



Improving data quality through regulator specific validation rules

Speaker

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Speaker





Paul Hulst

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- Member of BPB Taxonomy Architecture Guidance Task Force
- Member of XSB Open Information Model
- Board member XBRL Netherlands

Note:

This presentation contains the views and opinions of the speaker and is not an official position of De Nederlandsche Bank.



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About De Nederlandsche Bank

- DNB is the central bank, supervisor for the financial sector and resolution authority for the Netherlands. DNB also advises the Dutch government on economic matters.
- Collecting, validating, enhancing and disseminating data is a key role of the Statistics Department.



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Overview of current system



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Validation rules

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XVest and EVA

XVest

- Built by DNB using Fujitsu components
- Technology: Microsoft .NET
- Processes data in XBRL instances
- Rules defined through the XBRL formula linkbase

EVA

- Developed by DNB itself
- Technology: SAS
- Processes data shredded to a relational database

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 is XBRL data warehouse
 Facts
 Table + Data point

 Rules defined in a DNB-defined syntax, similar to the syntax of the EBA.



Example of EVA and XBRL syntax

	А	В	С	D	E	F	G	н	Ι	J
1										
2		Type of rule	Main table	Rows	Columns	Sheets	Formula	Severity	Fallback	Rounding
3	DNB_0001	Consistency	F 01.02		(010)		$\{r061\} = +\{r062\} + \{r063\} + \{r064\} + \{r065\} + \{r066\}$	Non-blocking	TRUE	Interval
4	DNB_0002	Consistency	F 01.02		(010)		${r141} = +{r142} + {r143} + {r144}$	Non-blocking	TRUE	Interval
5	DNB_0003	Consistency	C 01.00	(010;015;020)			{c010}	Non-blocking	FALSE	Interval
6	DNB_0004	Consistency	C 03.00	(010;030;050)			{c010}	Non-blocking	FALSE	Interval
7	DNB_0005	Consistency	C 04.00		(010)		{r860} > 0	Non-blocking	FALSE	Interval
8	DNB_0006	Plausibility	C 22.00		(020;030)		{r130} > 0	Non-blocking	FALSE	Interval
9	DNB_0007	Consistency	C 24.00		(150;160)		{r010} >= 3	Non-blocking	TRUE	Interval
10	DNB_0008	Consistency	C 24.00		(140)		{r010} >= 0 and {r010} <= 250	Non-blocking	FALSE	Interval
11	DNB_0009	Consistency	C 07.00.a	(010-090;110;130-280)		(All)	{c200} <= {c150}	Non-blocking	TRUE	Interval
12	DNB_0010	Consistency	C 08.01.a	(010-070;180)		(All)	{c010} >= 0 and {c010} <= 1	Non-blocking	TRUE	Interval
13	DNB_0022	Consistency	C 17.00.a	(010-080)	(010-080)		IF {r010} = 1 THEN {r030} = {r040}	Non-blocking	TRUE	Absolute
14	DNB_0059	Consistency	C 02.00				{C 02.00, r140, c010} = {C 07.00.a, r010, c220, s009}	Non-blocking	TRUE	Interval
15	DNB_0073	Consistency	C 18.00				{C 18.00, r010, c060, sNNN} = 2 * {C 18.00, r010, c060, s001}	Non-blocking	TRUE	Interval

