



Adequate Portfolio as Instrument of Integral Asset and Liability Management in the Commercial Bank

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Purposes

- ◆ The main purpose of this paper is to discuss some aspects of the assets and liability portfolio management for a commercial bank.
- ◆ Problem of the integrated total commercial bank asset and liability structure formation and management is, when useful occurrence of integrated structure and every outcome is defined determinately and is not followed with some guarantee to occur.



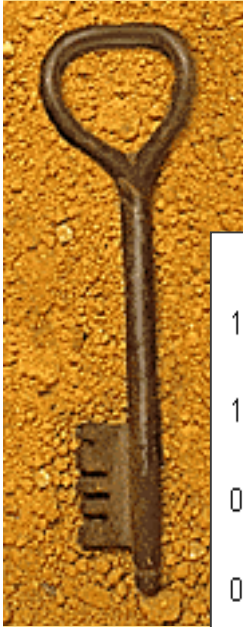
Instruments

- ◆ As instrument for the solution of the assessed problem the portfolio theory was chosen.
- ◆ Differently from modern (mean-standard deviation) portfolio, the author has used the idea of the portfolio adequate for stochasticity of investment nature (all occurrences-standard deviation).
- ◆ Quantatively (numerically) the problem is illustrated by constructing and evaluating main parameters of integral asset and liability portfolio.

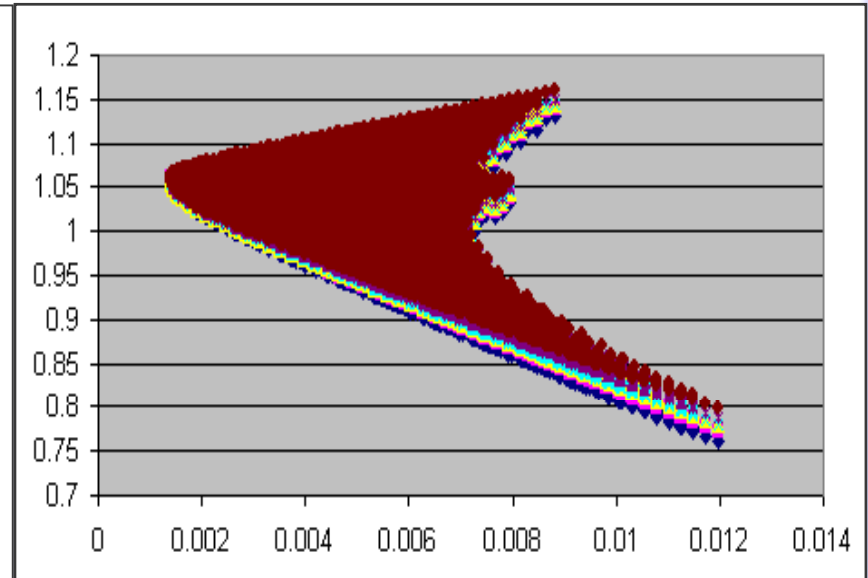
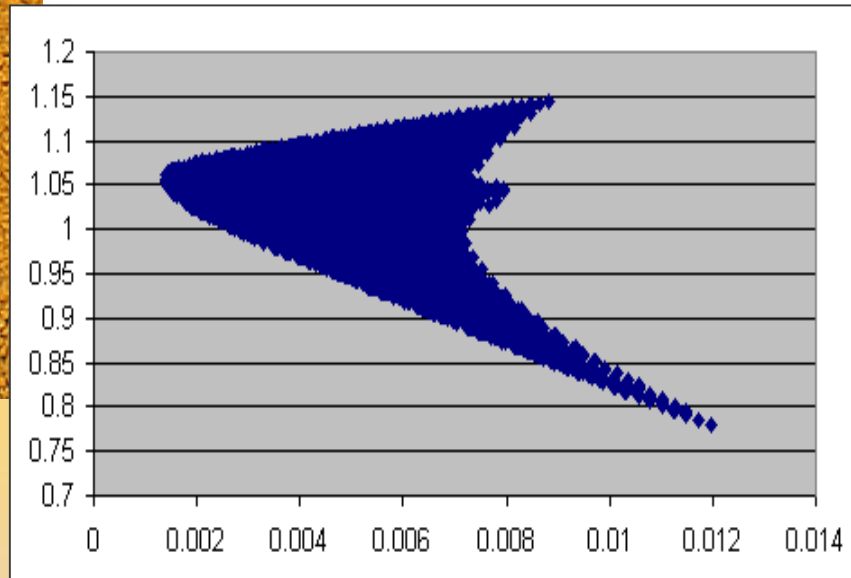


Integral AL Portfolio

- ◆ For deeper understanding of integral portfolio anatomy it is important to remember the main features of modern investment portfolio and the portfolio adequate for stochasticity of investment profit.
- ◆ To understand why integral portfolio obtains one or another geometric form, it is needed to remember, that it's formed as peculiar asset (investments) portfolio and liability portfolio composition.



