

Description of data used in numerical tests in the paper “A Heuristic for Moment-matching Scenario Generation”

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Abstract

This note provides a complete description of input data used in numerical tests in the paper “A Heuristic for Moment-matching Scenario Generation”, to be published in “Computational Optimization and Applications”.

In the paper, we test the presented heuristics on trees with 4, 8, 12 and 20 random variables and 40, 100, 200 and 1000 scenarios. All the cases—except the case of four random variables—are actual data files used in an asset allocation model at Gjensidige NOR. All the random variables are thus one-month returns of some assets. The scale of the returns may vary, since different types of assets are handled differently in the model.

All the assets in the tables have four-letter codes. The first two letters designate a type of the asset: **Cs**, **C1**, and **C2** stands for cash; **Bs**, **B1**, and **Bn** for short-, long- and unspecified bonds, respectively; and **st** for stocks. The second two letters designate country of the asset: in addition to the standard abbreviations, **Jp** stands for Japan, **Ge** for Germany, **Eu** for the Eurozone,¹ and **No** for Norway.

For the tests with twelve and twenty random variables, we have used two different data sets for each case to improve the estimates. The input data are in Tables 2, 3, 4, and 5, respectively. For the tests with four and eight random variables, only one data set was used. The data set for eight random variables is in Table 1. Since we did not have any distinct data set with only four random variables, we have used the first four variables from the data in Table 2.

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¹Except for the currency, Eurozone means Germany.

Table 1: Statistical properties — 8 random variables

	BnUS	BnJp	BnUK	BnGe	StUS	StJp	StUK	StGe
mean	-0.032	0.14	0.174	0.214	0.0	3.0	2.0	3.0
stdev	0.1	0.25	0.6	0.5	10.8	10.8	10.8	14.8
skew	0.0	0.5	0.4	0.4	-0.4	0.5	0.2	0.2
kurt	3.0	2.5	3.0	2.5	4.0	3.0	4.0	4.0
	BnUS	BnJp	BnUK	BnGe	StUS	StJp	StUK	
BnJp	0.2							
BnUK	0.5	0.2						
BnGe	0.5	0.2	0.5					
StUS	-0.4	-0.1	-0.2	-0.2				
StJp	-0.1	-0.4	-0.1	-0.1	0.2			
StUK	-0.2	-0.1	-0.4	-0.2	0.5	0.2		
StGe	-0.2	-0.1	-0.2	-0.4	0.5	0.2	0.5	

Table 2: Statistical properties — 12 random variables, set 1

	CsUS	CsJp	CsUK	CsGe	BnUS	BnJp	BnUK	BnGe	StUS	StJp	StUK	StGe
mean	0.03	-0.09	0.15	0.04	0.12	0.14	0.187	0.138	-3.0	2.0	3.0	-2.0
stdev	0.6	0.15	0.6	0.35	0.6	0.3	0.6	0.4	10	10.5	10.5	10.7
skew	0.25	0.6	0.0	0.5	0.3	0.5	0.3	0.25	-0.6	0.5	0.0	0.0
kurt	3.0	2.0	3.0	2.5	3.0	2.5	3.0	2.5	4.0	3.0	4.0	4.0
	CsUS	CsJp	CsUK	CsGe	BnUS	BnJp	BnUK	BnGe	StUS	StJp	StUK	
CsJp	0.1											
CsUK	0.2	0.1										
CsGe	0.2	0.1	0.2									
BnUS	0.4	0.0	0.1	0.1								
BnJp	0.0	0.4	0.0	0.0	0.2							
BnUK	0.1	0.0	0.4	0.1	0.5	0.2						
BnGe	0.1	0.0	0.1	0.4	0.5	0.2	0.5					
StUS	-0.3	0.0	-0.1	-0.1	-0.4	-0.1	-0.2	-0.2				
StJp	0.0	-0.3	0.0	0.0	-0.1	-0.4	-0.1	-0.1	0.2			
StUK	-0.1	0.0	-0.3	-0.1	-0.2	-0.1	-0.4	-0.2	0.5	0.2		
StGe	-0.1	0.0	-0.1	-0.3	-0.2	-0.1	-0.2	-0.4	0.5	0.2	0.5	

