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Dynamics of Capital Structure: Analyzing the Impact of Credit Rating Changes

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Abstract

This paper delves into the intricate relationship between credit rating changes and capital structure, employing a descriptive research design to explore this dynamic interplay. Secondary data from sources include CRISIL, company filings, and prominent databases like Bloomberg, the study centres on the case of non-financial firms listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) in India. The period under scrutiny spans from 2015 to 2022, encompassing 195 non-financial firms and totalling 1203 firm-year observations after excluding financial institutions due to their distinctive debt propensity.Methodologically, the research hinges on panel least squares regression to scrutinize the repercussions of credit rating shifts on leverage.

Keywords: Rating, leverage, capital.

Introduction to Credit Rating

Credit ratings have their origins in the United States financial crisis of 1837. Information asymmetry and a lack of faith in the financial system were blamed for the crisis's severe effects, which lasted for six years. Lewis Tappan, in the wake of the terrible crisis, established a commercial credit rating agency in 1841 to provide customers with accurate credit data. This organisation, which issued its first rating guide in 1859, served as the progenitor of modern credit rating agencies. Currently, Moody's Investor Service, Fitch Ratings, and Standard & Poor's Financial Services are the three largest credit rating agencies in the world. These organisations have subsidiaries all across the globe.

Credit rating is a method of measuring the creditworthiness of a debt issuer. It refers to relative capacity of an entity to meet financial commitments. It may also include a recovery expectation. These ratings are provided by the credit rating agencies. Moody's, Standard &Poor's (S&P) and Fitch are the key global credit rating agencies which evaluate issuers worldwide.

Table 1: Rating Scales used by Credit Rating Agencies

Moody's	S&P	Fitch	Description
Aaa	AAA	AAA	Highest credit quality, minimum credit risk
Aa1, Aa2, Aa3	AA+, AA, AA-	AA+, AA, AA-	Very high credit quality, very low credit risk
A1, A2, A3	A+, A, A-	A+, A, A-	High credit quality (upper-medium grade)
Baa1, Baa2, Baa3	BBB+, BBB, BBB-	BBB+, BBB, BBB-	Good credit quality, currently low credit risk
Ba1, Ba2, Ba3	BB+, BB, BB-	BB+, BB, BB-	Speculative elements, issuer faces major uncertainties and adverse conditions
B1, B2, B3	B+, B, B-	B+, B, B-	High credit risk, but issuer still able to meet its financial commitments
Caa1, Caa2, Caa3	CCC+, CCC, CCC-	CCC	Issuer currently vulnerable, default likely
Ca	CC	CC	Issuer currently highly vulnerable, near default
C	R, SD, D	C, RD, D	Lowest rating, typically in default on some (SD, RD) or all of its financial obligations

Source: Klimaviciene (2011)

As per market conventions, the term "investment grade" is defined as 'AAA' to 'BBB' categories of ratings, whereas, the term "speculative grade" is defined as 'BB' to 'D' categories of ratings. Credit rating agencies in India are governed by The Securities and Exchange Board of India (SEBI).Below are the six SEBI registered credit rating agencies:

Source: Charumathi (2017)

Figure 1: Credit Rating Agencies

Bond prices and demand are particularly sensitive to credit ratings since lower ratings indicate greater investment risk and lower bond prices. The interest rates on lower grade assets are greater.

CRISIL (part of S&P Global) was the first credit rating agency set up in India in 1987 and is the largest credit rating agency in the country. In India alone, it has assigned ratings to over 1,44,000 MSMEs and over 30,000 big and medium-sized corporations and financial institutions.The

researchobserves the case of CRISIL rated listed nonfinancial firms in the NSE/ BSEexchanges in India.