Modern Portfolio vs. Adequate Portfolio



1

Mean value – standard deviation portfolio:

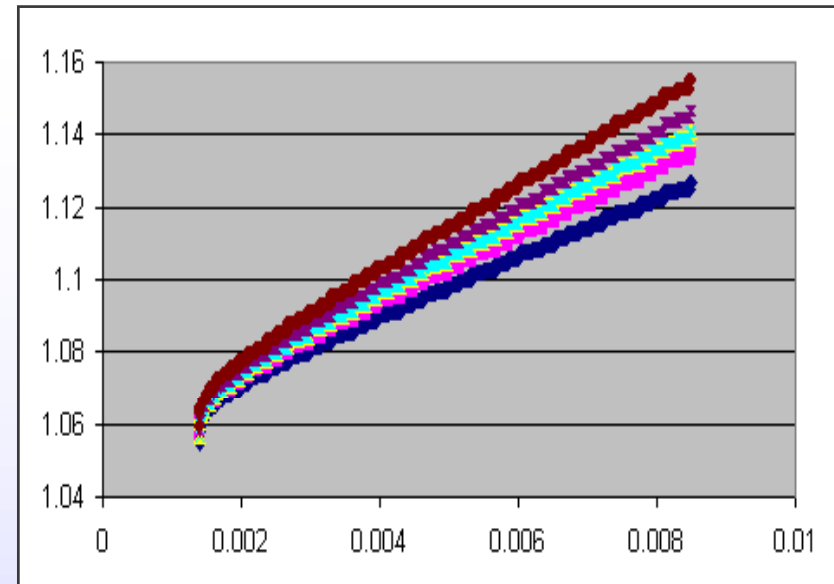
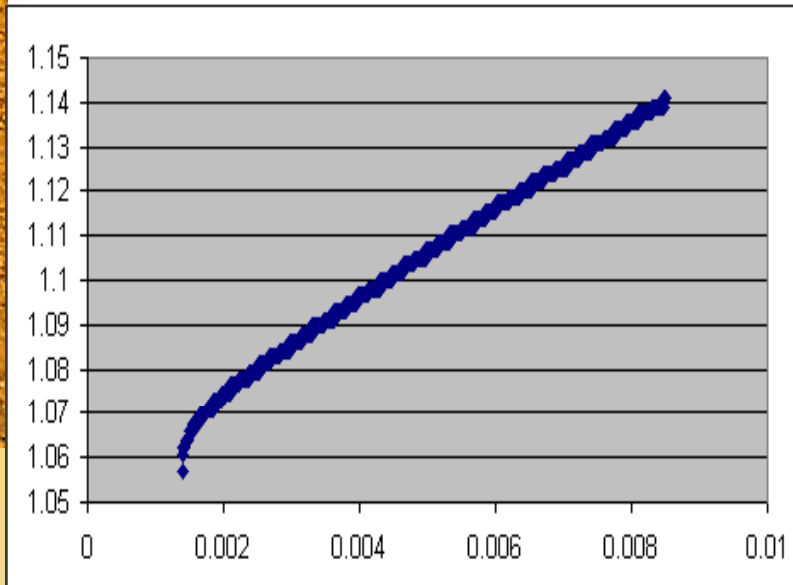
set of portfolio possibilities

Quartile – standard deviation portfolio:

bunch of “all quartiles”



Modern Portfolio vs. Adequate Portfolio



2

Mean value – standard deviation portfolio:

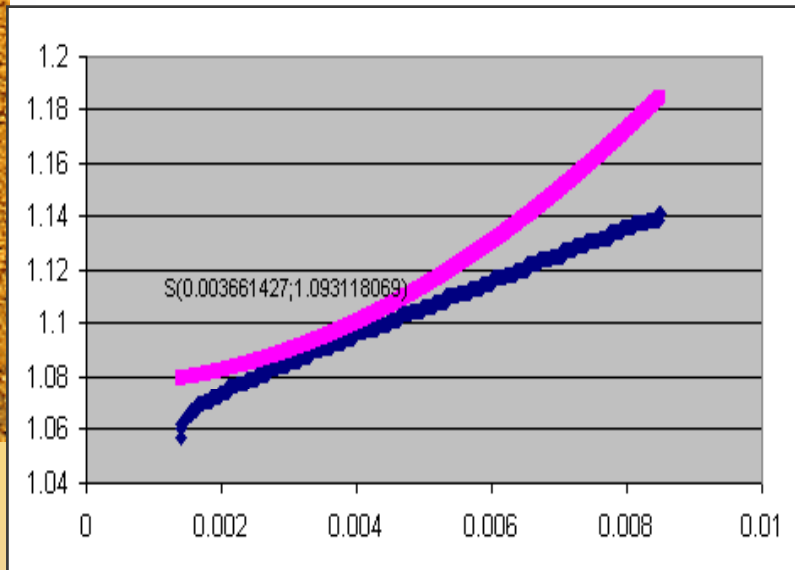
efficiency line

Quartile – standard deviation portfolio:

efficiency zone



Modern Portfolio vs. Adequate Portfolio



3

Mean value – standard deviation portfolio:

portfolio solution

Quartile – standard deviation portfolio:

necessity to define decision-making rule

Adequate Portfolio as Instrument of Integrated ALM



Conditions

To form integral portfolio such conditions where allowed:

1. Common liability and common asset extent coincide;
2. Both asset and liability opportunities obey for the normal distributions with the averages – a_i and standard deviations – σ_i shown in the brackets.



