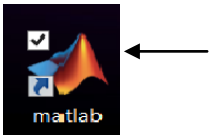
Installation and Execution Guide: CONDOR

System and software requirements:-

1) **Operating System: Windows XP/Vista/7/8 (32 Bit or 64 Bit)**
2) **RAM: Minimum 2GB**
3) **Clock Speed: Minimum 1.6 GHz**
4) **MATLAB 2013a (Activated)**
5) **GAMS 23.5 (Activated with full control)**
6) **Microsoft Office 2007 (Activated)**

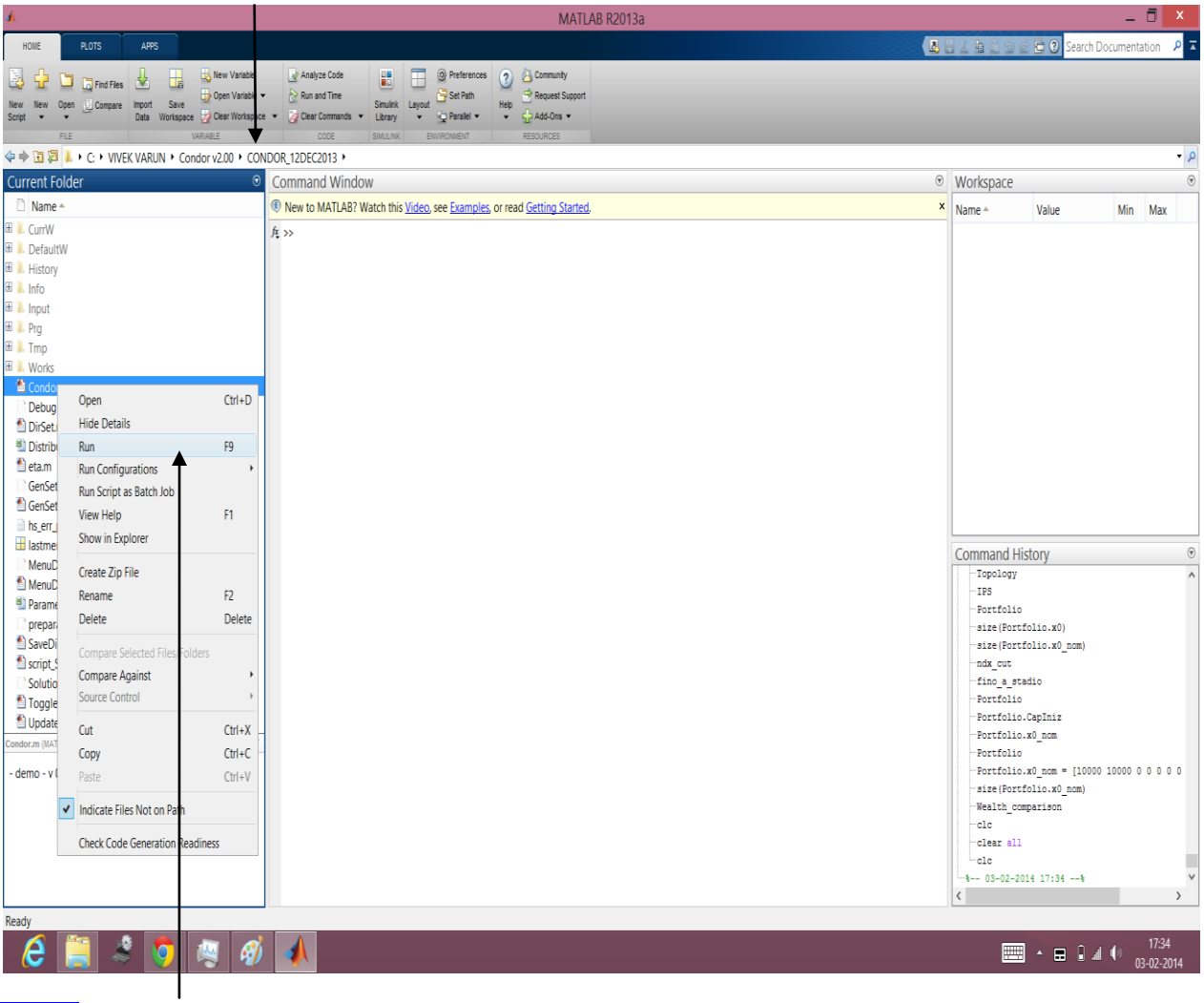
Systematic Steps for the execution of the tool-

Step 1. Run MATLAB on your system and load the target directory where CONDOR is located

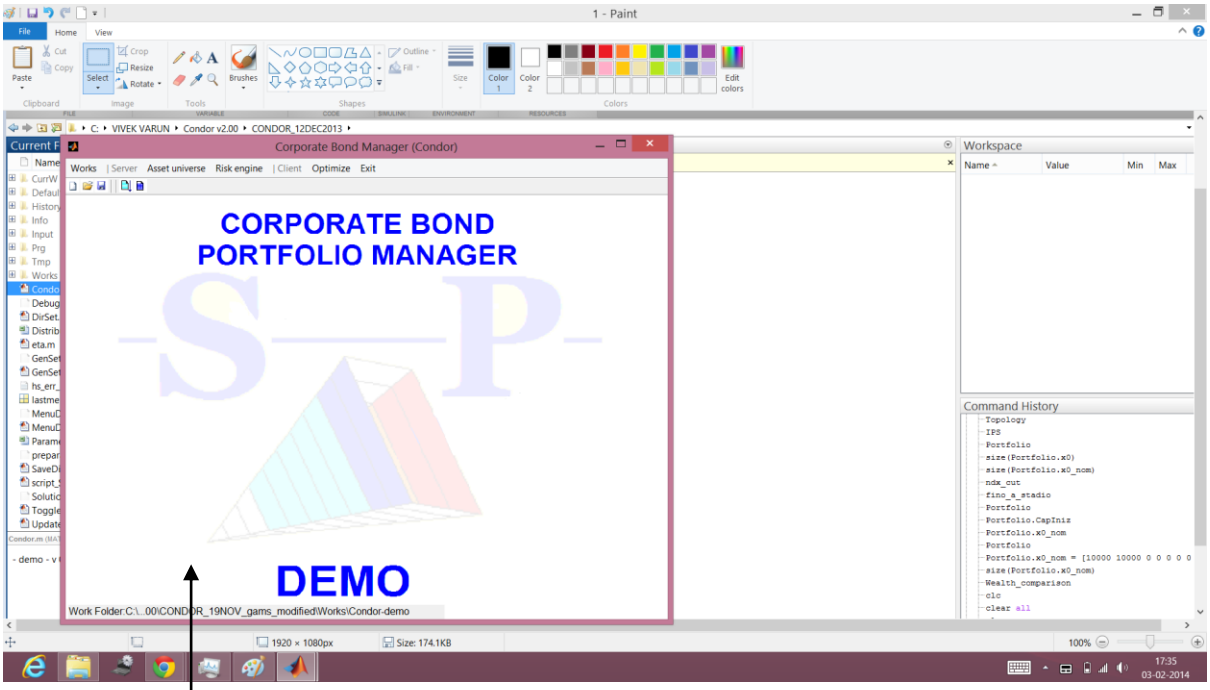


Run

Locate the target Directory

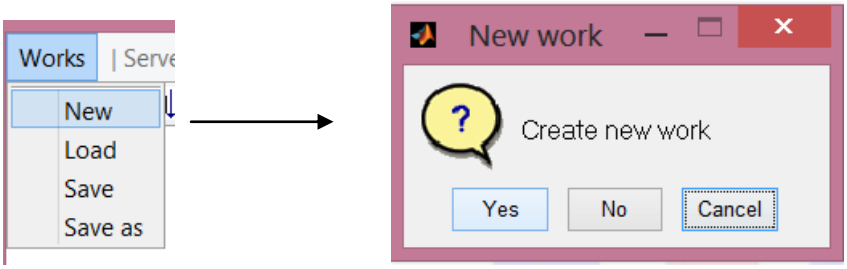


Step 2. Run the file Condor.m, a CONDOR GUI would then appear on your screen.



