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DETECTING THE RISK OF MANIPULATION OF FINANCIAL STATEMENTS FOR COMPANIES ON THE BUCHAREST STOCK EXCHANGE APPLYING THE BENEISH MODEL

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Introduction

- Accounting manipulation with its negative extensions (fraud) are topics that frustrate shareholders, investors, auditors and government. In order to protect them, econometric models have been developed in the specialized literature that can calculate the risk of handling financial statements.
- Numerous studies confirm the Beneish model's ability to detect the manipulation of financial statements. The model helps auditors by signaling possible issues in the financial statements
- The Beneish model calculates an M-score based on eight financial rates. The score above -2.22 signifies a risk of earnings manipulation.

$$M = -4.84 + 0.92 * DSRI + 0.528 * GMI + 0.404 * AQI + 0.892 * SGI + 0.115 * DEPI - 0.172 * SGAI + 4.679 * TATA - 0.327 * LVGI$$

Rates in M-Beneish model (1)

1. Days' sales in receivable index

$$DSRI = \frac{Receivables(t)}{Sales(t)} / \frac{Receivables(t-1)}{Sales(t-1)}$$

2. Gross margin index

$$GMI = \frac{Gross\ margin(t-1)}{Sales(t-1)} / \frac{Gross\ margin(t)}{Sales(t)}$$

3. Asset quality index

$$AQI = \left[1 - \frac{Current\ assets(t) + PP\&E(t)}{Total\ assets(t)} \right] / \left[1 - \frac{Current\ assets(t-1) + PP\&E(t-1)}{Total\ assets(t-1)} \right]$$

4. Sales growth index

$$SGI = \frac{Sales(t)}{Sales(t-1)}$$

Rates in M-Beneish model (2)

5. Depreciation index

$$DEPI = \frac{\text{Depreciation}(t-1)}{\text{Depreciation}(t-1) + PP\&E(t-1)} / \frac{\text{Depreciation}(t)}{\text{Depreciation}(t) + PP\&E(t)}$$

6. Sales, general and administrative expenses index

$$SGAI = \frac{\text{Sales, general and administrative expense}(t)}{\text{Sales}(t)} / \frac{\text{Sales, general and administrative expense}(t-1)}{\text{Sales}(t-1)}$$

7. Leverage index

$$LVGI = \frac{LTD(t) + \text{Current liabilities}(t)}{\text{Total assets}(t)} / \frac{LTD(t-1) + \text{Current liabilities}(t-1)}{\text{Total assets}(t-1)}$$