Formula Definition

Added to formulas_EGDQ.xml
Formula Resources Custom Functions
Keyword Search 🗸
Formulae / Assertions
W <value assertion=""> ID : eba_v0207_m : iaf:numeric-equal(\$a, iaf:sum((\$b, \$c, \$d, \$e, \$f, \$g, \$h, \$i, \$j, \$k, \$i, \$m, \$n, \$o, \$p, \$q))) [dimensional] W <value assertion=""> ID : eba_v0208_m : iaf:numeric-greater-equal-than(\$a, \$b) [dimensional]</value></value>
ter fri \$a <fact variable="">ID : eba_v0208_m.a Fallback value : 0</fact>
🔄 🚠 💲 <fact variable=""> ID : eba_v0208_m.b Fallback value : 0</fact>
Q <explicit dimension="" filter=""> ID : eba_v0208_m.f1 Dimension : eba_dim:BAS (Base) Member : eba_BA:x9 (Exposures)</explicit>
- D < Explicit Dimension Filter > ID : eba_v0208_m.f2 Dimension : eba_dim:MCY (Main category) Member : eba_MC:x198 (Instruments subject to securitisation credit risk tro
- D <explicit dimension="" filter=""> ID : eba_v0208_m.f3 Dimension : eba_dim: APR (Approach for prudential purposes) Member : eba_AP: x42 (Standardised Approach)</explicit>
C <explicit dimension="" filter=""> ID : eba_v0208_m.f4 Dimension : eba_dim:EXC (Exposure dass) Member : eba_EC:x27 (Items representing securitisation positions)</explicit>
C <explicit dimension="" filter=""> ID : eba_v0208_m.fS Dimension : eba_dim:TRI (Type of risk) Member : eba_TR:x2 (Credit risk)</explicit>
D <explicit dimension="" filter=""> ID : eba_v0208_m.f6 Dimension : eba_dim:PRP (Prudential portfolio) Member : eba_PL:x11 (Banking book)</explicit>
🕼 <concept filter="" name=""> ID : eba_v0208_m.f7 Concept : eba_met:mi213 (Risk weighted exposure amount after CAP)</concept>
- D < Explicit Dimension Filter > ID : eba_v0208_m.f8 Dimension : eba_dim:TIF (Type of investment firm) Member : eba_TA:x0 (Not applicable/All activities)
Q <explicit dimension="" filter=""> ID : eba_v0208_m.f9 Dimension : eba_dim:CPS (Counterparty sector) Member : eba_CT:x0 (Not applicable/ All counterparties)</explicit>
D <explicit dimension="" filter=""> ID : eba_v0208_m.f11 Dimension : eba_dim:CPZ (Size of the counterparty) Member : eba_CT:x0 (Not applicable/ All counterparties)</explicit>
- D <explicit dimension="" filter=""> ID : eba_v0208_m.f12 Dimension : eba_dim:MRW (Methods to determine risk weights) Member : eba_AP:x0 (Not applicable/ All approaches</explicit>
i - < Messages >

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Validation rules

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Issues with the current approach for DNB



Issues with the current implementation in EVA:

EVA is an DNB internal system, reporters can't use it.

Doesn't support the DNB goal of pushing validation to the reporter.

Reporters have to write their own code to implement the (± 5000) DNB checks.

- Which not all of them do, so no opportunity for them to improve their data systems.
- Implementation might be different than the DNB implementation, leading to discussion on the right interpretation

Separate feedback to reporters for EBA and DNB checks.



Requirements for alternative approaches

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Requirements of DNB:

- 1. No changes to external taxonomies or instances provided by reporters.
- Very limited impact on validation process / systems of reporters.
 So use technologies already available to reporters.



New approach for DNB checks

Implementation

Create formula linkbase(s) containing the DNB rules

Adapt XVest to use existing features from the Fujitsu components

- Instruct XBRL formula validation component to load an additional formula linkbase
- Instruct Excel feedback generator to load that linkbase as well
 Share the formula linkbase with the banks via the DNB website.



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FormulaGenerator

The FormulaGenerator is java application run from the command line that reads an csv file and creates an XBRL formula linkbase file using information from the mapping files also used by the Excel <-> XBRL convertors.

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Input: id, formula expression, preconditions, usage of fallback value, severity level and the error message(s).

Formula expression language uses references to table, row and column provided by the table linkbase.