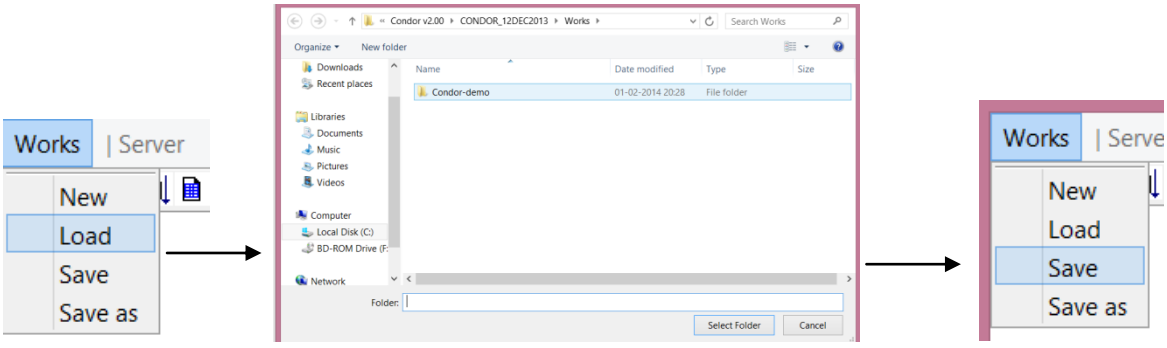
CONDOR GUI

Step3: CONDOR GUI has many dropdown menus, to begin with go to the 'Works' dropdown menu and then hit 'New' to create a new workspace.



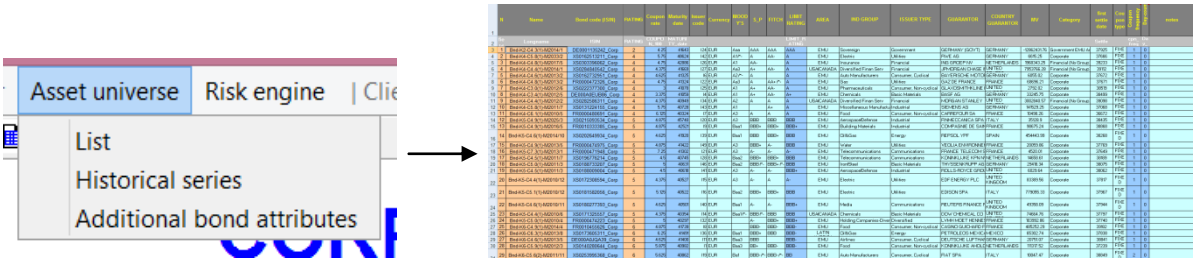
Another UI would then appear on screen for the confirmation of new workspace, hit 'Yes' to proceed further.

Step 4: Next step is to load the directory where input problem is defined.

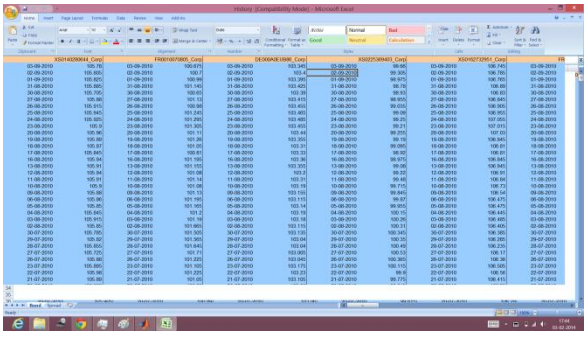


After clicking 'Load' in the 'Works' dropdown menu a new window would appear, locate the directory where input problem is defined, after successfully uploading the input problem hit 'Save' to save the workspace.

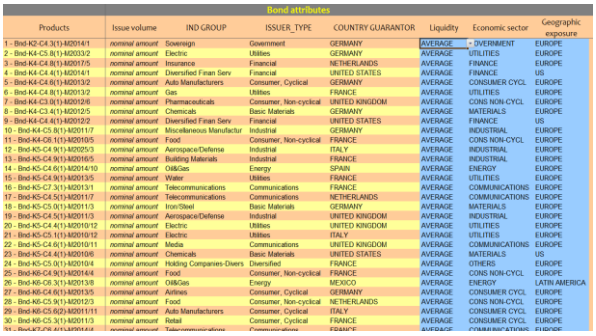
Step 5: Next step is to make sure that all the historical data is retrievable to the tool, this can be confirmed from the 'Asset Universe' dropdown menu. The 'Asset Universe' dropdown menu has 'List', 'Historical Series' and 'Additional Bond Attributes' sections where list of all the securities, price term structure and geographical exposures can be defined respectively.