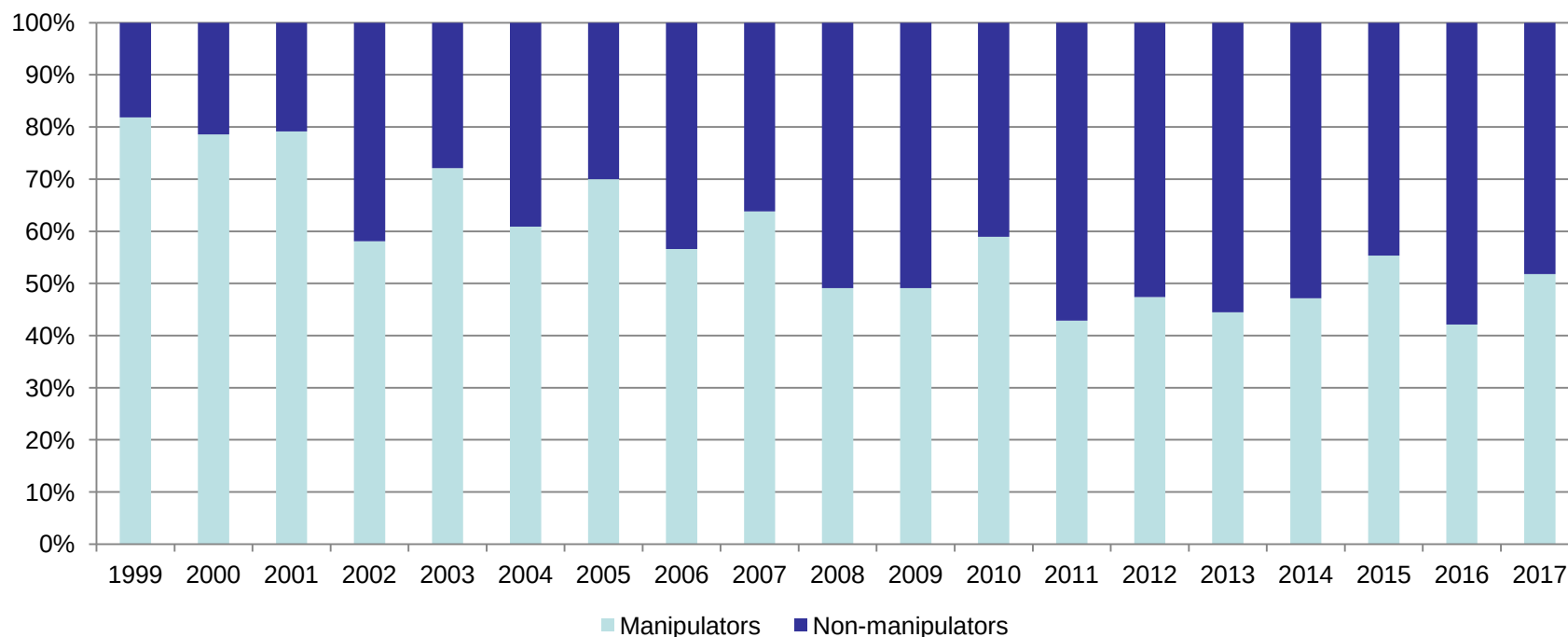
8. Total accruals to total assets

$$TATA = \frac{\text{Net income}(t) - \text{Net change in cash}(t)}{\text{Total assets}(t)}$$

Research methodology

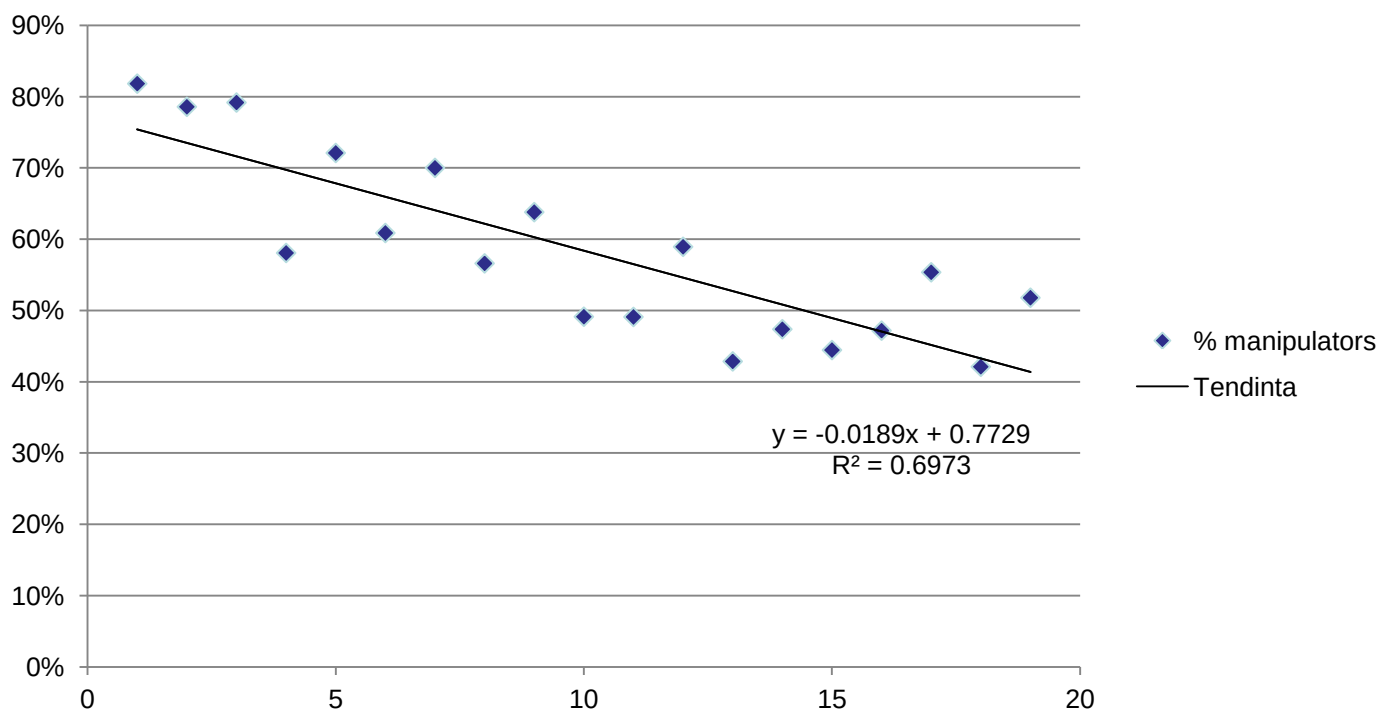
- To collect data, we accessed the Thomson Reuters database from which we extracted data from the financial statements of listed companies on the regulated market of the Bucharest Stock Exchange
- The calculations targeted the period 1998 - 2017, but at the level of each year, for some companies the data were incomplete to calculate the final score. Thus, we obtain a total number of 887 observations and an average number of 47 observations / year.
- The M score could be calculated for 2-19 years, depending on the data available for each company. On average, the score could be calculated for 13 years / company.
- In the same conditions, we calculated the Z score for the determination of the risk of fraud proposed by Robu & Robu (2013) for the companies listed on the Bucharest Stock Exchange, then comparing the results.