Table 2: Credit Rating Scale

Long-term	Short-term
CRISIL AAA	CRISIL A1
CRISIL AA	CRISIL A2
CRISIL A	CRISIL A3
CRISIL BBB	CRISIL A4
CRISIL BB	CRISIL D
CRISIL B	
CRISIL C	
CRISIL D	

Source: CRISIL rating website

Capital Structure: Concept and Theories

'Structure' refers to how everything is put together. Capital structure, then, refers to the way in which a company arranges its various forms of capital to satisfy its long-term funding requirements. A company's capital structure is the system it has in place to raise money for ongoing expenses and future expansion. Equity can be broken down into common stock, preferred stock, or retained earnings, while debt can be issued in the form of bonds or long-term notes payable.There are mainly three traditional capital structure theories that assist a firmselect its capital structure:

1. In 1950s, **Modigliani and Miller** proposed the first formal theory on capital structure. Before that, there was only descriptive theories available on capital structure. As per this theory, capital structure does not affect valuation of a firm. As per this theory, all else equal, a firm having high debt is as valuable as a firm having no debt or low debt. However, this theory was based on a number of assumptions. Some of these are as below:

- There is no tax shield benefit on interest cost.
- No transaction cost on buying and selling of securities.
- There is symmetry of information i.e., all stakeholders/investors have same information available.
- There is no bankruptcy cost.
- There is same cost of borrowing for all.

After Modigliani and Miller, Fama and French (2002) proposes that the optimal capital structure is a trade-off between interest tax shields and cost of financial distress. This theory is called **static trade-off theory**. As per this theory:

Value of firm = Value if all-equity financed + Present value of tax shield - Present value of cost of financial distress.

2. David Durand (1952) proposed the **Net Income Approach** under which he suggested that variation in debt ratio bringsvariation in capital costs. He also proposes **Net Operating Income Approach**, which states that there is no relation between leverage ratio and discount rates.
3. In 1984, Myers and Majluf popularized the **pecking order theory** which is considered as an alternate to the trade-off theory. This theory is based on the key assumption of asymmetric information. Asymmetric information captures that one party (firm/management) has more or better information than the other (investors). Pecking order theory states that a company's way of financing signals the public about the performance of the company.As per this theory, company prefer financing in below orders:

- Internally through retained earning.
- Financing through debt.
- Financing through issue of new equity.

Literature Review

The intricate interplay between a firm's capital structure and its financial performance has long captivated the attention of scholars, practitioners, and policymakers alike. The structure of a company's financing—comprising the proportion of debt and equity—profoundly influences its risk profile, cost of capital, and ability to navigate economic fluctuations. Within this realm, credit ratings serve as a crucial benchmark, reflecting the perceived creditworthiness of a firm and influencing its access to capital markets and borrowing costs. As such, understanding the dynamics of capital structure in response to credit rating changes emerges as a topic of paramount significance in the field of corporate finance.Over the past decades, the study of capital structure and its determinants has spawned a substantial body of research. However, the relationship between credit rating modifications and capital structure adjustments remains a relatively underexplored territory, offering fertile ground for investigation. This research paper embarks on an empirical exploration of the multifaceted interactions between credit rating changes and capital structure decisions, aiming to shed light on the nuanced mechanisms that underlie such dynamics.The main objective of the following literature review is to provide a comprehensive synthesis of existing studies that investigate the intricate interplay between credit rating alterations and capital structure adjustments.

- Despite using the identical approach, **Kemper and Rao (2013)** were unable to verify Kisgen's (2006) findings. The research of Kemper and Rao lent credence to Kisgen's CR-CS model, but only for companies expecting a downgrade in their rating. It was concluded and contended that Kisgen's conclusions are influenced by the subsample of enterprises with low credit ratings. Debt issuance has decreased, although Kemper and Rao suggested that this is due to a lack of access to the debt markets rather than a strategic decision to do so.
- Credit rating agencies grew more cautious in their bond rating assignments during the course of the study period (1985-2009), as found by **Baghai, Servaes, and Tamayo (2014)**. U.S. companies are more likely to lower leverage, request fewer debt ratings, and store less cash as a result of stricter ratings.
- **Huang and Shen (2015)** claimed that downgraded and promoted enterprises modify their

capital structure in the same way. They also found that nations with more developed financial markets and stronger legal and institutional settings than weak ones have faster responses from businesses when ratings are increased or reduced.