List of Products

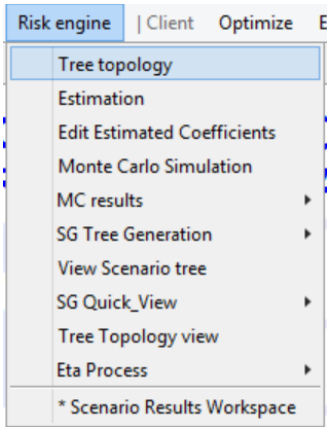


Historical Price and Spread series

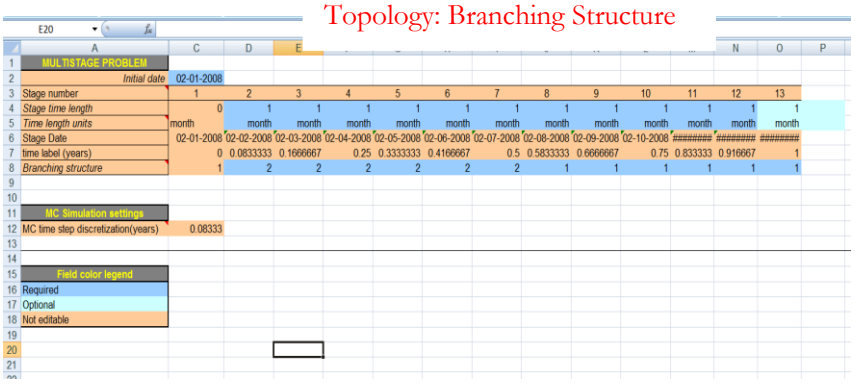


Additional Bond Attributes

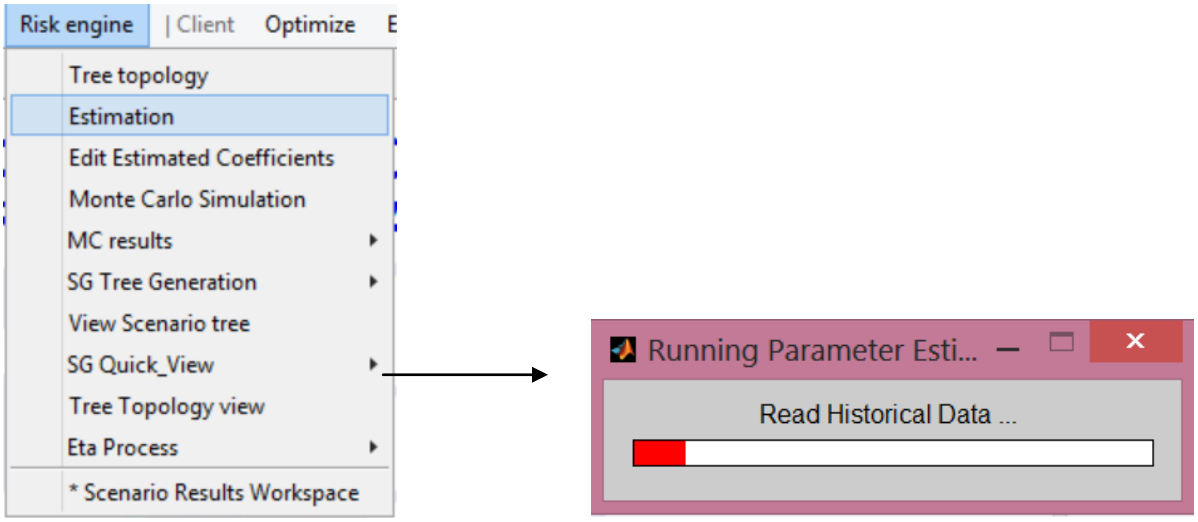
Step 6: Now go to the 'Risk Engine' dropdown menu. Here 'Topology' needs to be modified according to the complexity and the rigorousness of the solution problem. Hitting 'Topology' would take you to the Excel sheet where branching structure is defined.



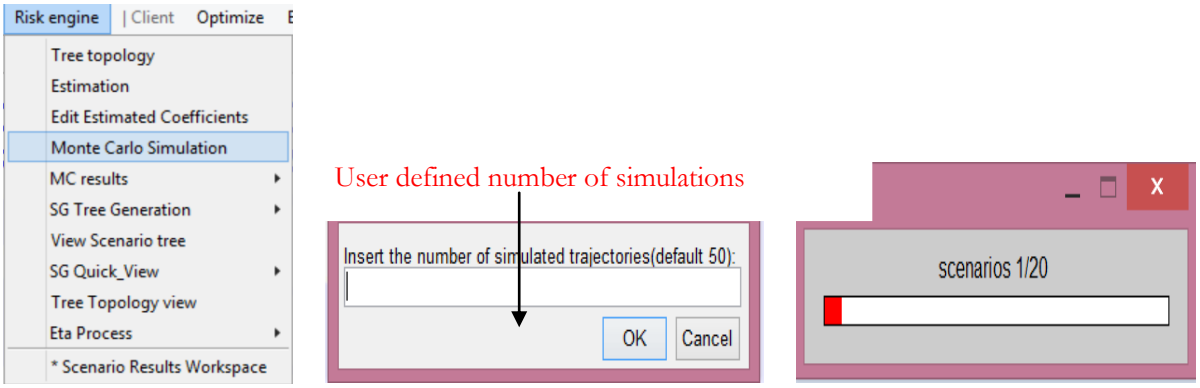
Topology: Branching Structure



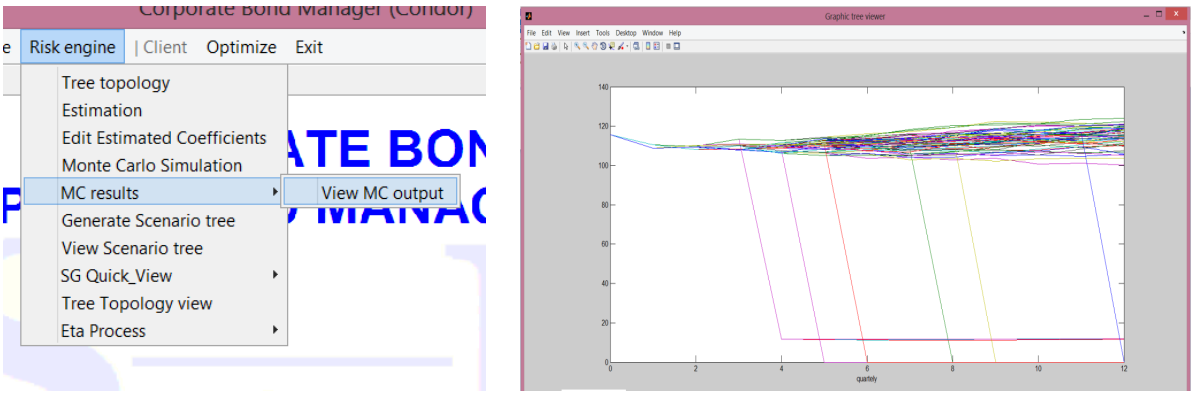
Step 7: Run the 'Estimation'



Step 8: Run the 'Monte Carlo Simulation', an input dialogue box would flash on your screen to confirm the user defined number of simulations. Then, the progress of the simulation process would be dynamically updated in waitbar. After successful completion of the simulation process the waitbar would disappear.

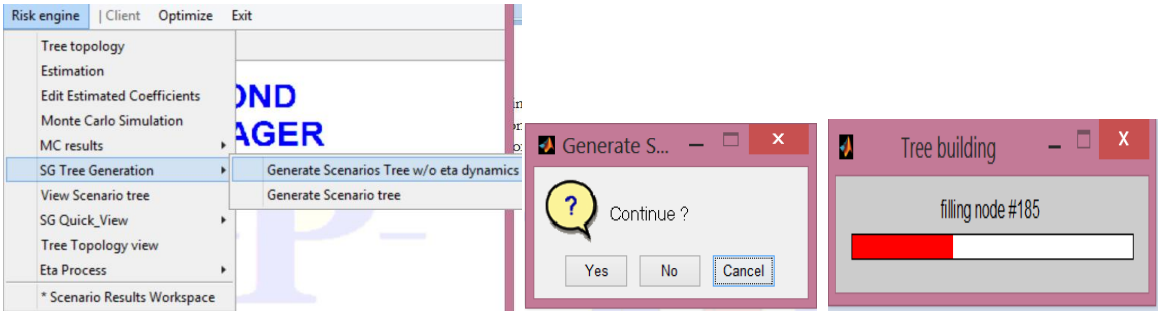


Step 8 (a) (Optional): The simulations trajectories generated can be viewed in 'MC Results' -> 'View MC Output'

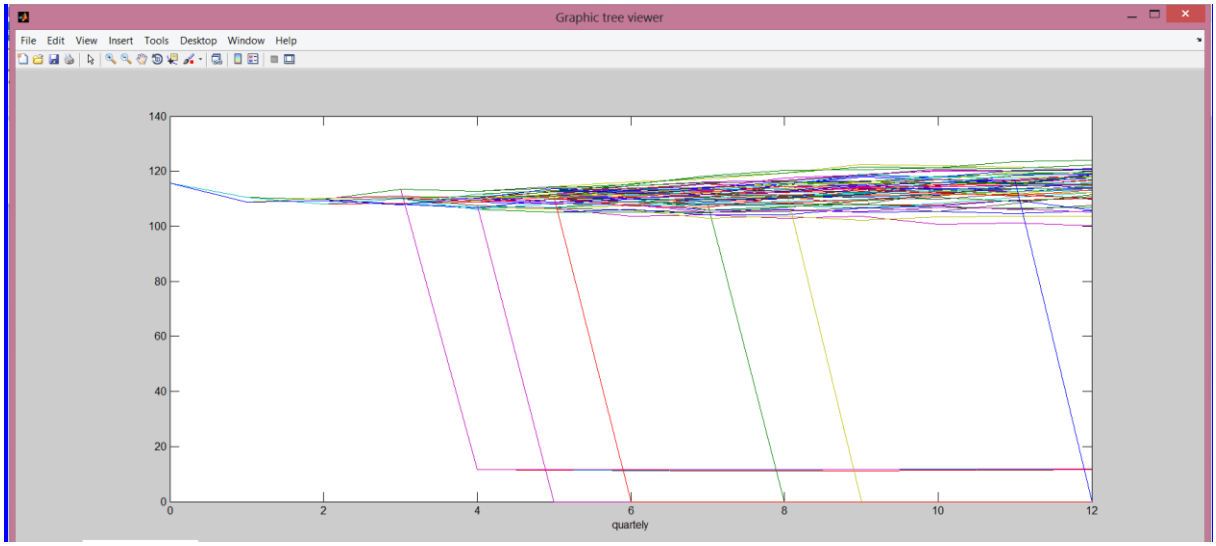


Step 9: Next we generate scenario tree with 'SG Tree Generation' menu, there are two options namely 'Generate Scenario Tree w/o eta Dynamics' and 'Generate Scenario Tree'. Choose one of them as per the