Dividing companies into manipulators / non-manipulators according to Beneish model



For the years 1999-2017, we obtain an average of 55% manipulators. The highest weightings of the manipulators appear in the years 1999-2001 (79%-82%). These percentages are, however, less relevant, because for these years the number of observations is lower. The minimum weight of the manipulated financial statements appears in 2016 (42%).

Evolution of the percentage of manipulators (1999-2017)



There is an optimistic evolution of the manipulators in the second part of the analyzed period and, in general, a linear, decreasing trend.

Comparison of financial performance for manipulators and non-manipulators (1)

	Manipulated	Non-manipulated
	financial statements	
Net income	52.067	13.711
Operating income	64.558	35.548
Net change in cash	(14.551)	30.981
Cash from operating activities	73.681	95.159
Net profit margin (Net income/Sales)	-88%	-15%
Operating profit margin (Operating income/Sales)	-133%	-17%
Net change in cash-to-Net income	-0,47	5,21
Cash from operating activities-to-Operating income	0,55	-0,49
Liquidity current ratio	274%	262%
ROA	6%	-2%
Debt ratio (Total liabilities/Total assets)	37%	50%
Shareholder equity ratio (Equity/total assets)	63%	50%
EQ	40,6	41,8

Comparison of financial performance for manipulators and non-manipulators (2)

- In the case of manipulated financial statements, the average of the reported profits is higher than in the case of non-manipulated financial statements. This may mean, on the one hand, that larger companies are more tempted to manipulate their earnings, and on the other hand, increasing profits may be the goal of accounting manipulation.
- The average cash flow is lower for accounting manipulations.
- the ratio between cash flow and profit is lower (even negative).
- ROA, the liquidity and solvency rates are higher when manipulating the financial statements, and the degree of indebtedness is lower.
- In conclusion, the financial performance is better within the manipulated financial statements, but it is a dissimulated performance, not a real one. Contrary to expectations, the average earnings quality reported by Thomson Reuters is approximately the same in the two situations in which the quality of earnings is defined as the extent to which previous earnings are reliable and are likely to persist. Basically, this result is contrary to the theory of Beneish, Lee & Nichols (2013) that claims that earnings of companies with high M-scores are more likely to disappear next year, unlike those of low-scoring M companies that tend to persist.