- **Gupta (2021)** used panel data and cross-sectional methods to try to figure out what factors influence the credit ratings given to Indian enterprises over the long and short term. The credit ratings were the dependent variable, while the six financial elements were the independent variables in an ordered probit analysis. Corporate credit ratings were shown to be significantly correlated with size, profitability, and leverage in both panel data and cross-sectional analyses. Credit ratings were also affected most by size, then leverage, and finally profitability. The main result of this research was the development of two separate mathematical models, both of which perform quite well in terms of accuracy of prediction. Investors, academics, practitioners, and others might use these models to better understand the creditworthiness and security of diverse organizations and make more informed decisions.

Research Objectives

The objectives of the present study are:

- To assess the relationship between change in broad credit rating and capital structure of firms in Indian perspective.
- To assess the relationship between change in notch credit rating and capital structure of firms.
- To assess the relationship between change in speculative/investment grade credit rating and capital structure of firms in Indian perspective.

Research Methodology

The research design of the study is primarily descriptive in nature as the study aims to access the relationship between credit rating and leverage for which secondary data is being referred. Subsequently, the impact of various variables is tested through hypothesis by incorporating the panel least square regression method. Further, models have been tested and checked for problems like autocorrelation and multicollinearity which are usuallyassociated with the regression model.The study used three models to assess the relationship between credit rating and leverage:

Model 1	The impact of an actual wide rating change in the prior year (T-1) on the current year's capital structure (T)
Model 2	The impact of real notch rating change in the prior year (T-1) on the current year's capital structure (T)
Model 3	The impact of real rating change to investment or speculative grade on the current year's capital structure (T)

Figure 2: Models Used in the Regression

Data Collection and Population Size: For this study, the data has been collected from secondary sources like from CRISIL, company filings (annual reports/presentations) and various databases (like Bloomberg). The study examines the case of CRISIL rated listed nonfinancial companies in the National Stock Exchange (NSE)/ Bombay Stock Exchange (BSE) exchanges in India, during the period **2015 to 2022** to analyseany possible relationship between credit ratings and decision of capital structure.

This study started with all CRISIL rated companies' data which was available for close to 700 companies. Using BSE (**~4300 companies**) and NSE **(~1650 companies**) listed companies' database, it was found that **261 companies** are listed (out of 707 companies). Out of 261 companies, 66 are banks/financials companies. Diversified financials, Banks and insurance companies as defined by BSE/NSE/CRISIL are not included in the study. So, the final sample size for the study consists of **195 non-financial firms with 1203 firm-year observations**.

Variable used: Variables used in the regression modelsare based on the US market studies done by the **Kisgen (2006)** and Saudi market studies done by **Bora Aktan and others (2019)**:

Independent Variables	***BRup*** : Dummy variable equal to 1 if last year's broad credit rating score minus current year score is greater than 0; otherwise, equal to 0
	BRdown : Dummy variable equal to 1 if last year's broad credit rating score minus current year score is less than 0; otherwise, equal to 0
	NHup : Dummy variable equal to 1 if previous year notch credit rating score minus current year score is greater than 0; otherwise, equal to 0
	NHdown : Dummy variable equal to 1 if previous year notch credit rating score minus current year score is less than 0; otherwise, equal to 0
	IGSGup : Dummy variable equal to 1 if previous year investment-speculative grade score minus current year score is less than 0: otherwise, equal to 0
	IGSGdown : Dummy variable equal to 1 if previous year investment-speculative grade score minus current year score is greater than 0: otherwise, equal to 0
Dependent Variables	$NDIssue_{it} = (\Delta D_{i,t} - \Delta E_{i,t}) / A_{i,t}$ Where: $D_{i,t}$ = Book value of long-term debt plus book value of short-term debt for firm i at time t $E_{i,t}$ = Book value of total shareholders' equity for firm i at time t $A_{i,t}$ = Beginning-of-year total assets for firm i at time t
Control variable	SIZE: $Revenue_{it}$ LEV: $D_{it} / (D_{it}+E_{it})$ PROF: $Adj\ EBITDA_{it} / A_{it}$