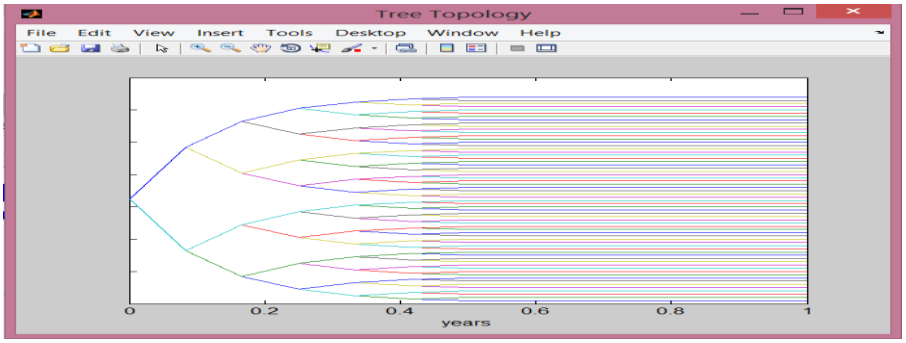
requirement of the problem then a dialogue box would appear confirming the execution of the process. Click 'Yes' to proceed further. The progress of the scenario tree generation would be updated dynamically with a waitbar. After successful completion of the process a dialogue box would appear confirming the completion of the process.



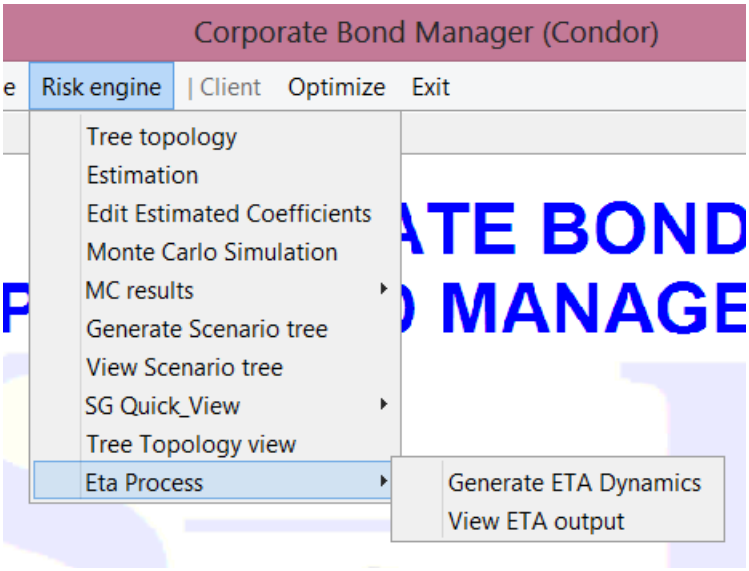
Step 9(a) (Optional): The scenario tree thus generated can be viewed under 'SG_Quic View'



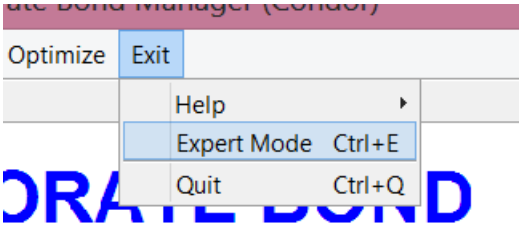
Step 10: Next we may view the tree topology view under 'Tree Topology View'



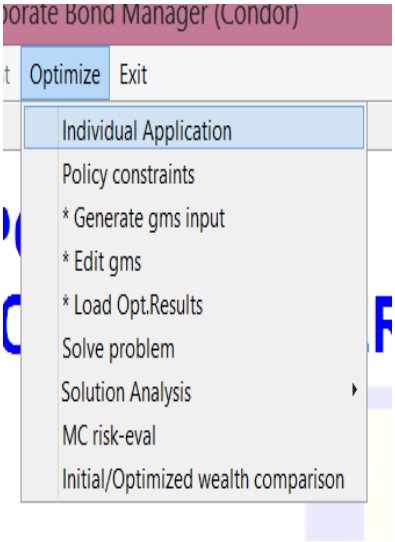
Step 11: Next we can see the eta dynamics (idiosyncratic factors) generated for each security.

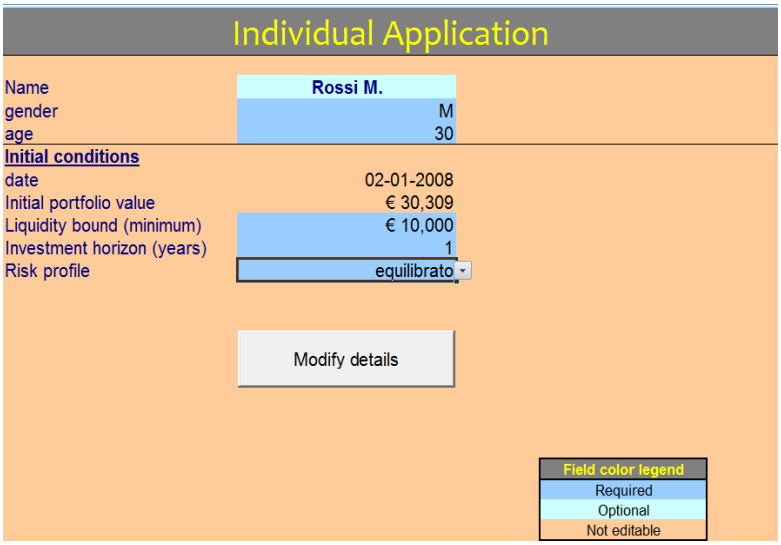


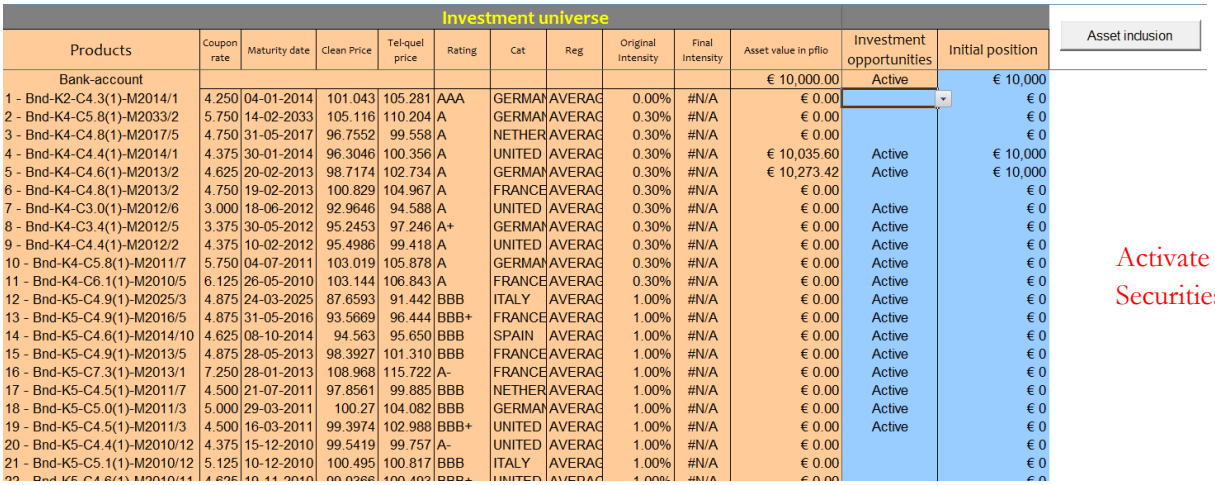
Step 12. Now we move to the 'Exit' dropdown menu to activate the 'Expert Mode', activating this mode would allow stepwise analysis through GAMS environment.