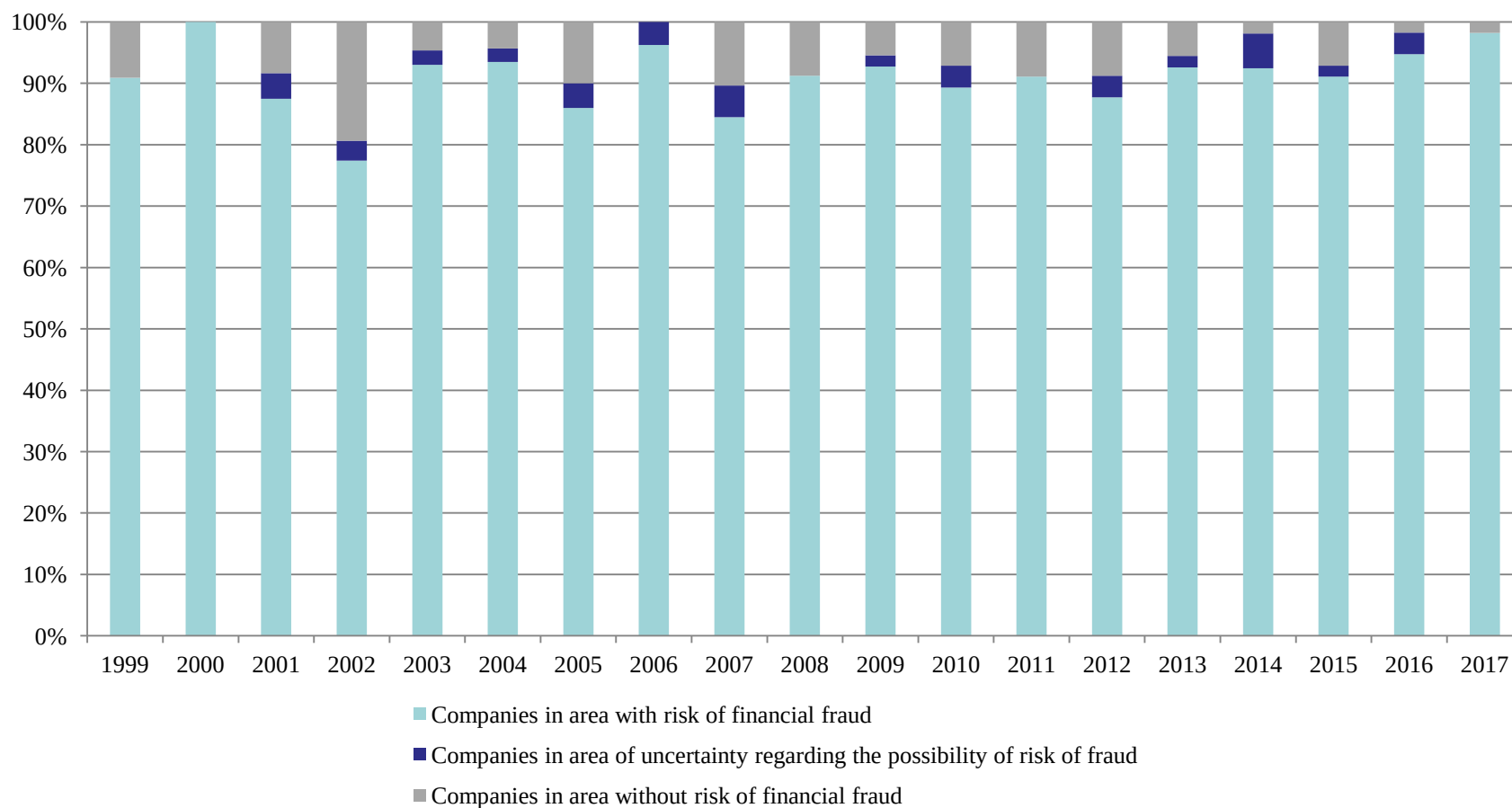
Robu model

- Robu & Robu (2013) have applied Beneish variables for companies listed on the Bucharest Stock Exchange obtaining the following model for the determination of the risk of fraud:

$$\begin{aligned} Z_{\text{fraud risk-Beneish}} &= -0.383 * DSRI + 0.039 * GMI - 0.325 * AQI + 0.448 * SGI + 0.273 \\ &\quad * DEPI + 0.915 * DGAI + 0.478 * LVGI - 0.153 * TATA \end{aligned}$$

- The results of this classify the company in one of the following groups of risk:
 - Interval [-2,841; -0,355] – area without risk of financial fraud
 - Interval (-0,355; 0,313) – area of uncertainty regarding the possibility of risk of fraud, situation which implies applying supplementary audit procedures
 - Interval [0,313; 2,453] – area with risk of financial fraud