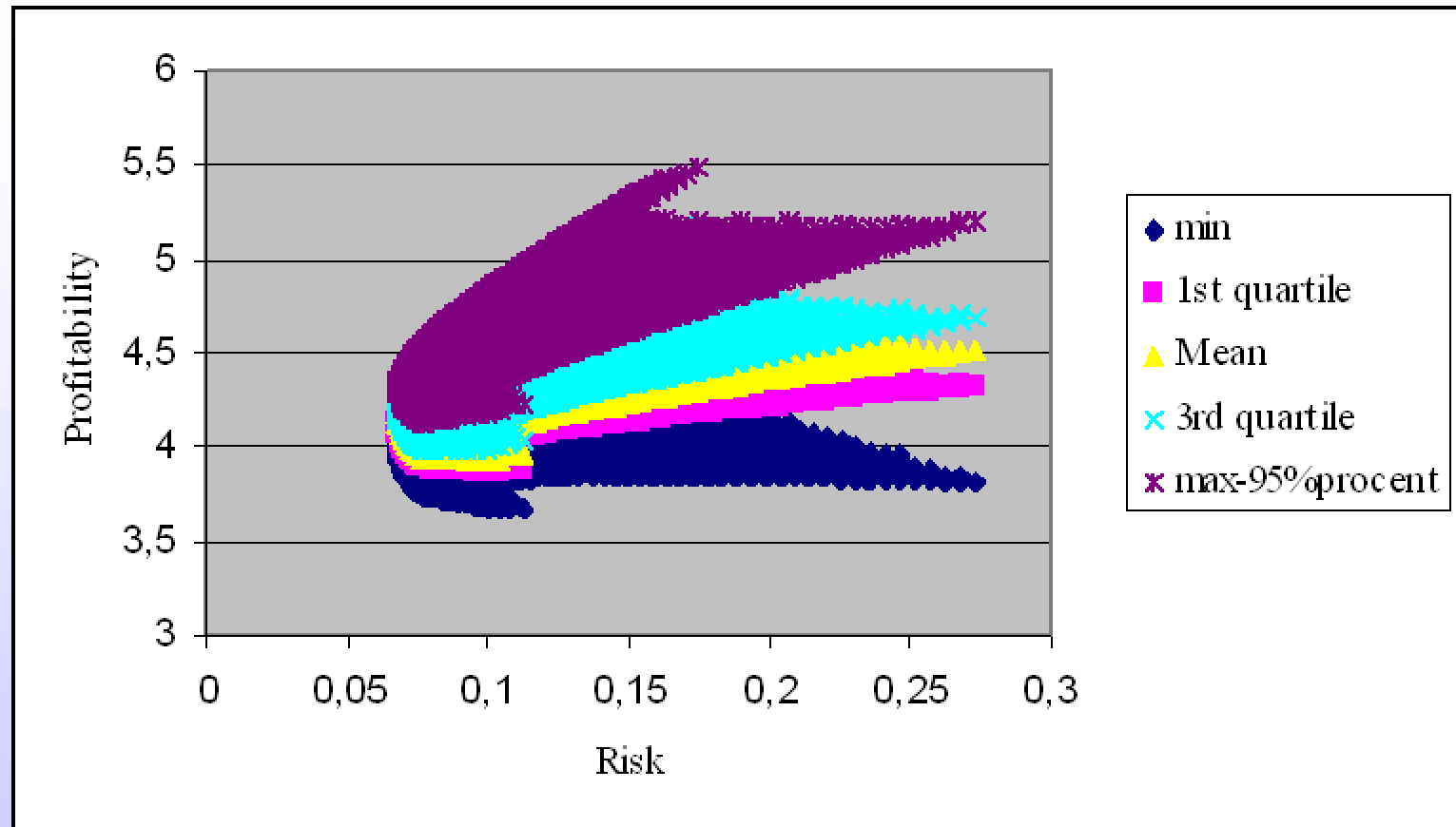
Assets and Liabilities

Now, integral portfolio will be analyzed, which is formed from:

<u>four liabilities:</u>	<u>four kind of assets:</u>
$I_1 (a_1 = -2,908, \sigma_1 = 0,4118),$	$I_5 (a_5 = 4,5101, \sigma_5 = 0,2747)$
$I_2 (a_2 = -0,8968, \sigma_2 = 0,1864),$	$I_6 (a_6 = 5,0576, \sigma_6 = 0,1782)$
$I_3 (a_3 = -1,1522, \sigma_3 = 0,1823)$	$I_7 (a_7 = 3,9561, \sigma_7 = 0,1107)$
$I_4 (a_4 = -2,441, \sigma_4 = 0,3779)$	$I_8 (a_8 = 3,9290, \sigma_8 = 0,1029)$