Step 13. Next we move to the final menu 'Optimize'. First we go to the 'Individual Application' where we define aggressiveness of the problem, inclusion of the securities from the investment universe in problem solving.





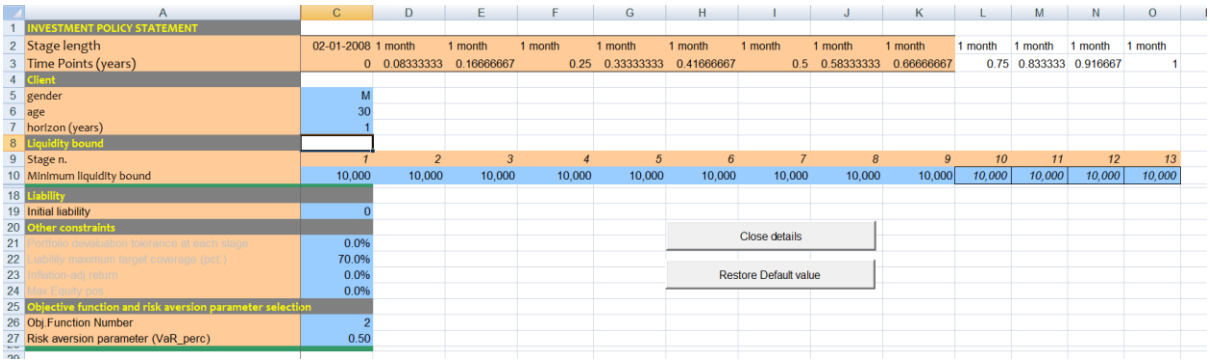


Investment universe

Products	Coupon rate	Maturity date	Clean Price	Tel-quel price	Rating	Cat	Reg	Original intensity	Final intensity	Asset value in pflio	Investment opportunities	Initial position
Bank-account										€ 10,000.00	Active	€ 10,000
1 - Bnd-K2-C4.3(1)-M2014/1	4.250	04-01-2014	101.043	105.281	AAA	GERMAN	AVERAG	0.00%	#N/A	€ 0.00		€ 0
2 - Bnd-K4-C5.8(1)-M2033/2	5.750	14-02-2033	105.116	110.204	A	GERMAN	AVERAG	0.30%	#N/A	€ 0.00		€ 0
3 - Bnd-K4-C4.8(1)-M2017/5	4.750	31-05-2017	96.7552	99.558	A	NETHER	AVERAG	0.30%	#N/A	€ 0.00		€ 0
4 - Bnd-K4-C4.4(1)-M2014/1	4.375	30-01-2014	96.3046	100.356	A	UNITED	AVERAG	0.30%	#N/A	€ 10,035.60	Active	€ 10,000
5 - Bnd-K4-C4.6(1)-M2013/2	4.625	20-02-2013	98.7174	102.734	A	GERMAN	AVERAG	0.30%	#N/A	€ 10,273.42	Active	€ 10,000
6 - Bnd-K4-C4.8(1)-M2013/2	4.750	19-02-2013	100.829	104.967	A	FRANCE	AVERAG	0.30%	#N/A	€ 0.00		€ 0
7 - Bnd-K4-C3.0(1)-M2012/6	3.000	18-06-2012	92.9646	94.588	A	UNITED	AVERAG	0.30%	#N/A	€ 0.00	Active	€ 0
8 - Bnd-K4-C3.4(1)-M2012/5	3.375	30-05-2012	95.2453	97.246	A+	GERMAN	AVERAG	0.30%	#N/A	€ 0.00	Active	€ 0
9 - Bnd-K4-C4.4(1)-M2012/2	4.375	10-02-2012	95.4986	99.418	A	UNITED	AVERAG	0.30%	#N/A	€ 0.00	Active	€ 0
10 - Bnd-K4-C5.8(1)-M2011/7	5.750	04-07-2011	103.019	105.878	A	GERMAN	AVERAG	0.30%	#N/A	€ 0.00	Active	€ 0
11 - Bnd-K4-C6.1(1)-M2010/5	6.125	26-05-2010	103.144	106.843	A	FRANCE	AVERAG	0.30%	#N/A	€ 0.00	Active	€ 0
12 - Bnd-K5-C4.9(1)-M2025/3	4.875	24-03-2025	87.6593	91.442	BBB	ITALY	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
13 - Bnd-K5-C4.9(1)-M2016/5	4.875	31-05-2016	93.5669	96.444	BBB+	FRANCE	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
14 - Bnd-K5-C4.6(1)-M2014/10	4.625	08-10-2014	94.563	95.650	BBB	SPAIN	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
15 - Bnd-K5-C4.9(1)-M2013/5	4.875	28-05-2013	98.3927	101.310	BBB	FRANCE	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
16 - Bnd-K5-C7.3(1)-M2013/1	7.250	28-01-2013	108.968	115.722	A-	FRANCE	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
17 - Bnd-K5-C4.5(1)-M2011/7	4.500	21-07-2011	97.8561	99.885	BBB	NETHER	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
18 - Bnd-K5-C5.0(1)-M2011/3	5.000	29-03-2011	100.27	104.082	BBB	GERMAN	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
19 - Bnd-K5-C4.5(1)-M2011/3	4.500	16-03-2011	99.3974	102.988	BBB+	UNITED	AVERAG	1.00%	#N/A	€ 0.00	Active	€ 0
20 - Bnd-K5-C4.4(1)-M2010/12	4.375	15-12-2010	99.5419	99.757	A-	UNITED	AVERAG	1.00%	#N/A	€ 0.00		€ 0
21 - Bnd-K5-C5.1(1)-M2010/12	5.125	10-12-2010	100.495	100.817	BBB	ITALY	AVERAG	1.00%	#N/A	€ 0.00		€ 0

Asset inclusion

Activate Securities



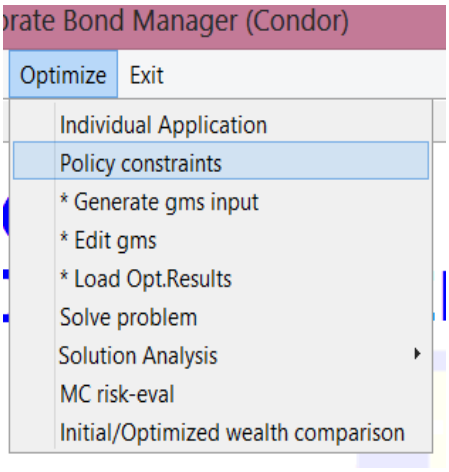
	A	C	D	E	F	G	H	I	J	K	L	M	N	O
1	INVESTMENT POLICY STATEMENT													
2	Stage length	02-01-2008	1 month	1 month	1 month	1 month	1 month	1 month	1 month	1 month	1 month	1 month	1 month	1 month
3	Time Points (years)	0	0.08333333	0.16666667	0.25	0.33333333	0.41666667	0.5	0.58333333	0.66666667	0.75	0.833333	0.916667	1
4	Client													
5	gender	M												
6	age	30												
7	horizon (years)	1												
8	Liquidity bound													
9	Stage n.	1	2	3	4	5	6	7	8	9	10	11	12	13
10	Minimum liquidity bound	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
18	Liability													
19	Initial liability	0												
20	Other constraints													
21	Portfolio devaluation tolerance at each stage	0.0%												
22	Liability maximum target coverage (pct.)	70.0%												
23	Inflation-adj. return	0.0%												
24	Max Equity port.	0.0%												
25	Objective function and risk aversion parameter selection													
26	Obj.Function Number	2												
27	Risk aversion parameter (VaR_perc)	0.50												