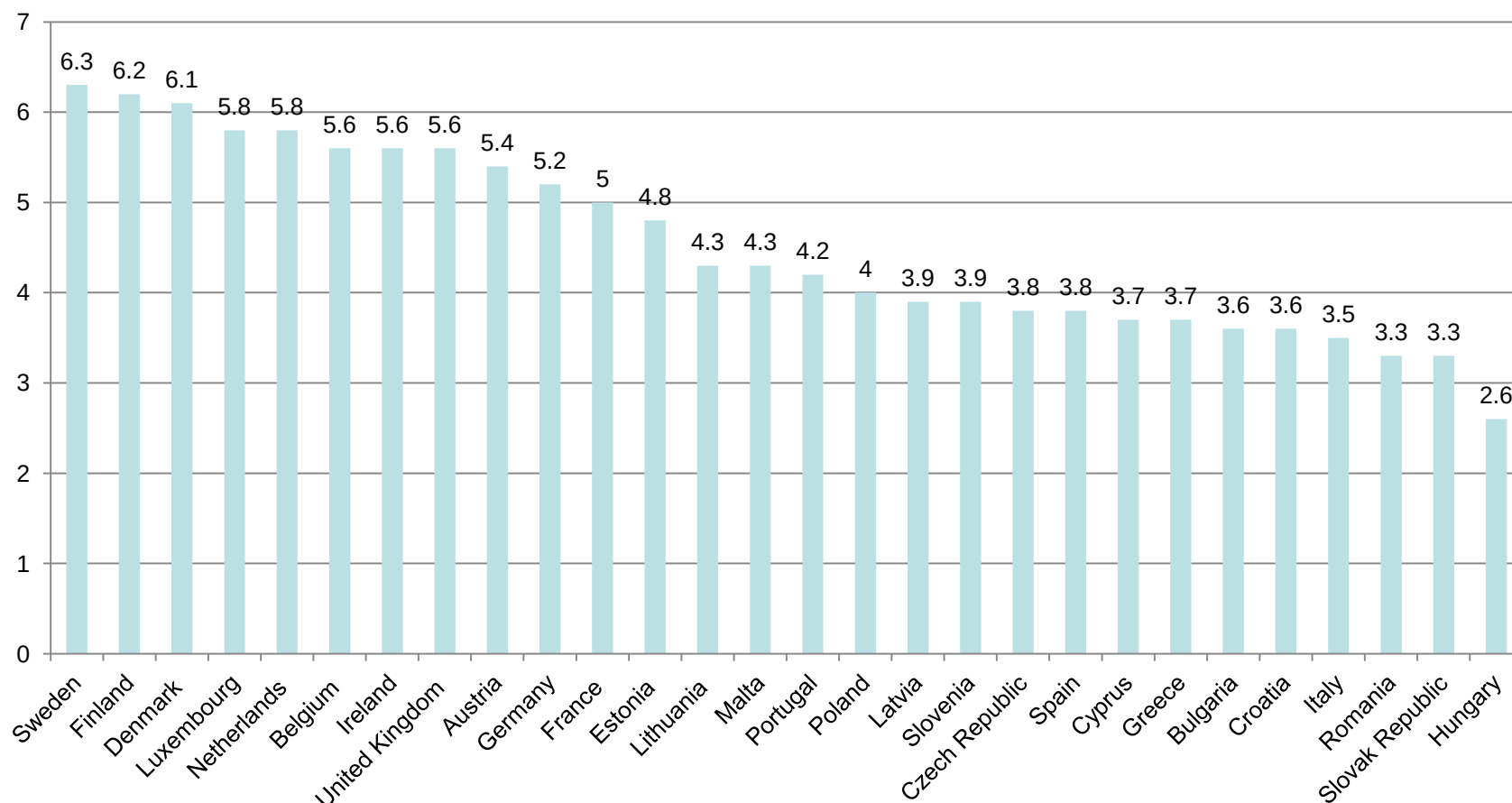
Dividing companies into risk areas according to Robu model



Manipulation percentage in other countries according to M-Beneish score

- The Beneish model was also applied at the level of **Greece** on a number of 25,468 companies for the years 2011-2012. For **33%** of these, the score obtained was greater than -2.2, which ranks them in the manipulators category (Repousis, 2016)
- Of the 229 **Vietnamese** companies listed on HOSE in 2013-2014, **48.4%** were resorted to earnings management (Anh & Linh, 2016).
- For 34 of the 50 companies in **Albania (68%)**, the M score indicates a manipulation of the financial statements (Shehu, 2015).
- In **Italy**, in the period 2009-2010, immediately after the beginning of the financial crisis, **33%** of the sample presents a high risk of earnings manipulation (Corsi et.al, 2015).

Ethical behaviour of firms 2016-2017 according to World Economic Forum



The score of ethical behavior of the romanian companies is 3.3 out of 7 (47%).
By difference, in a proportion of 53% the companies have a corrupt behavior.

Conclusions (1)

- The averages of indicators that explain the risk of manipulation for the analyzed companies are higher than those calculated by Beneish (1999), which means that the manipulation is more aggressive in the case of Romania
- For the years 1999-2017, we obtain an average of 55% manipulators and a general tendency to decrease them
- the percentage is high compared to that obtained in Italy and Greece (33% manipulators), or Vietnamese companies (48.4%), but less dramatically than in Albania (68%)

Conclusions (2)

- Applying the Robu model, the results are more dramatic: on average, 91% of the companies considered are in the area at risk of financial fraud
- However, we note the results obtained by applying the Beneish model, which are comparable to the level at which we are in the ranking made by the World Economic Forum in the Global Competitiveness report on the ethical behavior of companies.
- Financial performance is better in the manipulated financial statements (Average profits, ROA, liquidity and solvency rates are higher, and the degree of indebtedness is lower), but it is a distorted performance, not a real one.

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**Thank You for your
attention!**

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