



WROCLAW UNIVERSITY  
OF ECONOMICS  
AND BUSINESS  
1947–2022

P. Kuśmierczyk, R. Kurach, M. Kośny

***Are women truly less financially literate than men?  
On methodological problems with measuring  
knowledge***

Radosław Kurach

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# 1. Introduction: BIG 3 (Lusardi and Mitchell, 2004)

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Q1. [COMPOUNDED INTEREST] Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- a) **More than \$102**
- b) Exactly \$102
- c) Less than \$102
- d) Do not know
- e) Refuse to answer

Q2. [INFLATION] Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

- a) More than today
- b) Exactly the same
- c) **Less than today**
- d) Do not know
- e) Refuse to answer

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# 1. Introduction: BIG 3 results

Q3. [DIVERSIFICATION] Please tell me whether this statement is true or false. “Buying a single company’s stock usually provides a safer return than a stock mutual fund.”

- a) True
- b) False
- c) Do not know
- d) Refuse to answer

Authors	Country	Year of data	Interest rate Q		Inflation Q		Risk divers. Q		All 3 correct (%)	At least 1 do not know (%)	N
			Correct (%)	DK (%)	Correct (%)	DK (%)	Correct (%)	DK (%)			
Lusardi and Mitchell ( <a href="#">2011c</a> )	USA	2009	64.9	13.5	64.3	14.2	51.8	33.7	30.2	42.4	1488
Van Rooij, Lusardi, and Alessie ( <a href="#">2011</a> )	Netherlands	2010	84.8	8.9	76.9	13.5	51.9	33.2	44.8	37.6	1665
Bucher-Koenen and Lusardi ( <a href="#">2011</a> )	Germany	2009	82.4	11.0	78.4	17.0	61.8	32.3	53.2	37.0	1059
Sekita ( <a href="#">2011</a> )	Japan	2010	70.5	12.5	58.8	28.6	39.5	56.1	27.0	61.5	5268
Agnew, Bateman, and Thorp ( <a href="#">2013</a> )	Australia	2012	83.1	6.4	69.3	13.0	54.7	37.6	42.7	41.3	1024
Crossan, Feslier, and Hurnard ( <a href="#">2011</a> )	New Zealand	2009	86.0	4.0	81.0	5.0	49.0	2.0	24.0	7.0	850
Brown and Graf ( <a href="#">2013</a> )	Switzerland	2011	79.3	2.8*	78.4	4.2*	73.5*	13.0*	50.1*	16.9*	1500
Fornero and Monticone ( <a href="#">2011</a> )	Italy	2007	40.0*	28.2*	59.3*	30.7*	52.2*	33.7*	24.9*	44.9*	3992
Almenberg and S��ve-S��derbergh ( <a href="#">2011</a> )	Sweden	2010	35.2*	15.6*	59.5	16.5	68.4	18.4	21.4*	34.7*	1302
Arrondel, Debbich, and Savignac ( <a href="#">2013</a> )	France	2011	48.0*	11.5*	61.2	21.3	66.8*	14.6*	30.9*	33.4*	3616
Klapper and Panos ( <a href="#">2011</a> )	Russia	2009	36.3*	32.9*	50.8*	26.1*	12.8*	35.4*	3.7*	53.7*	1366
Beckmann ( <a href="#">2013</a> )	Romania	2011	41.3	34.4	31.8*	40.4*	14.7	63.5	3.8*	75.5*	1030
Moure ( <a href="#">2016</a> )	Chile	2009	47.4	32.1	17.7	20.9	40.6*	N/A*	7.7	53.1	14,463
Boisclair, Lusardi, and Michaud ( <a href="#">2017</a> )	Canada	2012	77.9	8.8	66.18	16.13	9.36	31.29	42.5	37.23	6805
Kalmi and Ruuskanen ( <a href="#">2017</a> )	Finland	2014	58.1	6.1	76.5	6.4	65.8	10.25	35.6	14	1477

\*Questions that have slightly different wording than the baseline financial literacy questions listed in the text  
Lusardi (2019)

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# 1. Introduction: BIG 3 results (Poland, 2019)

