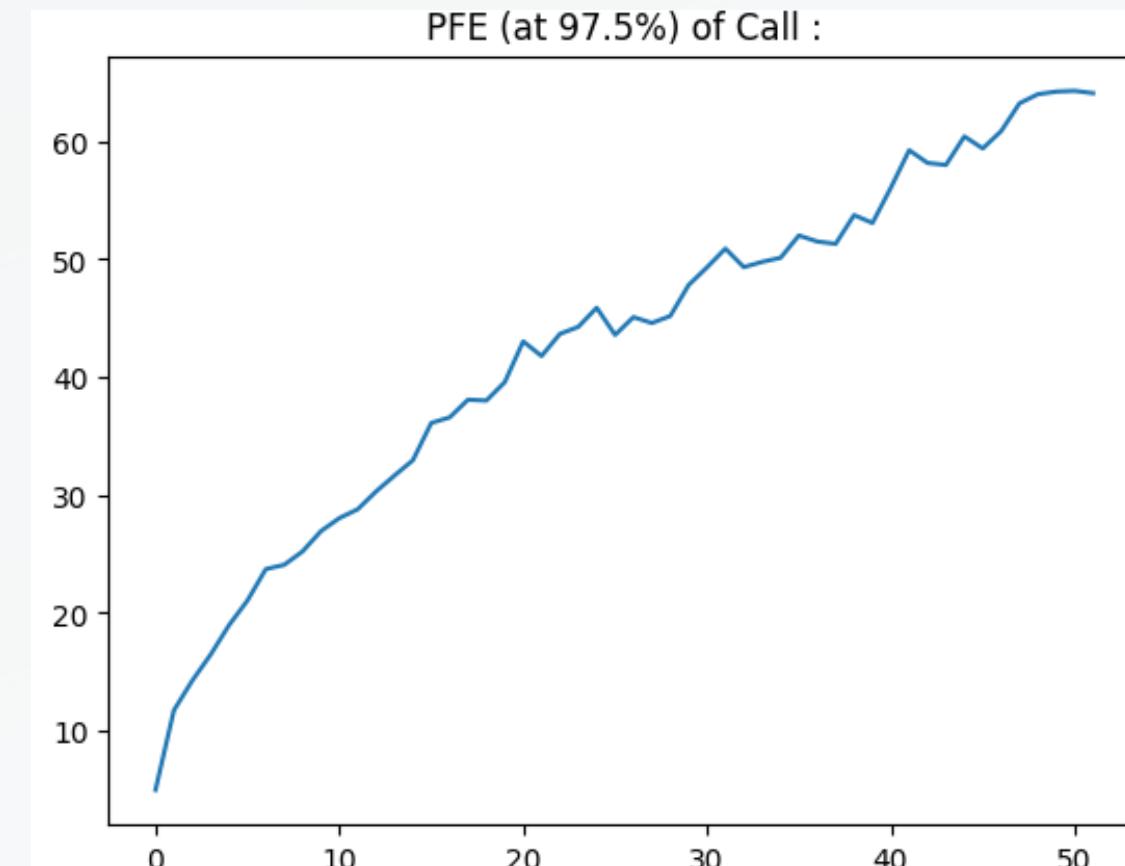
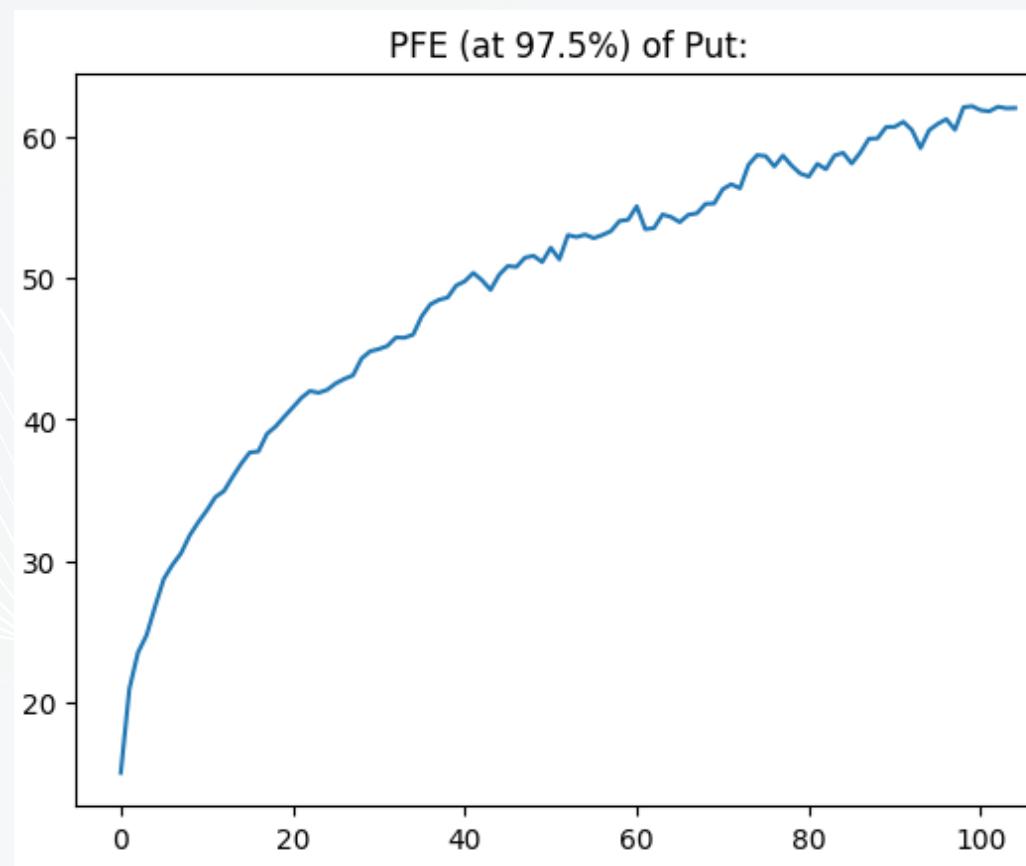
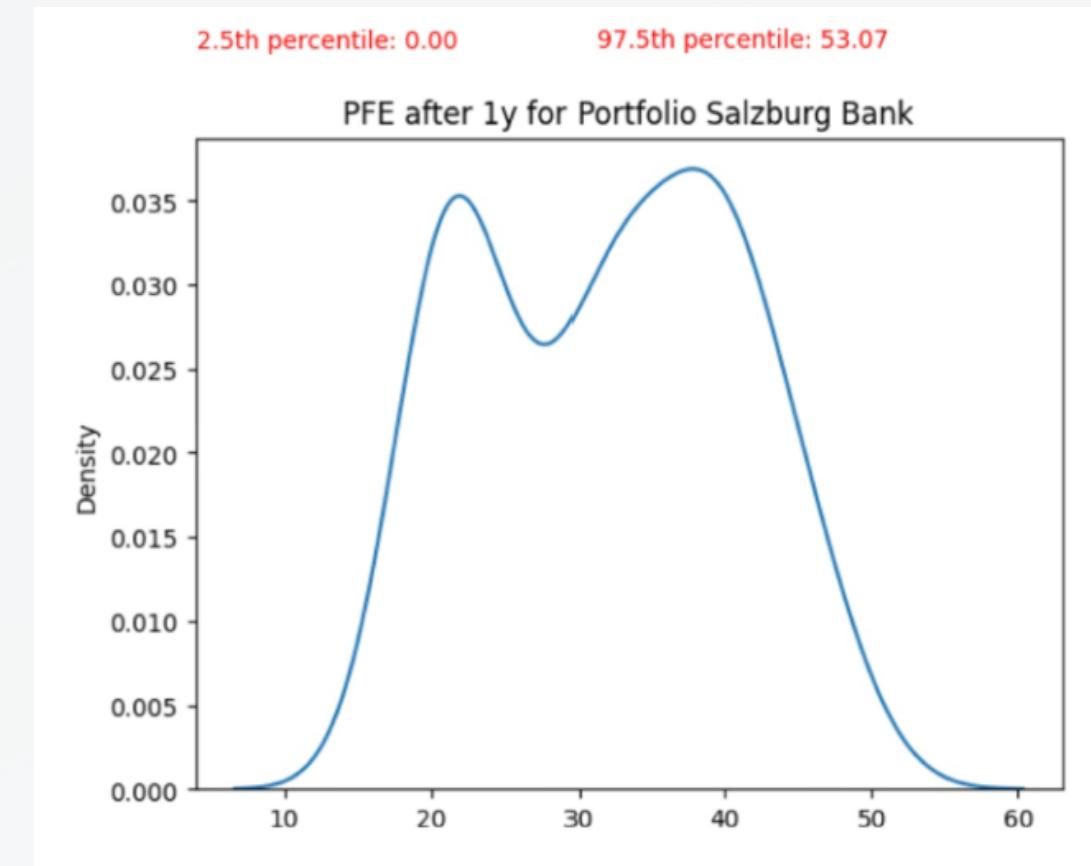
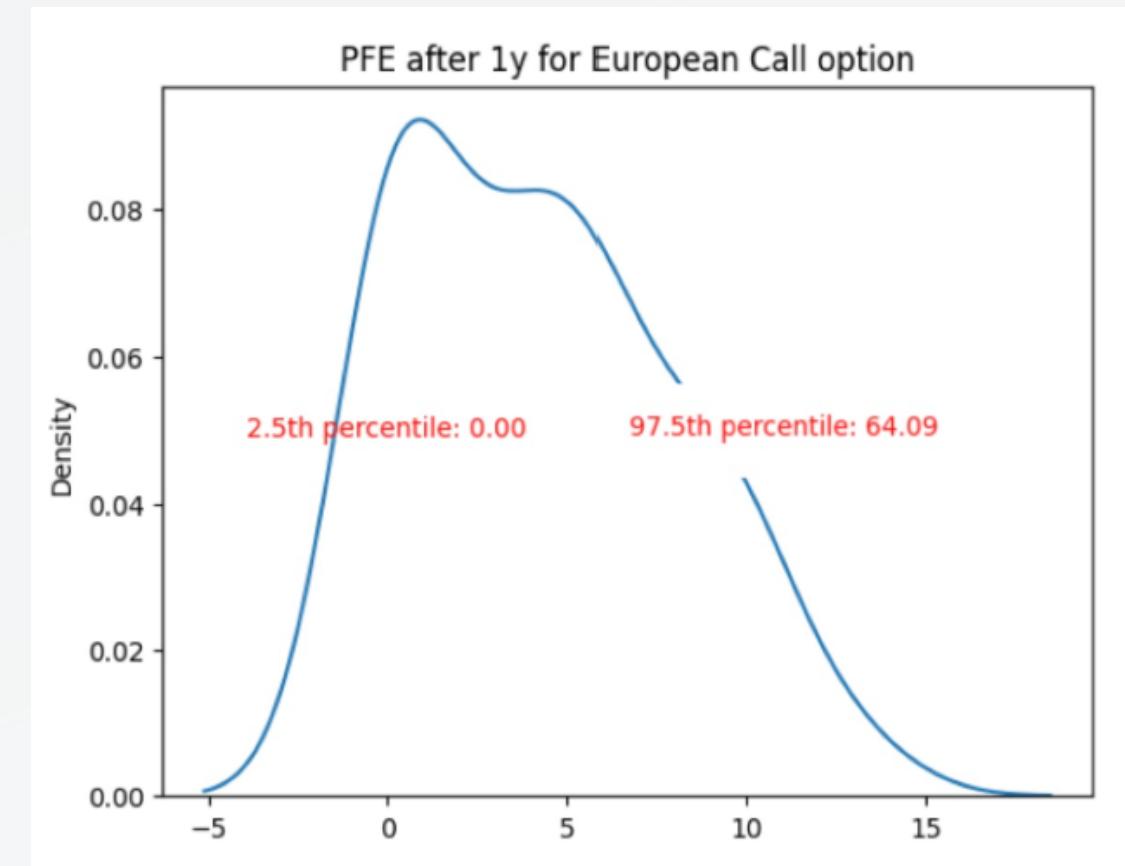