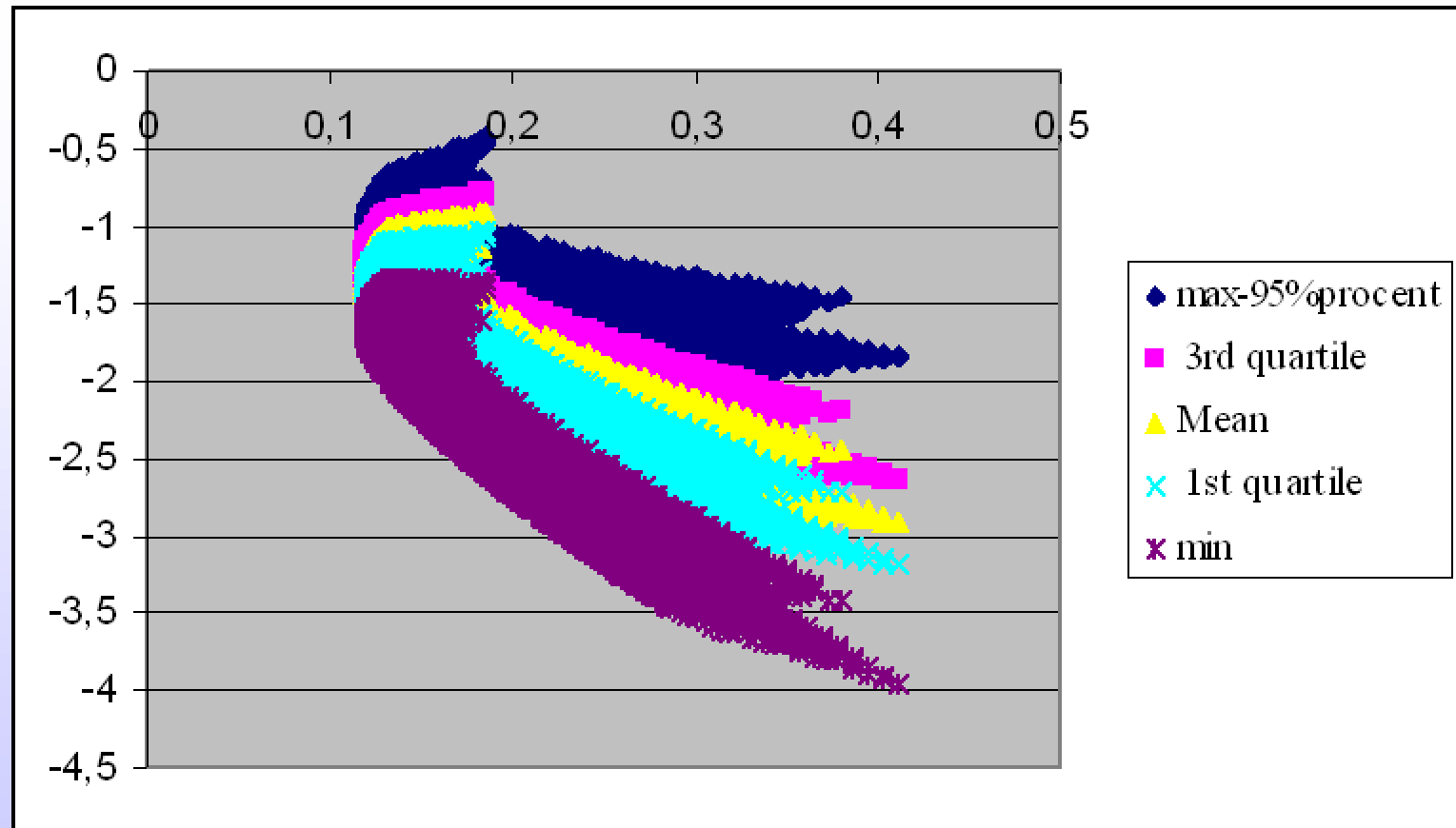


Assets Portfolios



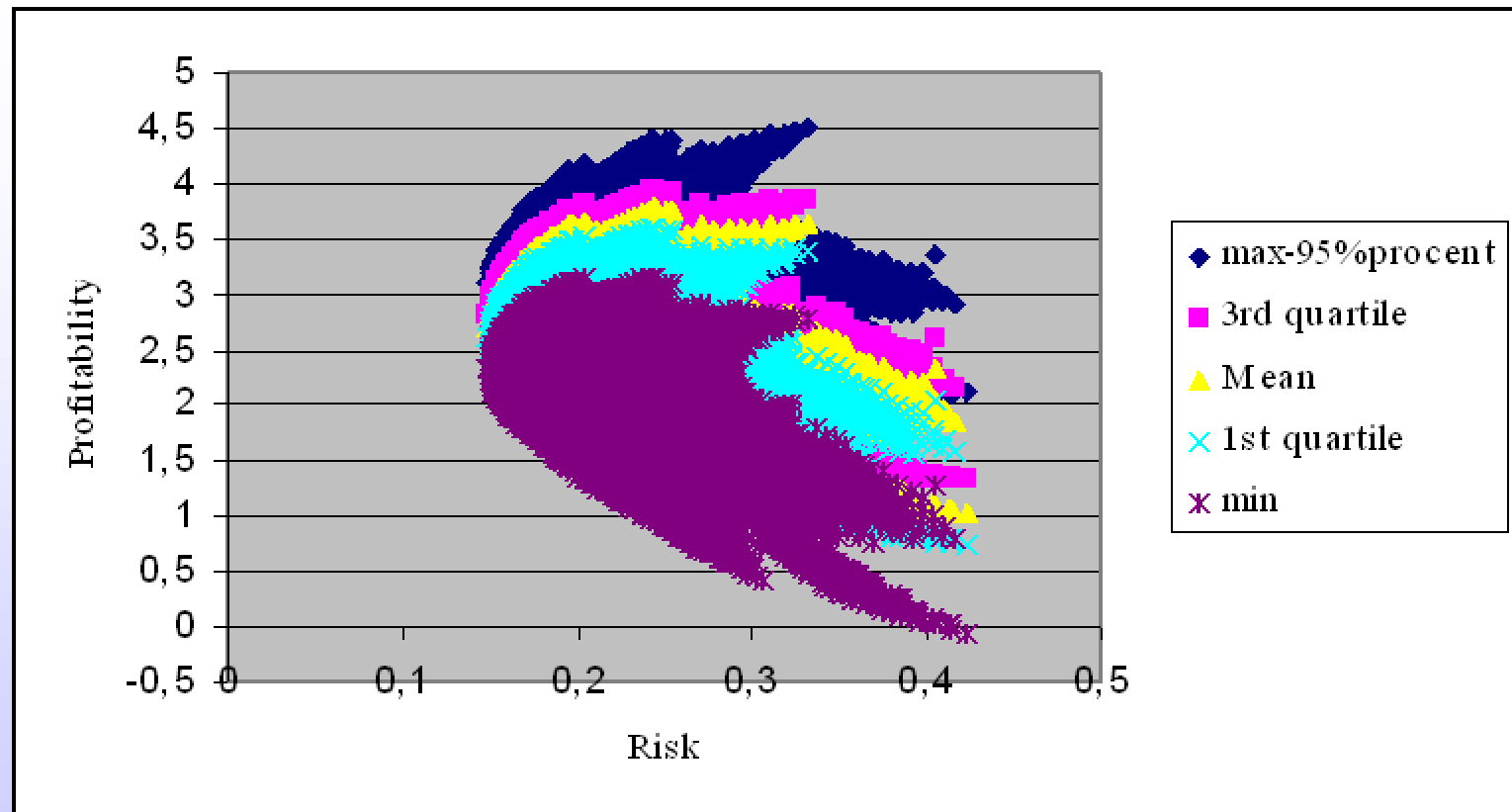


Liabilities Portfolios



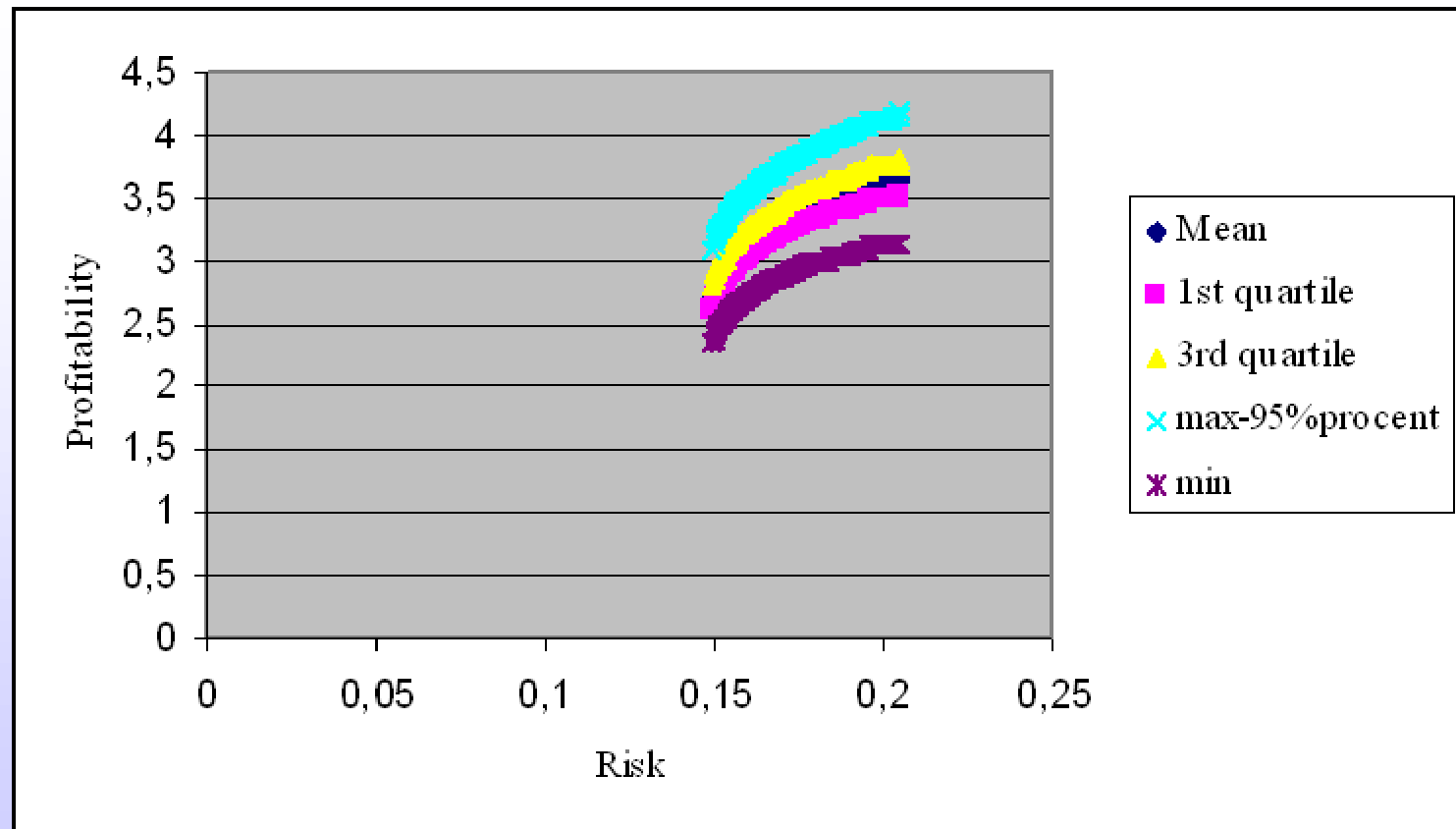


Possibility Sets of AL Portfolio





Isoguarantees of Corresponding Level of Portfolio Analogue





Utility Logic

- ◆ The geometrical view of integral portfolio witnesses that its utility logic should be similar to classical investment portfolio logic.
- ◆ But evidently, every method and result of classical portfolio should be checked.
- ◆ The integral portfolio studies should enable new interpretation or even supplement results of classical investment portfolio.