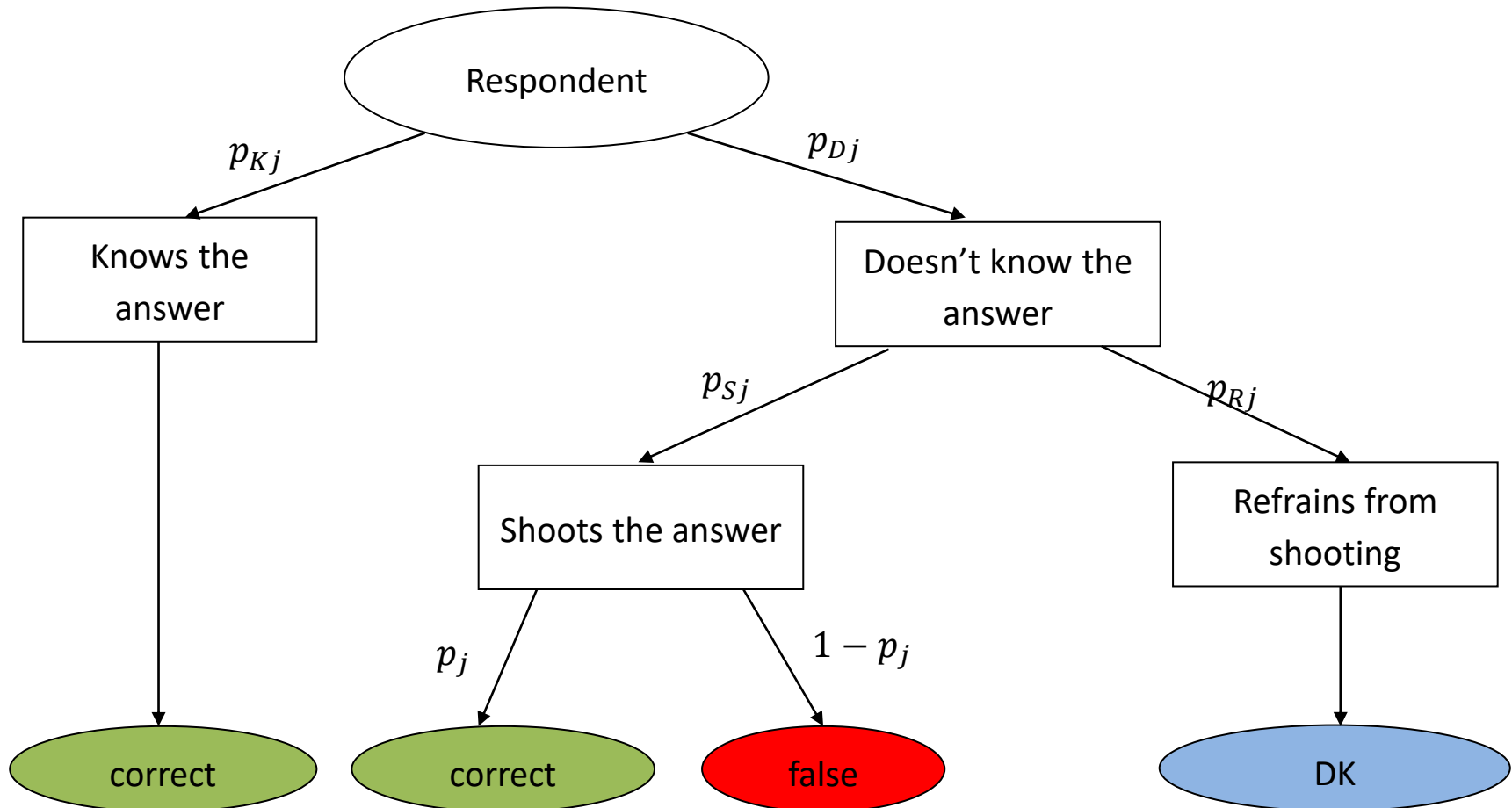
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Question	Correct	False	Don't know
All respondents			
Q1	55.75%	32.46%	11.79%
Q2	55.94%	30.03%	14.03%
Q3	57.25%	17.31%	25.44%
Male respondents			
Q1	57.02%	32.46%	10.53%
Q2	59.43%	30.70%	9.87%
Q3	58.77%	19.30%	21.93%
Female respondents			
Q1	54.81%	32.46%	12.72%
Q2	53.34%	29.53%	17.13%
Q3	56.12%	15.82%	28.06%
Gender gap (M-F)			
Q1	2.21%	0.00%	-2.19%
Q2	6.09% **	1.17%	-7.26% ***
Q3	2.65%	3.48% *	-6.13% **