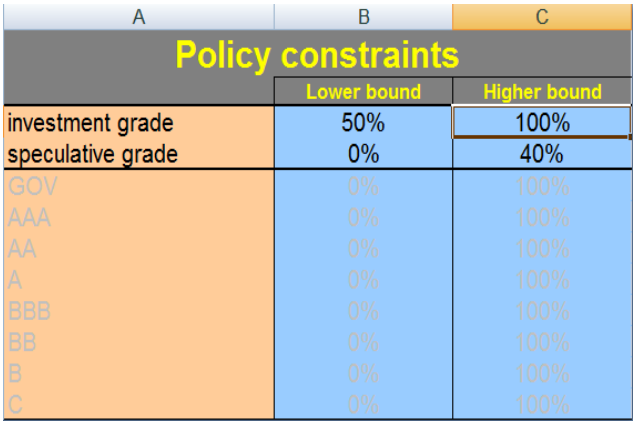
Close details

Restore Default value

Check the liquidity bounds, risk aversion coefficient and Objective function definition

Step 14: Now we modify the policy constraints of the input problem under 'Policy Constraints'

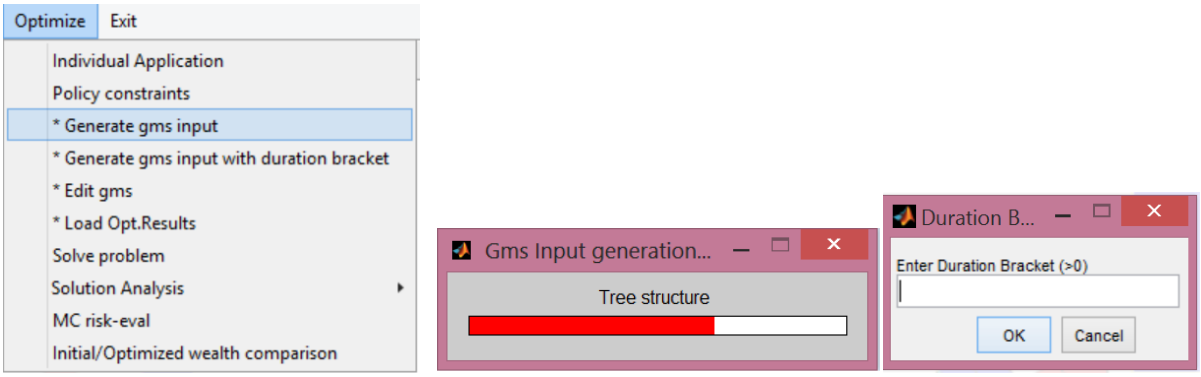




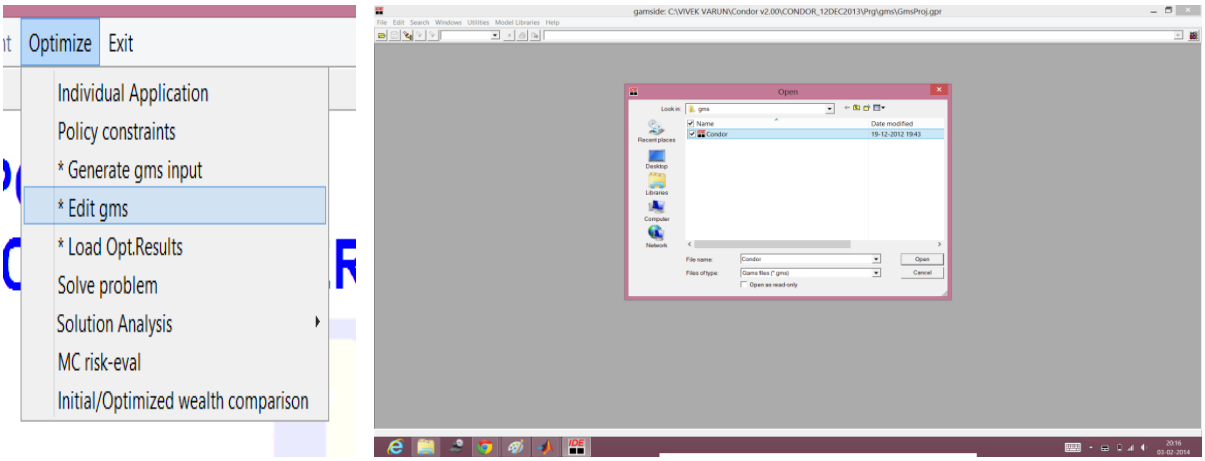
	A	B	C
	Policy constraints		
		Lower bound	Higher bound
	investment grade	50%	100%
	speculative grade	0%	40%
	GOV	0%	100%
	AAA	0%	100%
	AA	0%	100%
	A	0%	100%
	BBB	0%	100%
	BB	0%	100%
	B	0%	100%
	C	0%	100%

Policy constraints o set upper and lower bounds on investment and speculative grade securities and on particular asset class

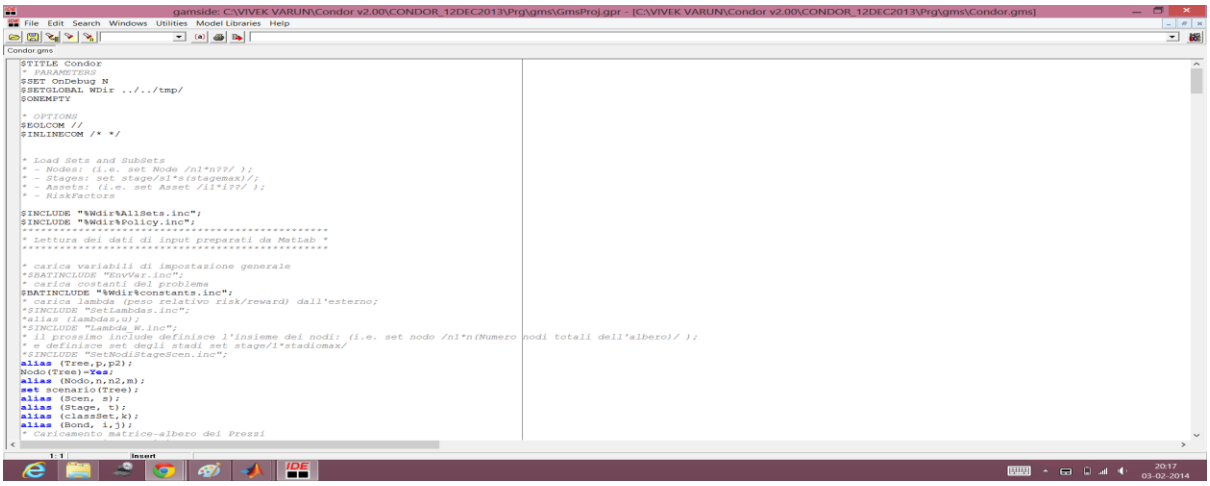
Step 15: Next we generate the input for the GAMS platform under '*Generate gms input' or 'Generate Gms input with duration bracket'. Choose one option according to the problem. 'Generate gms input with duration bracket' would be followed by a input dialogue box where it would ask for the duration interval around mean. A value entered equals to 2 means it would filter out securities with mean duration less 2 and mean duration plus 2 at all the stages.