Integral Portfolio Features (1)

- ◆ Some integral portfolio features become clear, if compared it to the classical investment portfolio.
- ◆ As it is known, in a classical portfolio possible portfolio sets tops absolutely coincide with base investment, i.e. investment, which can not be expressed as linear combinations of other investment, by using structure coefficients – w , coordinates – standard deviation and average.
- ◆ In the case of integral portfolio tops coincide, for example, average square deviation and average interaction description portfolio, with asset and liability pair sums coordinates.



Integral Portfolio Features (2)

- ◆ When we examine point estimated level of, say, net profit, then the goal for an investor is quite understandable – to gain maximum of possible profit.
- ◆ But this evidence disappears if the future possibilities would be given not as point estimated but as spectrum of possibilities with different guarantees of each possibility.
- ◆ Also it is commonly assessed that the highest profit never follows with highest guarantee, so it is worth full to be able to commensurate these indicators.

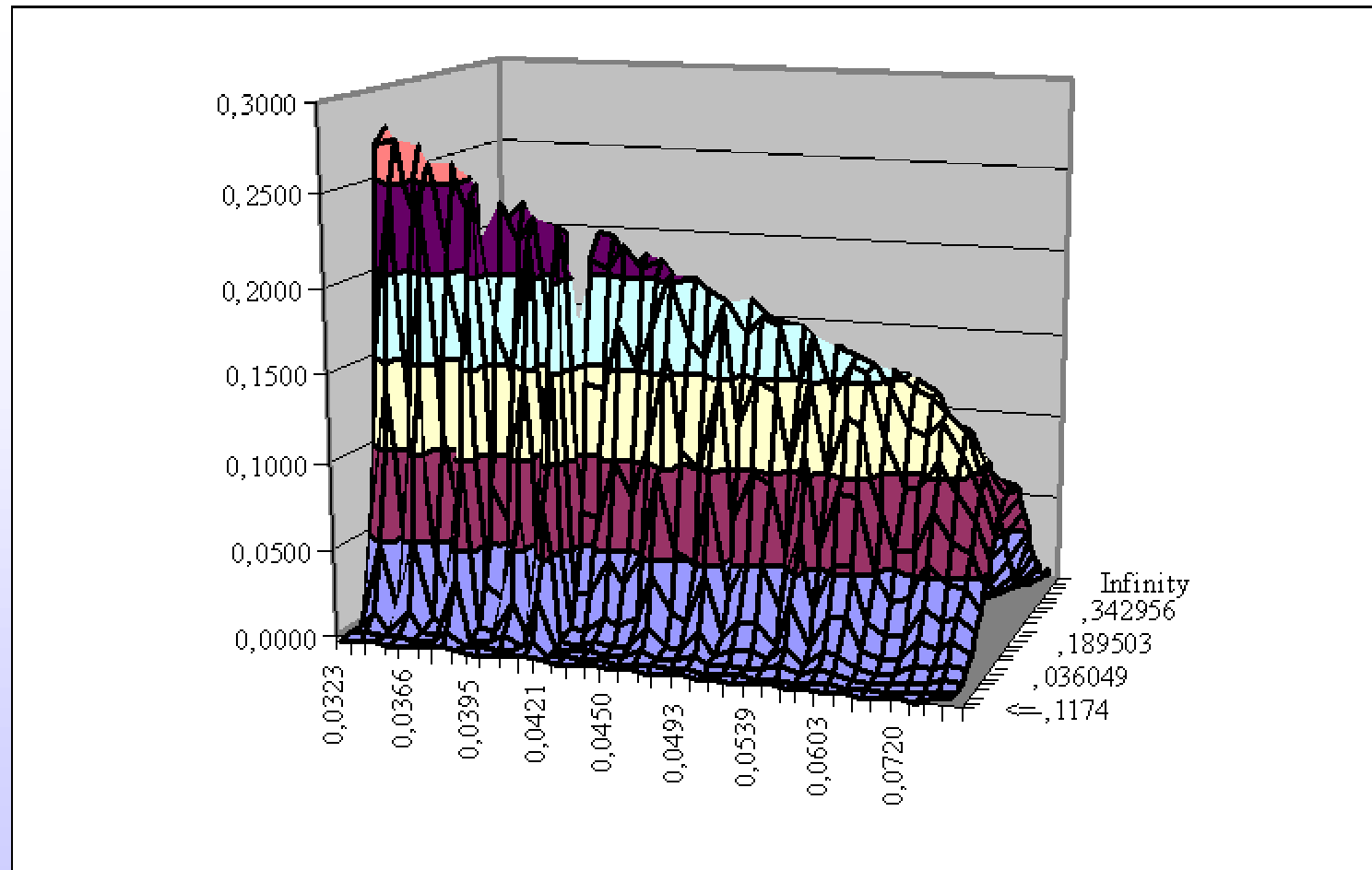


Integral Portfolio Features (3)

- ◆ Also it is very important to assess that absolutely best solution could hardly exist, i.e. the best solution for all investors.
- ◆ For every investor it is necessary individually examine which combinations of profitability and guarantee occur together are preferable.
- ◆ By the way in the case of “mean value – standard deviation” portfolio idea we cannot examine this problem if profit possibilities probability distribution function is not clear.
- ◆ Almost in every situation a decision-maker must evaluate the function in order to form an orientation for the decision.