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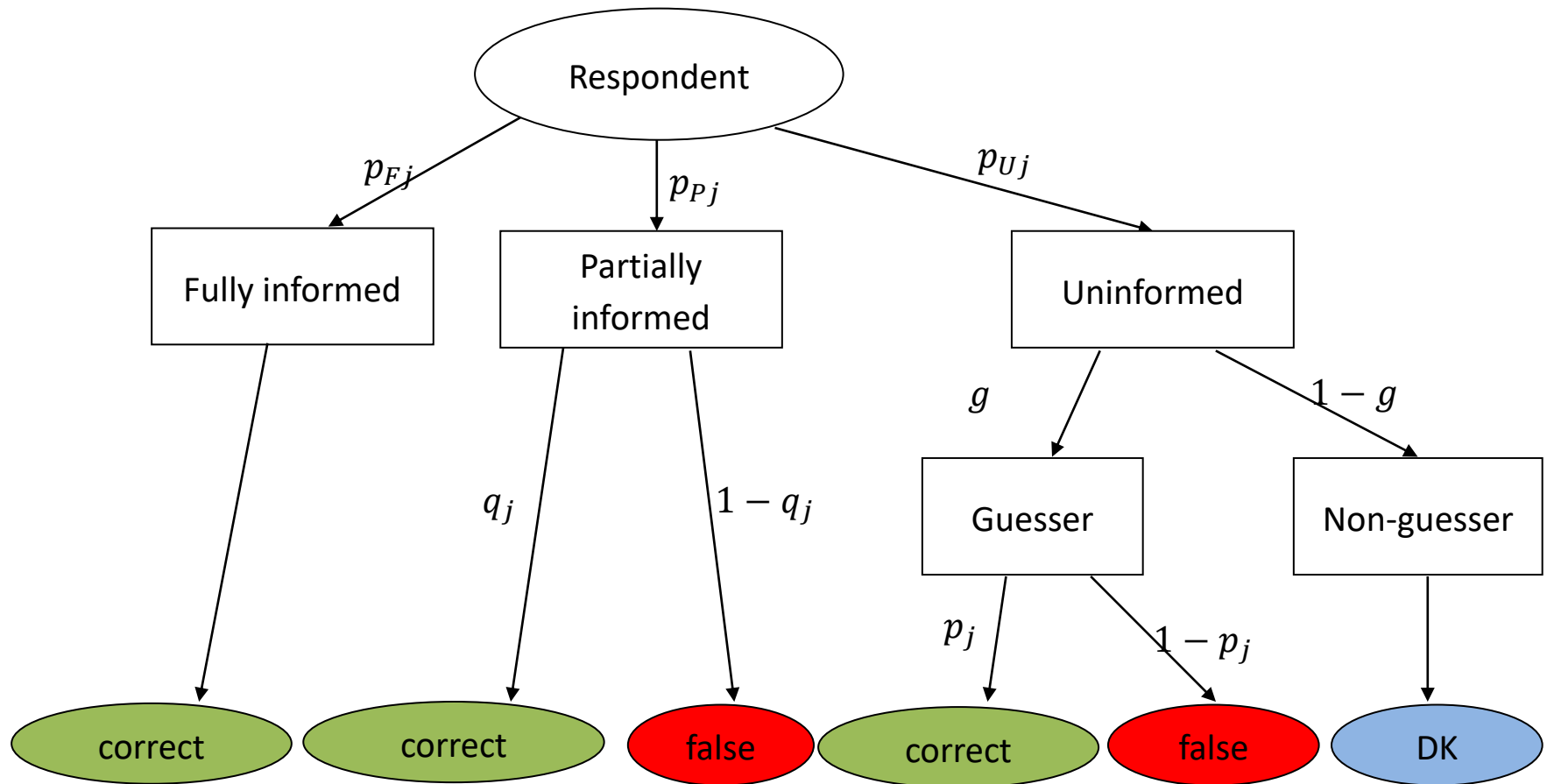
## 2. Models of knowledge – the Bayesian model