Table 3: Statistical properties — 12 random variables, set 2

	CsUS	CsUK	CsEu	CsNo	BsEu	BIUS	BlJp	BlUK	BlEu	BlNo	StUS	StJp
mean	0.641	-0.114	0.303	0.529	-0.207	-0.145	0.36	-0.707	-0.075	0.765	4.0	2.5
stdev	0.35	0.3	0.3	0.3	1.05	2.38	1.62	2.1	2.25	2.475	12.59	16.14
skew	0.2	0.2	0.2	0.3	0	-0.1	-0.2	-0.2	-0.1	-0.1	0.2	0.2
kurt	3.2	3.2	3.2	3.3	2.8	2.8	2.8	2.8	2.8	2.8	3.2	3.2

	CsUS	CsUK	CsEu	CsNo	BsEu	BIUS	BlJp	BlUK	BlEu	BlNo	StUS
CsUK	0.2										
CsEu	0.2	0.3									
CsNo	0.2	0.2	0.2								
BsEu	0.2	0.1	0.4	0.0							
BIUS	0.2	0.0	0.0	0.0	0.0						
BlJp	0.0	0.0	0.0	0.0	0.0	0.1					
BlUK	0.1	0.3	0.1	0.0	0.3	0.4	0.1				
BlEu	0.1	0.1	0.3	0.0	0.6	0.4	0.1	0.4			
BlNo	0.0	0.2	0.0	0.2	0.4	0.4	0.1	0.4	0.6		
StUS	0.1	0.0	0.0	0.0	0.0	0.25	0.1	0.2	0.2	0.1	
StJp	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.2	0.1	0.3

Table 4: Statistical properties — 20 random variables, set 1

	C1US	C1Jp	C1UK	C1Eu	C1No	C2US	C2Jp	C2UK	C2No	BsUS
mean	0.217	0.073	-0.13	-0.085	0.0	0.378	0.0226	-0.0237	0.108	-0.235
stdev	0.3	0.08	0.25	0.2	0.5	0.5	0.16	0.4	1	0.525
skew	-0.2	-0.4	0.0	0.0	0.0	0.2	-0.4	0.0	0.0	-0.2
kurt	2.5	2.2	2.5	3	3.3	2.5	2.2	2.5	3.3	2.65
	BIUS	BIJp	BIUK	BIEu	StUS	StJp	StUK	StEu	StNo	BsEu
mean	-0.793	-0.765	-0.721	-0.45	2.0	0.0	2.0	1.0	-1.0	0.042
stdev	1.75	1.35	1.05	1.875	9.496	9.927	8.633	10.359	9.064	0.525
skew	-0.2	-0.3	-0.6	-0.2	0.0	0.3	0.2	0.2	0.0	-0.1
kurt	2.8	2.5	2.8	2.8	3.2	3.2	3.2	3.3	3.5	2.9
	C1US	C1Jp	C1UK	C1Eu	C1No	C2US	C2Jp	C2UK	C2No	BsUS
C1Jp	0.0									
C1UK	0.1	0.0								
C1Eu	0.1	0.0	0.3							
C1No	0.0	0.0	0.1	0.1						
C2US	0.7	0.0	0.0	0.0	0.0					
C2Jp	0.0	0.7	0.0	0.0	0.0	0.0				
C2UK	0.0	0.0	0.7	0.0	0.0	0.1	0.0			
C2No	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.1		
BsUS	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	
BsEu	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
BIUS	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.5
BIJp	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
BIUK	0.1	0.0	0.3	0.0	0.0	0.1	0.0	0.3	0.0	0.1
BIEu	0.1	0.0	0.1	0.2	0.0	0.1	0.0	0.1	0.0	0.1
StUS	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2
StJp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
StUK	0.0	0.0	-0.3	-0.1	0.0	0.0	0.0	-0.3	0.0	0.0
StEu	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
StNo	0.0	0.0	-0.1	-0.1	-0.3	0.0	0.0	-0.1	-0.3	0.0
	BsEu	BIUS	BIJp	BIUK	BIEu	StUS	StJp	StUK	StEu	
BIUS	0.1									
BIJp	0.0	0.0								
BIUK	0.1	0.4	0.1							
BIEu	0.5	0.4	0.1	0.5						
StUS	0.0	0.3	0.1	-0.1	-0.1					
StJp	0.0	0.1	0.25	0.0	0.1	0.4				
StUK	0.0	0.1	0.1	-0.2	-0.1	0.5	0.3			
StEu	0.0	0.1	0.1	-0.1	0.0	0.4	0.2	0.5		
StNo	0.0	0.1	0.0	0.0	0.0	0.3	0.3	0.4	0.5	