#assertionID	formulaExpression	precondition	useFallbackValue	severity	unsatisfiedMessage
EGDQ-0067	max({{T_C 28.00, R_NNN, C_230}}) >= 0.1	C 28.00	FALSE	WARNING	en:EGDQ-0067 - There should be at least one exposure with
					equal to 10.
EGDQ-0068	[T_C 30.00, C_020:C_250] -> [iaf:numeric-equal({T_C 28.00, R_NNN, C_210},	C 28.00,C 30.00	TRUE	WARNING	en:EGDQ-0068 - Total of exposure value before application
	iaf:sum({{ T_C 30.00, R_NNN }}))]				C.28.00 should equal the sum of the columns 020 to 250 of t

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Validation rules

	Α	В	С	G	Z	AF	AG	AH	AI	AJ		
1	TOC	C 06.02 (GS) Gr	roup Solvency									
2		ENTITIES	WITHIN SCOPE OF CONSC	LIDATION		INFORMATION ON THE CONTRIBUTION OF E						
3		Name	LEI code	Share of holding (%)	Total risk exposure amount	sure Qualifying own funds included in consolidated own funds						
4						Qualifying tier 1 instru	uments included in cons		Qualifying own funds instruments included in consolidated tier 2	MEMORANDUM ITEM: GOODWILL (-) / (+) NEGATIVE		
5							Minority interests included in consolidated common	Qualifying tier 1 instruments included in consolidated	capital	GOODWILL		
7	Legal entity	010	025	060	250	310	320	330	340	350		
10	149128	rule 149 & rule 128	Legalldentifier20Pos	30,03%		-	0,00					
11	141	rule 141		40,04%	33434,00		25,01			602141350,00		
12	147	rule 147	Legalldentifier20Pos	89,05%	1234000,00							

Check No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator
150	There should not be contributions to CET1 in 100% holdings	if c320<>0 then c060 < 100%	[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} < 1.0) else (true())]

For all rows



	Α	В	С	G	Z	AF	AG	AH	AI	AJ	A	В
1	TOC	C 06.02 (GS) Gr	oup Solvency									eba.europa.eu/xbrl/crr/fws/corep/ 14/2017-04-04/mod/COREP Con
2		ENTITIES WITHIN SCOPE OF CONSOLIDATION			INFORMATION ON THE CONTRIBUTION OF ENTITIES						2	
		Name	LEI code	Share of holding (%)	Total risk exposure		Qualifying own funds included in consolidated own funds				3 Default As	pect
3		-			amount			PLACE ALL N.L.			4 category	value
						Qualitying tier 1 Instr	uments included in cons	solidated tier 1 capital	Qualifying own funds instruments included		5 Period Start	2014-01-01
4									in consolidated tier 2		6 Period End	2014-12-31
5							Minority interests	Qualifying tier 1	capital	GOODWILL	 Identifier	Legalldentifier20Pos
							included in	instruments included in consolidated			8 Scheme	http://standards.iso.org/iso/17442
6	1		005	000	050	0.40	consolidated common		0.40	050	9 Currency	EUR
7	Legal entity	010	025	060	250	310	320	330	340	350	10 Language	en
10	149128	rule 149 & rule 128	Legalldentifier20Pos	30,03%			0,00					
11	141	rule 141		40,04%	33434,00		25,01			602141350,00		
12	147	rule 147	Legalldentifier20Pos	89,05%	1234000,00							
1				1								

C	Check No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator
	150	There should not be contributions to CET1 in 100% holdings	if c320<>0 then c060 < 100%	[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} <= 1.0) else (true())]
	The parent entity should report no Minority interests		If c025=entity_id then c320=0	[T_C 06.02, R_NNN] -> [if {C_025} = string(xfi:entity({C_025}))) then ({C_320} = 0) else (true())]