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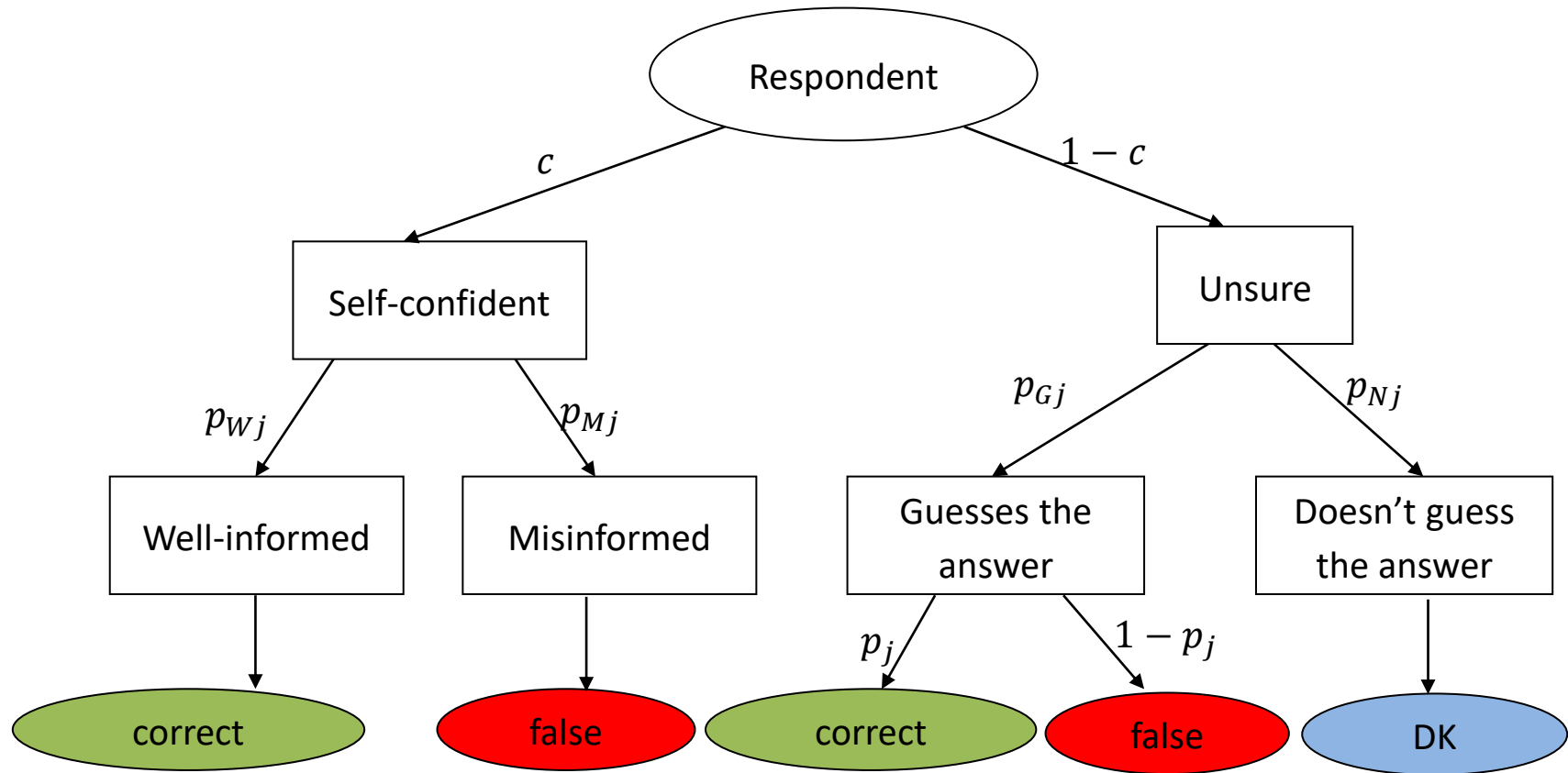
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## 2. Models of knowledge – the partial information model



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## 2. Models of knowledge – „bad knowledge” model



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### 3. How to estimate the „bad knowledge” model?