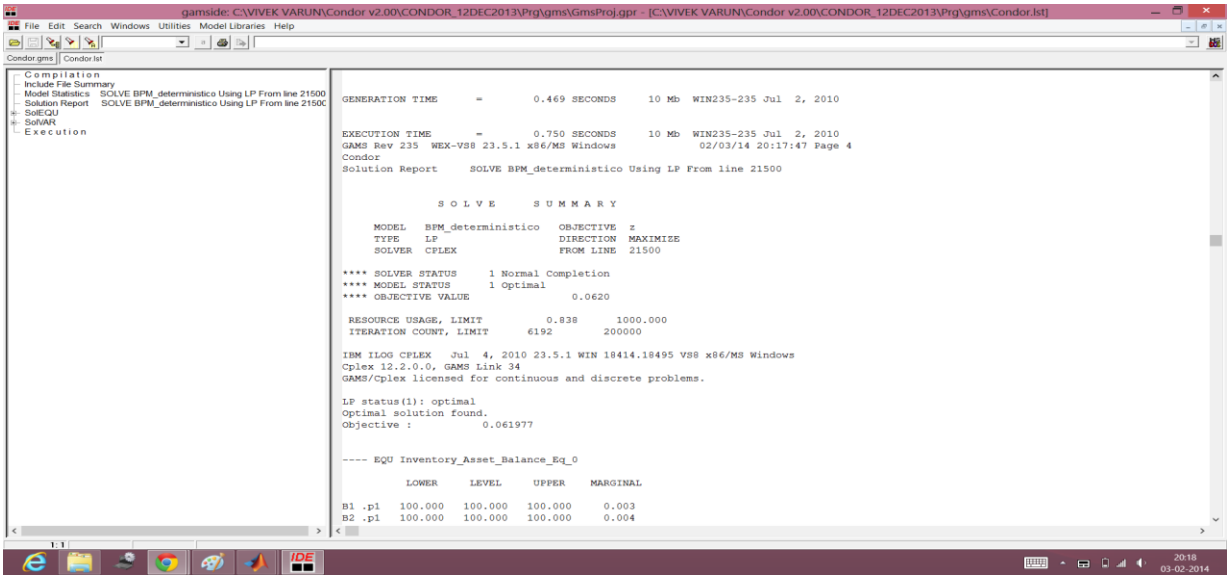
Step 16: Now we go to the GAMS environment from '*Edit gms', this would take us to the GAMS environment where we need to open the GAMS file for the optimization part of the problem. Run the GAMS.



GAMS platform

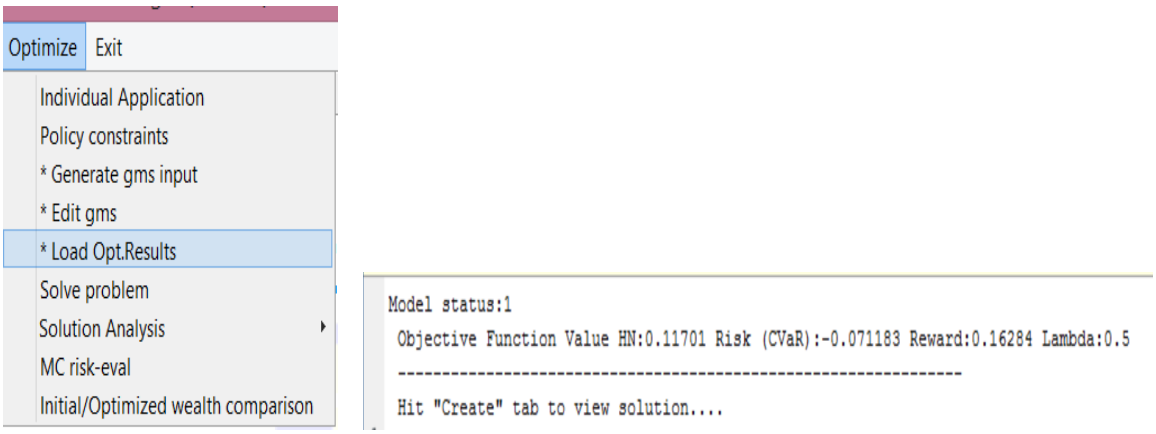


GAMS file: Optimization Code



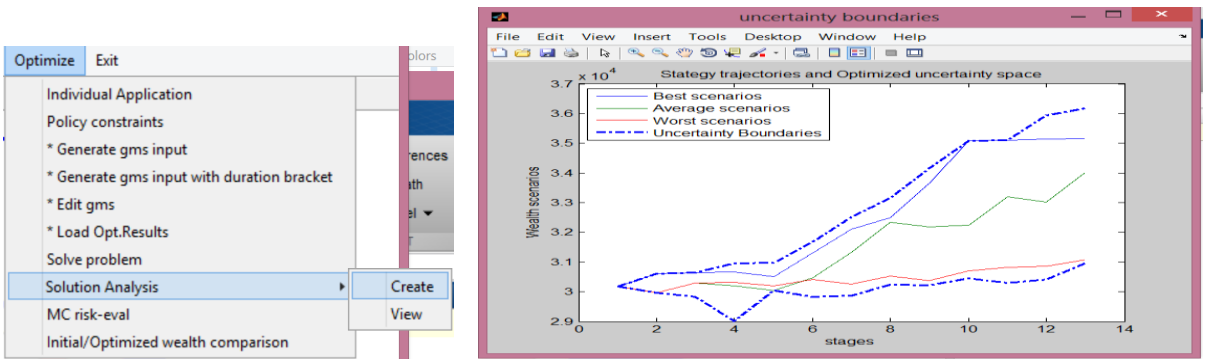
GAMS Output file: Optimization Code

Step 17. The solution of the optimization problem thus solved in GAMS environment is imported in MATLAB by hitting '*Load Opt.Results'

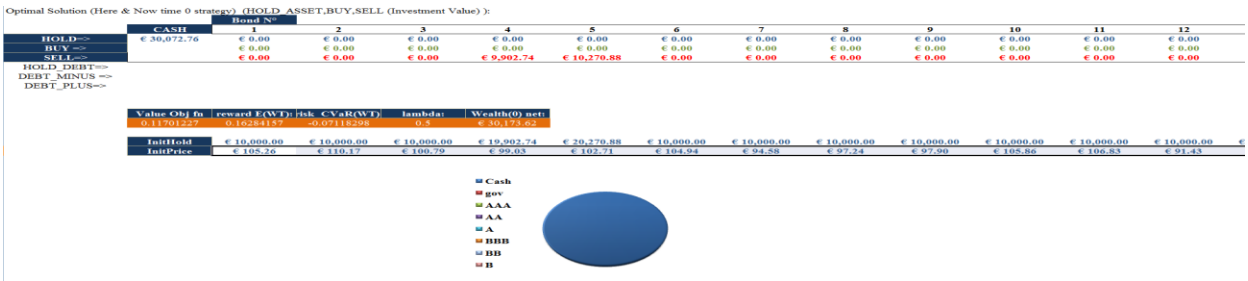


Loading optimal results

Step 18: Next we move to the 'Solution Analysis' to 'Create' to see the outputs of the optimization problem.