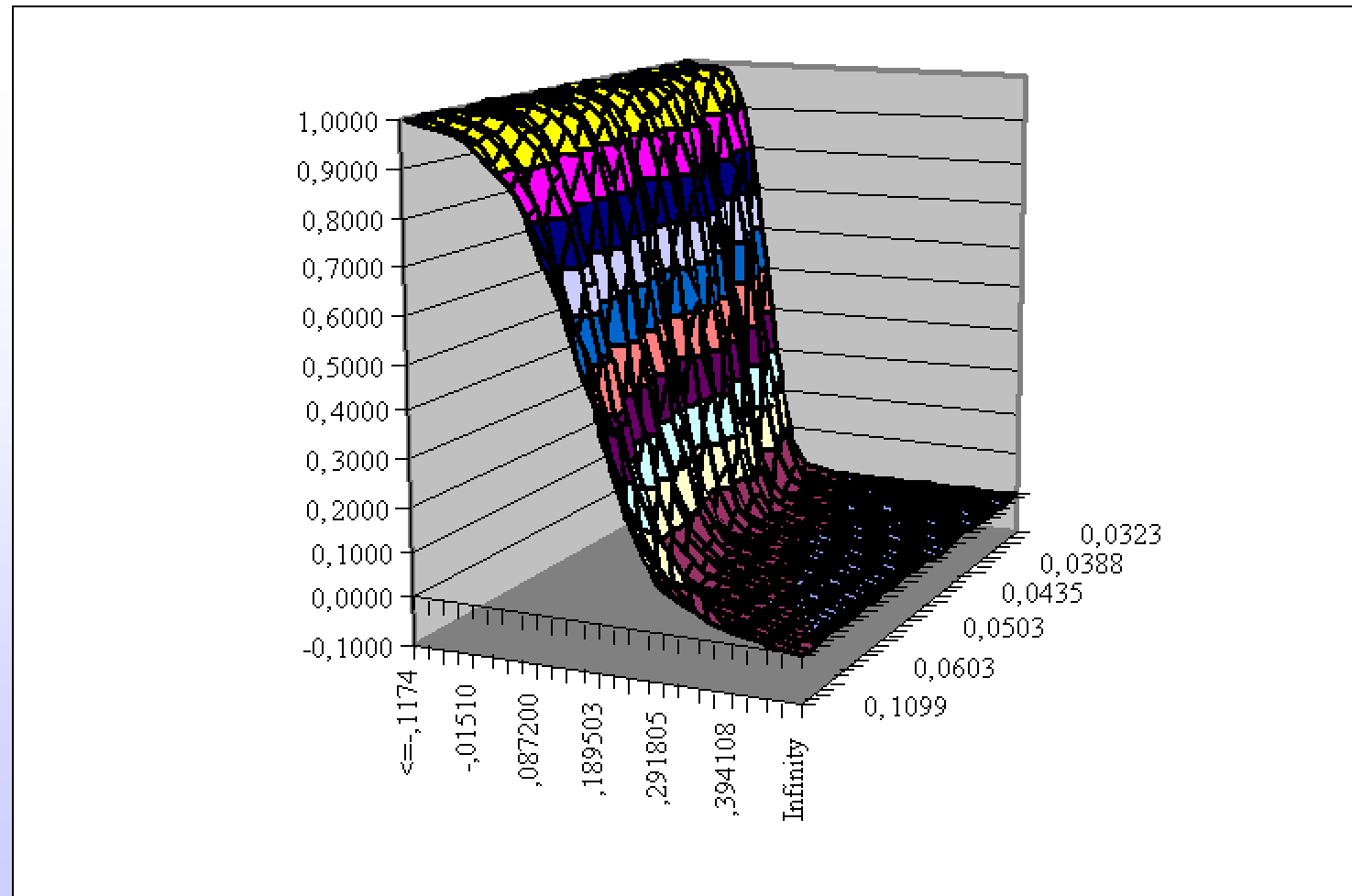
Probability Distribution Functions



Adequate Portfolio as Instrument of
Integrated ALM



Survival Functions Family of Portfolio Analogues



Adequate Portfolio as Instrument of
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Probability Distribution Numerical Anatomy