Figure 3: Variables Used in the Research

Analysis & Discussion

Descriptive Statistics

Table 3: Summary of Number of Data Points

Number of companies	
CRISIL Rated (listed & unlisted)	707
NSE listed companies	1,639
BSE listed companies	4,331
Listed (out of 707)	261
Financial companies	66
Ex-financial Listed (out of 707)	195
LT Rating available	170
Period in years	8
Data points	1,360
Rating Data points available	**1,203**
Rating change cases	**146**

Source: CRISIL, BSE and NSE

The dataset comprises a diverse spectrum of 707 companies, all of which have undergone CRISIL rating assessments, encompassing both listed and unlisted entities. From this initial cohort, 261 companies have found their place on the prominent stock exchanges, namely the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). Notably, a meticulous refinement process culled the final sample to 195 non-financial companies listed on these exchanges, ensuring a focused investigation.To delve into the credit rating nuances, the dataset encapsulates credit ratings for 170 companies across an 8-year span, amounting to a total of 1,360 data points ripe for rigorous analysis. Within this corpus, a concentrated subset of 1,203 data points pertains specifically to credit rating information. Within this analytical framework, a significant 146 instances of credit rating modifications were observed, marking pivotal moments of change in the financial landscape. The below table provides CRISIL Rating grades by years.

Table 4: Rating Change Cases by Types and Years

	Total	**Up**	**Down**	**Notch Up**	**Notch Down**
2016	24	6	5	8	5
2017	23	9	2	11	1
2018	22	4	0	15	3
2019	19	3	4	6	6
2020	17	1	6	7	3
2021	19	2	3	13	1
2022	22	5	1	12	4
	146	**30**	**21**	**72**	**23**

Source: CRISIL

Broad rating change test: This model is based on the hypothesis that after recent downgrade or upgrade of broad rating,companies issue less debt relative to equity than companies that experienced no change in ratings

$$H_0: \beta_i \geq 0 \qquad i = 1,2$$

$$H_1: \beta_i < 0$$

To determine whether recent wide rating upgrades or downgrades have any impact on net debt issuance relative to equity, the following regression model has been used:

$$NDIssue_{it} = \alpha + \beta_1 BRup_i + \beta_2 BRdown_i + \varphi K_{it} + \varepsilon_{it}$$

Sample: 2016 2022
Periods included: 7
Cross-sections included: 33
Total panel (unbalanced) observations: 205

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.033223	0.016592	-2.002344	0.0466
BRUP	-0.013825	0.021655	-0.638396	0.5239
BRDOWN	-0.021531	0.028506	-0.755340	0.4509
SIZE	1.83E-07	8.23E-08	2.218907	0.0276
LEV	0.184496	0.028098	6.566181	0.0000
PROF	-0.557962	0.099099	-5.630351	0.0000

R-squared	0.274950	Mean dependent var	-0.035907
Adjusted R-squared	0.256733	S.D. dependent var	0.103555
S.E. of regression	0.089277	Akaike info criterion	-1.965304
Sum squared resid	1.586123	Schwarz criterion	-1.868045
Log likelihood	207.4436	Hannan-Quinn criter.	-1.925965
F-statistic	15.09278	Durbin-Watson stat	1.641194
Prob(F-statistic)	0.000000		

Source: Panel least square analysis using EViews software

Above regression model results related to broad credit ratings change indicate that both coefficients (β1 and β2) have negative signs; therefore, the alternative hypothesis is accepted and the null hypothesis is rejected. This indicates that that post recent broad credit rating downgrade or upgrade, companies issue less debt relative to equity vs.companies that undergone no change in ratings. Above results shows that that on an average companies issue close to 2% less debt relative to equity post broad credit rating downgrade (For example: downgrade from BBB to BB), and companies issue close to 1% less debt relative to equity after broad credit rating upgrade (For example: upgrade from A to AA). This result is inconsistent with the Credit Rating-Capital Structure hypothesis **(Kisgen 2006)** and earlier studies done for the US and Saudi Arabia's market.