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The distributions of the answers in question  $j$  depends on the probability, that respondent:

- is well informed ( $p_{Wj}$ ), (question dependent)
- guesses the answer ( $p_{Gj}$ ), (question dependent)
- is self-confident ( $c$ ). (question independent)

$$\begin{cases} s_{1j} = c \cdot p_{Wj} + (1 - c) \cdot p_{Gj} \cdot p_j \\ s_{0j} = c \cdot p_{Mj} + (1 - c) \cdot p_{Gj} \cdot (1 - p_j) \end{cases}$$

$$p_{Wj} = \frac{s_{1j} - (1 - c - s_{2j}) \cdot p_j}{c}$$

$$p_{Mj} = 1 - p_{Wj}$$

$$p_{Gj} = 1 - \frac{s_{2j}}{1 - c}$$

$$p_{Nj} = 1 - p_{Gj}$$

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### 3. How to estimate the „bad knowledge” model?

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- How to estimate the probability of being self-confident ( $c$ )?

$\pi_i$  – as a vector of answers to the subsequent BIG3 questions. E.g. (1,0,2) means – Q1-correct, Q2 – false, Q3 – DK. We have 27 combinations.

- Next, we introduce 0-1 variable  $C_i$ : 1 - respondent is self-confident, 0 - unsure; we estimate the expected value of this variable conditional on the profile of answers:  $E(C_i | \pi_i)$ .

E.g. if respondent marked DK at least once the variable takes the 0 value.

- Using the total probability formula we get  $c = E_i[E(C_i | \pi_i)]$

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## 4. „Bad knowledge” model – estimation results

Question	Well-informed $(p_{Wj})$	Misinformed $(p_{Mj})$	Guess the answer $(p_{Gj})$	Refrain from guessing $(p_{Nj})$	Self- confident $(c)$
All respondents					
Q1	84.17%	15.83%	75.53%	24.47%	51.82%
Q2	85.98%	14.02%	70.87%	29.13%	
Q3	88.54%	11.46%	47.18%	52.82%	
Male respondents					
Q1	81.53%	18.47%	75.85%	24.15%	56.42%
Q2	85.42%	14.58%	77.36%	22.64%	
Q3	84.98%	15.02%	49.68%	50.32%	
Female respondents					
Q1	86.54%	13.46%	75.37%	24.63%	48.34%
Q2	86.54%	13.46%	66.84%	33.16%	
Q3	91.68%	8.32%	45.69%	54.31%	
Gender gap (M-F)					
Q1	-5.01% *	5.01% *	0.48%	-0.48%	8.08% ***
Q2	-1.12%	1.12%	10.52% ***	-10.52% ***	
Q3	-6.70% ***	6.70% ***	3.99%	-3.99%	

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## 4. „Bad knowledge” model – estimation results

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Profile	$E(C_i \pi_i)$	$E(X_{wi1} \pi_i)$	$E(X_{wi2} \pi_i)$	$E(X_{wi3} \pi_i)$	$BIG3C_i$
000	0.0465	0	0	0	0
001	0.2735	0	0	0.58564	0.5856
010	0.3741	0	0.6851	0	0.6851
100	0.3415	0.6342	0	0	0.6342
011	0.8220	0	0.9438	0.9454	1.8893
101	0.8002	0.9305	0	0.9376	1.8681
110	0.8641	0.9551	0.9586	0	1.9137
111	0.9800	0.9939	0.9944	0.9946	2.9830
Other	0	0	0	0	0

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## 5. Final conclusions

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- We presented just a few models which are computable.
- The formulas that we have provided could be applied to re-interpret the results of the previous BIG3 studies conducted by other researchers.
- We don't say which model is „the best” one – it requires further research.

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Thank you for your attention!

[radoslaw.kurach@ue.wroc.pl](mailto:radoslaw.kurach@ue.wroc.pl)

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