Opportunities	0,0323	0,0366	0,0373	0,0408	0,0421	0,0428	0,0475	0,0514	0,0568	0,0624	0,0647	0,0720	0,0786	0,0950	0,1099
<=-,1174	0	0	0	0	0	0	0	0,0001	0,0001	0,0001	0,0001	0,0008	0,0010	0,0041	0,0049
-,09183	0	0	0	0	0	0	0,0003	0,0004	0,0003	0,0004	0,0003	0,0016	0,0017	0,0043	0,0042
-,06625	0,0010	0,0012	0,0004	0,0002	0,0002	0,0002	0,0015	0,0020	0,0012	0,0015	0,0009	0,0042	0,0041	0,0079	0,0070
-,04068	0,0095	0,0085	0,0032	0,0015	0,0011	0,0012	0,0065	0,0073	0,0041	0,0044	0,0027	0,0096	0,0087	0,0136	0,0112
-,01510	0,0500	0,0379	0,0173	0,0080	0,0062	0,0064	0,0215	0,0216	0,0119	0,0114	0,0073	0,0195	0,0168	0,0219	0,0170
,010474	0,1525	0,1102	0,0623	0,0309	0,0242	0,0243	0,0553	0,0513	0,0289	0,0256	0,0170	0,0356	0,0296	0,0332	0,0248
,036049	0,2703	0,2094	0,1487	0,0850	0,0687	0,0674	0,1097	0,0978	0,0586	0,0494	0,0344	0,0581	0,0475	0,0470	0,0343
,061625	0,2785	0,2601	0,2358	0,1651	0,1410	0,1367	0,1687	0,1494	0,0992	0,0821	0,0607	0,0847	0,0692	0,0623	0,0452
,087200	0,1668	0,2112	0,2481	0,2272	0,2091	0,2031	0,2009	0,1833	0,1404	0,1175	0,0932	0,1103	0,0917	0,0776	0,0569
,112776	0,0581	0,1121	0,1733	0,2214	0,2242	0,2209	0,1852	0,1805	0,1660	0,1449	0,1246	0,1284	0,1106	0,0905	0,0681
,138352	0,0117	0,0389	0,0804	0,1528	0,1739	0,1759	0,1322	0,1426	0,1642	0,1539	0,1450	0,1335	0,1214	0,0989	0,0777
,163927	0,0014	0,0088	0,0247	0,0746	0,0975	0,1026	0,0731	0,0905	0,1357	0,1409	0,1468	0,1242	0,1212	0,1014	0,0845
,189503	0,0001	0,0013	0,0050	0,0258	0,0395	0,0438	0,0313	0,0460	0,0938	0,1111	0,1295	0,1032	0,1100	0,0974	0,0876
,215078	0	0,0001	0,0007	0,0063	0,0116	0,0137	0,0104	0,0188	0,0541	0,0754	0,0994	0,0766	0,0909	0,0877	0,0865
,240654	0	0	0,0001	0,0011	0,0024	0,0031	0,0027	0,0062	0,0261	0,0441	0,0664	0,0509	0,0683	0,0741	0,0813
,266230	0	0	0	0,0001	0,0004	0,0005	0,0005	0,0016	0,0105	0,0222	0,0386	0,0302	0,0467	0,0586	0,0729
,291805	0	0	0	0	0	0,0001	0,0001	0,0003	0,0036	0,0097	0,0196	0,0160	0,0290	0,0435	0,0623
,317381	0	0	0	0	0	0	0	0,0001	0,0010	0,0036	0,0086	0,0076	0,0164	0,0302	0,0507
,342956	0	0	0	0	0	0	0	0	0,0002	0,0012	0,0033	0,0032	0,0084	0,0197	0,0393
,368532	0	0	0	0	0	0	0	0	0	0,0003	0,0011	0,0012	0,0040	0,0120	0,0290
,394108	0	0	0	0	0	0	0	0	0	0,0001	0,0003	0,0004	0,0017	0,0069	0,0204
,419683	0	0	0	0	0	0	0	0	0	0	0,0001	0,0001	0,0007	0,0037	0,0137
,445259	0	0	0	0	0	0	0	0	0	0	0	0	0,0002	0,0019	0,0088
,470834	0	0	0	0	0	0	0	0	0	0	0	0	0,0001	0,0009	0,0053
Infinity	0	0	0	0	0	0	0	0	0	0	0	0	0	0,0006	0,0065
Σ=	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Adequate Portfolio as Instrument of
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Notes

- ◆ In the left vertical line (column) there are net profit possibilities while in the upper horizontal line (row) – levels of risk. In each cell there are guarantee for every amount of profit under the chosen level of risk.
- ◆ There is sufficient evidence about the changes of a separate guarantee level when one chooses a different level of risk.
- ◆ If one takes the column with risk level 0,0323 one can find only 5 cells, the guarantee of which exceeds 1%, but even 3 of them here this indicators exceeding 15%.
- ◆ At this time the lost column, where risk level is 0,1099 shows that there are even 19 profit possibilities where the guarantee level exceeds 1%, but none exceeds 9%.
- ◆ These facts give some information about the interaction between profit and risk levels that could hardly be understood from the “mean value – standard deviation” portfolio.



Conclusions (1)

- ◆ Development of management theory and practices encounters two fully perceptible and mutually unobjectionable aspects with the intersection points very difficult to reveal.
 1. One of them is that the future of the process of many self-regulating and management objects cannot be defined determinately.
 2. The second is that in reality the development of the process will choose only one possibility.
- ◆ The adjusting process of these two aspects in portfolio management is burdened by the fact that desirable states of portfolio results are defined by two indicators: profitability and reliability.
- ◆ Consequently decision-making algorithms should encounter commensurable of these indicators.



Conclusions (2)

- ◆ It is needed to consider every state of all kinds of quintile – risk portfolios for the creation of effective portfolio management algorithm. Its reliability should to be the inseparable characteristic of these states.
- ◆ Undoubtedly that main problem for a financial institution both investing and borrowing is an integral asset and liability management while striving for highest efficiency but also taking into account guarantee of selected level of the efficiency.
- ◆ As an effective instrument for the solution of this problem the integral asset and liability portfolio conception and methods of its realization could be used.



Conclusions (3)

- ◆ Integral asset and liability portfolio, offered in the presentation, should become compound element of asset and liability management perspective, helping to answer questions where and how much to borrow, where and how much to invest, and also helping to join forecasting and planning, and risk management systems together.



Thank You for attention!

Any questions?



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