Using formula functions

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	Α	В	С	G	Z	AF	AG	AH	AI	AJ	A	B C D E	F	G
1	TOC	C 06.02 (GS) G	roup Solvency								1 <u>TOC</u>	C 02.00 (CA 2) Capital Adequacy - Risk E	xposure A	
2		ENTITIES	S WITHIN SCOPE OF CONS	OLIDATION		INFORMATION ON THE CONTRIBUTION OF ENTITIES							-	Amount 010
3		Name	LEI code	Share of holding (%)	Total risk exposure amount						4 TOTAL RI	RE LOCATION IN A CARL AND A CARL	010 1	1267434,00
4						Qualifying tier 1 ins	Qualifying tier 1 instruments included in consolidated tier 1 capital Qualifying own funds MEMORANDUM instruments included ITEM: GOODWILL (-) in consolidated tier 2 / (+) NEGATIVE				5 AMOUNT	paragraph 2 and Article 98 of CRR	020	
5							Minority interests included in consolidated common	Qualifying tier 1 instruments included in consolidated	capital	GOODWILL				
7	Legal entit	010	025	060	250	310	320	330	340	350				
10	149128	rule 149 & rule 128	Legalldentifier20Pos	30,03%	1		0,00							
	141	rule 141		40,04%	33434,00		25,01			602141350,00				
12	147	rule 147	Legalldentifier20Pos	89,05%	1234000,00									

Check No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator					
150	There should not be contributions to CET1 in 100% holdings		[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} <= 1.0) else (true())]					
149	The parent entity should report no Minority interests If c025=entity_id then c320=0 [T		[T_C 06.02, R_NNN] -> [if {C_025} = string(xfi:entity({C_025}))) then ({C_320} = 0) else (true())]					
147	each investee of the group should not differ greatly from the RWAs reported	-0.01 < ((C02.00, r010, c010) - (sum(C06.02, c250)) / (C02.00, r010, c010)) < 0.25	if({T_C 02.00, R_010, C_010} != 0) then (iaf:numeric-greater-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), -0.01) and iaf:numeric-less-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), 0.25)) else (true())					

Can become a bit difficult to read

Validation rules

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	Α	В	С	G	Z	AF	AG	AH	AI	AJ
1	TOC	C 06.02 (GS) Gr	oup Solvency							
2		ENTITIES	WITHIN SCOPE OF CONSC	DLIDATION	INFORMATION ON THE CONTRIBUTIO					
3		Name	LEI code	Share of holding (%)	Total risk exposure amount					
4						instruments in in consolidate			Qualifying own funds instruments included in consolidated tier 2	MEMORANDUM ITEM: GOODWILL (-) / (+) NEGATIVE
5							Minority interests included in consolidated common	Qualifying tier 1 instruments included in consolidated	capital	GOODWILL
7	Legal entity	010	025	060	250	310	320	330	340	350
10	149128	rule 149 & rule 128	Legalldentifier20Pos	30,03%		-	0,00			
11	141	rule 141		40,04%	33434,00		25,01			602141350,00
12	147	rule 147	Legalldentifier20Pos	89,05%	1234000,00					

heck: No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator
150	CET1 in 100% holdings		[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} <= 1.0) else (true())]
144			[T_C 06.02, R_NNN] -> [if {C_025} = string(xfi:entity({C_025}))) then ({C_320} = 0) else (true())]
147	The sum of the RWAs contributed by each investee of the group should not differ greatly from the RWAs reported in CO2 -0.01 ia investee of the group should not differ greatly from the RWAs reported in CO2 ((C02.00, r010, c010) - (sum(C06.02, c250)) / R ia		if({T_C 02.00, R_010, C_010} != 0) then (iaf:numeric-greater-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), -0.01) and iaf:numeric-less-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), 0.25)) else (true())
124	•	Flag if codes reported in c025 are not unique, when reported	manually done

I couldn't do it with the FormulaGenerator

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Validation rules

Current status and future plans

Implementation of supporting logic (e.g. Xvest) is almost done.

FormulaGenerator is used

- for consistency checks on data from a single XBRL report,
- to create the additional validation rules on CRDIV as defined by the ECB (EGDQ),
- and also directly to be included in DNB taxonomies (DNB BSI-MIR, DNB CRDIV-BO)

FormulaGenerator

- Works well,
- can't do all the checks we need, so those rules are built by XBRL experts manually.

Future plans: plausibility checks on a single instance and multi instance processing.



XBRL formula is well suited to improve data quality in reports that is part of the functionality all NCAs and reports already have.

With an XBRL formula generator your domain experts can develop (most of) the validation rules, so the XBRL experts can focus on the remaining complicated ones.

Resulting in more rules.

Questions?