Table 5: Statistical properties — 20 random variables, set 2

	C1US	C1Jp	C1UK	C1Eu	C1No	C2US	C2Jp	C2UK	BsEu	BnEu
mean	0.602	0.055	0.175	0.531	0.432	0.655	-0.005	0.472	0.291	0.249
stdev	0.35	0.1	0.3	0.3	0.3	0.35	0.15	0.28	0.495	1.05
skew	0.3	0.0	0.2	0.2	0.3	0.2	-0.2	0.3	0.2	0.0
kurt	3.2	3.2	3.2	3.2	3.3	3	3	3	2.8	2.8
	BIUS	BIJp	BIUK	BIEu	BINo	StUS	StJp	StUK	StEu	StNo
mean	-0.354	-0.405	0.742	0.165	1.238	3.5	3.5	4	3.5	2.5
stdev	2.38	1.62	2.1	2.25	2.475	10.527	10.075	8.6	10.636	10.948
skew	-0.1	-0.2	-0.2	-0.1	-0.1	0.2	0.2	0.2	0.2	-0.3
kurt	2.8	2.8	2.8	2.8	2.8	3.2	3.2	3.2	3.3	3.5
	C1US	C1Jp	C1UK	C1Eu	C1No	C2US	C2Jp	C2UK	BsEu	BnEu
C1Jp	0.0									
C1UK	0.2	0.0								
C1Eu	0.2	0.0	0.3							
C1No	0.2	0.0	0.2	0.2						
C2US	0.6	0.2	0.2	0.2	0.2					
C2Jp	0.0	0.6	0.0	0.0	0.0	0.0				
C2UK	0.12	0.0	0.6	0.2	0.2	0.2	0.0			
BsEu	0.2	0.0	0.2	0.6	0.2	0.2	0.0	0.2		
BnEu	0.2	0.0	0.1	0.4	0.0	0.1	0.0	0.1	0.6	
BIUS	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0
BIJp	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
BIUK	0.1	0.0	0.3	0.1	0.0	0.1	0.0	0.3	0.2	0.3
BIEu	0.1	0.0	0.1	0.3	0.0	0.1	0.0	0.1	0.4	0.6
BINo	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.2	0.0	0.4
StUS	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
StJp	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
StUK	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	-0.1
StEu	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	-0.1
StNo	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-0.1
	BIUS	BIJp	BIUK	BIEu	BINo	StUS	StJp	StUK	StEu	
BIJp	0.1									
BIUK	0.4	0.1								
BIEu	0.4	0.1	0.4							
BINo	0.4	0.1	0.4	0.6						
StUS	0.25	0.1	0.2	0.2	0.1					
StJp	0.2	0.3	0.1	0.2	0.1	0.3				
StUK	0.2	0.0	0.3	0.2	0.1	0.5	0.2			
StEu	0.2	0.0	0.2	0.3	0.1	0.4	0.2	0.5		
StNo	0.2	0.0	0.2	0.2	0.1	0.3	0.2	0.3	0.3	