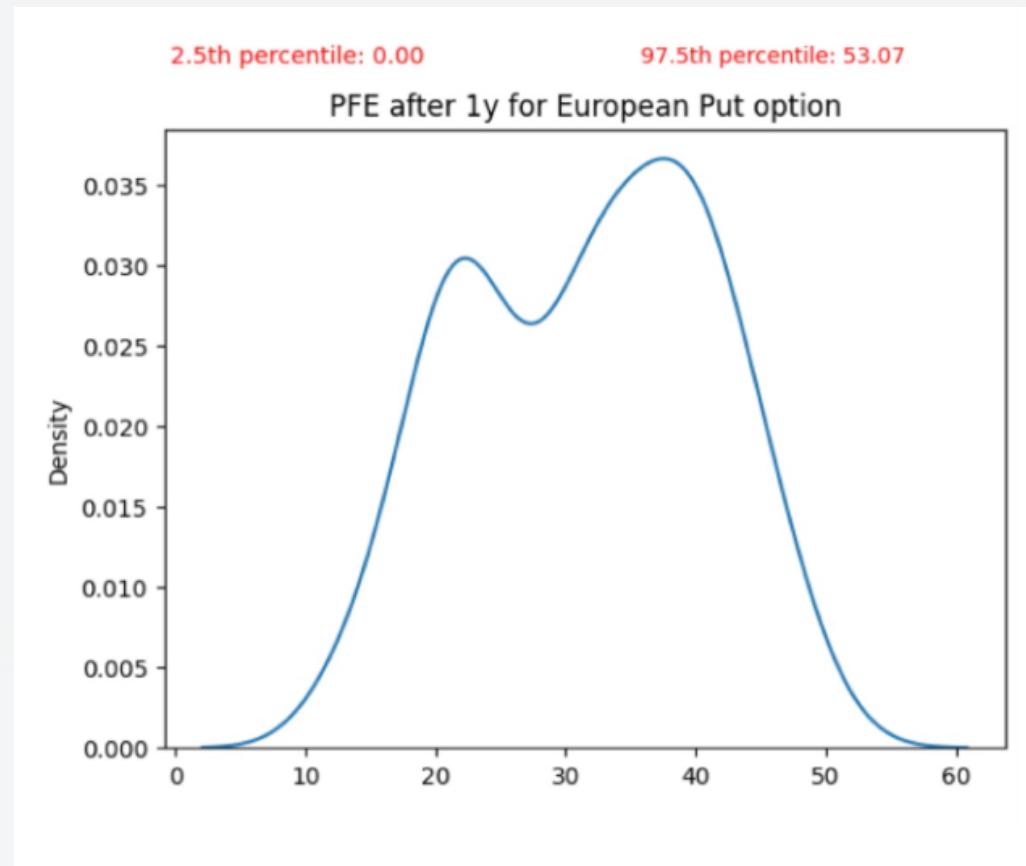
Measure	Value
EAD Call	11.9255
EAD Put	27.2640
EAD Portfolio	40.1920
RWA PUT	91.5148
RWA CALL	37.9142
RWA PORTFOLIO	127.7807

Table 7: Bank of Mazowsze

Measure	Value
American EAD	667.5845
Asian EAD	454.8494
Portfolio EAD	1094.4719
RWA American	2439.0931
RWA Asian	1592.2728
RWA Portfolio	3917.9329

$$RWA = 12.5 \times K \times EAD$$

04 PFE



THANK'S FOR WATCHING

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Saulescu Silviu Bogdan*