Viewing the boundaries of the optimal portfolio



Output Portfolio: Here & Now Solution

Sr. No. Asset Class

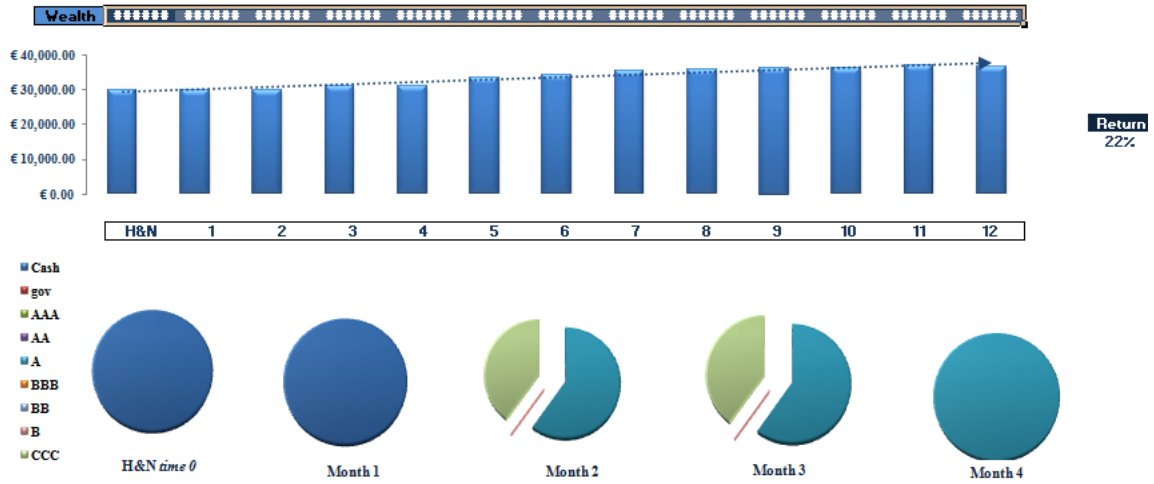
Best Scenario Strategy

		H&N	1	2	3	4	5	6	7	8	9	10	11	12
		€ 30,072.76	€ 30,097.82	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 20.65	€ 0.00	€ 610.11	€ 610.62
1	2	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
2	4	€ 0.00	€ 0.00	€ 17,965.94	€ 18,627.60	€ 31,285.23	€ 33,477.77	€ 34,230.57	€ 35,447.91	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
3	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
4	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
5	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
6	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
7	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
8	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
9	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
10	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
11	4	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
12	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
13	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
14	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
15	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
16	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
17	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
18	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
19	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
20	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
21	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
22	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
23	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00
24	5	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 0.00	€ 21,485.91	€ 21,775.00	€ 21,825.66	€ 21,820.32	€ 21,715.39

Output Portfolio: Distribution of securities across various asset classes

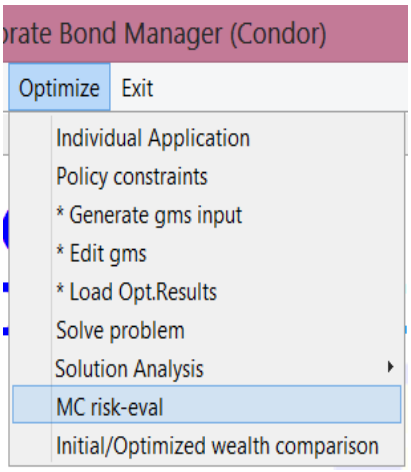
Best Strategy Portfolio Composition

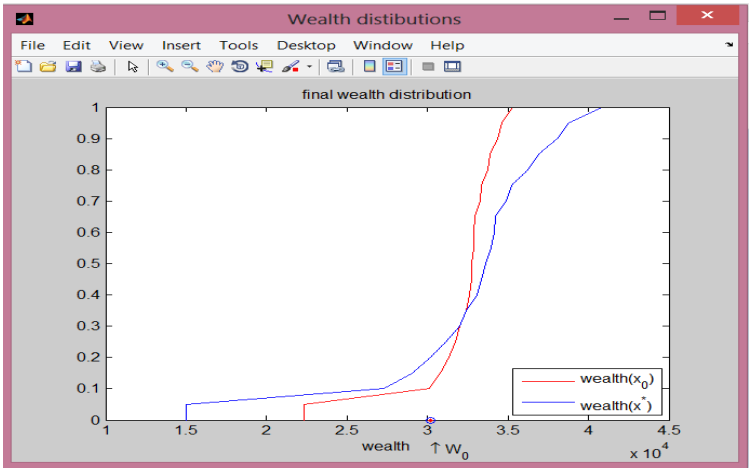
	H&N	1	2	3	4	5	6	7	8	9	10	11	12
Cash	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%
gov	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
AAA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
AA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A	0%	0%	60%	60%	100%	100%	100%	100%	0%	0%	0%	0%	0%
BBB	0%	0%	0%	0%	0%	0%	0%	0%	60%	60%	60%	59%	59%
BB	0%	0%	0%	0%	0%	0%	0%	0%	3%	2%	2%	0%	0%
B	0%	0%	0%	0%	0%	0%	0%	0%	37%	38%	38%	39%	39%
CCC	0%	0%	40%	40%	0%	0%	0%	0%	0%	0%	0%	0%	0%



Output Portfolio: Distribution of securities across various asset classes (Pie Charts)

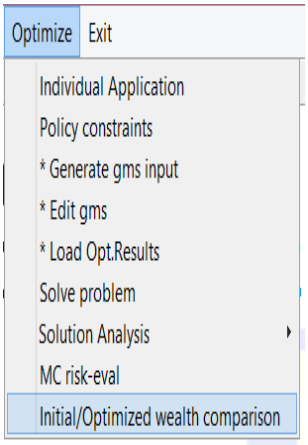
Step 20: Next we look at the risk evaluator under 'MC risk-eval'

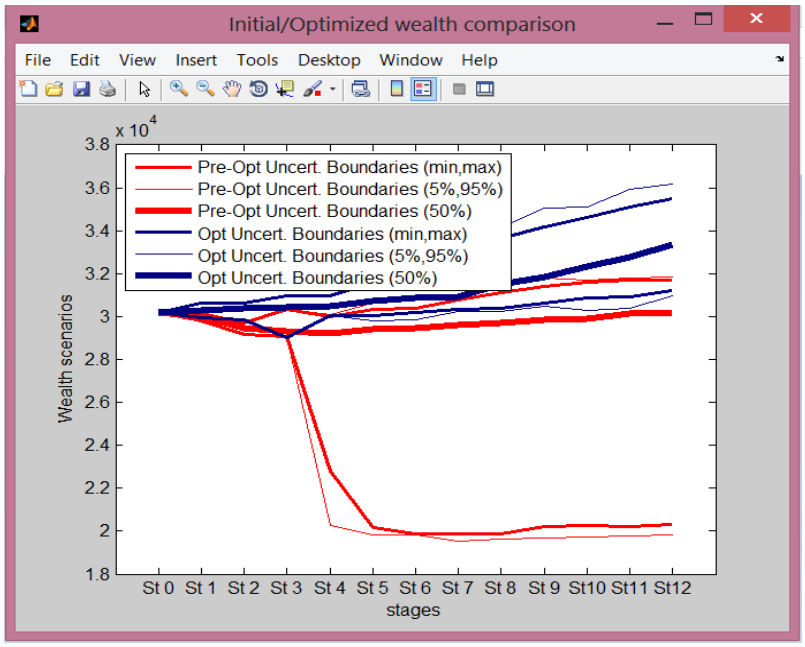




Risk Evaluation

Step 21: Last we can compare the initial and optimized wealth by hitting 'Initial/Optimized wealth comparison'





Optimized wealth Analysis