Three control variables are used in the analysis: **Size (SIZE)**, **Profitability (PROF)** and**Leverage (LEV)**. If we remove the control variable, model is showing very less value of R-squared (less than 0.10) that signifies that these control variables (SIZE, PROF and LEV) are significant variables that need to be taken into account while analysing the impact of credit ratings on debt issuance.

In the above results, calculated F statistics is greater than the critical value (Prop), that implies that the model is statistically significant. Further, the adjusted R-squared (0.2567) is also in line with previous studies (US and Saudi markets) which were in the range of 0.28 to 0.38. Moreover, Durbin–Watson stat is 1.64 (around 2) which indicates that there is no serial correlation for the model.

Notch rating change test

This model is based on the hypothesis that after recent downgrade or upgrade of notch credit rating, companies issue less debt relative to equity than companies that experienced no change in rating

$$H_0: \beta_i \geq 0 \qquad i = 1,2$$

$$H_1: \beta_i < 0$$

To determine whether recent notch rating upgrades or downgrades have any impact on net debt issuance relative to equity, the following regression model has been used:

$$NDIssue_{it} = \alpha + \beta_1 NHup_i + \beta_2 NHdown_i + \varphi K_{it} + \varepsilon_{it}$$

Sample: 2016 2022
Periods included: 7
Cross-sections included: 65
Total panel (unbalanced) observations: 376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.024613	0.009984	-2.465304	0.0141
NRUP	0.001971	0.011879	0.165951	0.8683
NRDOWN	0.010407	0.020043	0.519256	0.6039
SIZE	-5.28E-08	4.89E-08	-1.080934	0.2804
LEV	0.134708	0.017904	7.523889	0.0000
PROF	-0.451979	0.062197	-7.266898	0.0000

R-squared	0.227570	Mean dependent var	-0.037694
Adjusted R-squared	0.217132	S.D. dependent var	0.081687
S.E. of regression	0.072276	Akaike info criterion	-2.400810
Sum squared resid	1.932833	Schwarz criterion	-2.338104
Log likelihood	457.3523	Hannan-Quinn criter.	-2.375918
F-statistic	21.80162	Durbin-Watson stat	1.720036
Prob(F-statistic)	0.000000		

Source: Panel least square analysis using EViews software

Above regression model results related to notch credit ratings change indicate that both coefficients (β1 and β2) have positive signs; therefore, the alternative hypothesis is rejected and the null hypothesis is accepted. This indicates that we cannot confirm that post recent notch credit rating downgrade or upgrade, companies issue less debt relative to equity vs. companies that undergone no change in ratings. Again, this result is inconsistent with the Credit Rating-Capital Structure hypothesis (Kisgen 2006) and earlier studies where it was found that companies are more concerned about broad rating changes as compared to notch rating changes. Further, generally, rather than the notch rating, regulations are more concerned or associated with broad credit ratings change.

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Similar with broad rating test, here also, three control variables are used in the analysis: **Size (SIZE), Profitability (PROF) and Leverage (LEV)**. If we remove the control variable, model is showing very less value of R-squared (less than 0.10) that signifies that these control variables (SIZE, PROF and LEV) are significant variables that need to be taken into account while analysing the impact of credit ratings on debt issuance.

In the above results, calculated F statistics is greater than the critical value (Prop), that implies that the model is statistically significant. Further, the adjusted R-squared (0.2171) is also in line with previous studies (US and Saudi markets) which were in the range of 0.28 to 0.38. Moreover, Durbin–Watson stat is 1.72 (around 2) which indicates that there is no serial correlation for the model.

Investment grade-speculative grade rating change test: This model is based on the hypothesis that After recent credit ratings change to investment or speculative grade, companies issue less debt vs. to equity than firms not close to the investment-speculative grade.

$$H_0: \beta_i \geq 0 \qquad i = 1,2$$

$$H_1: \beta_i < 0$$

To determine whether recent rating change to either investment grade to speculative grade or speculative grade to investment grade have any impact on net debt issuance relative to equity, the following regression model has been used:

$$NDIssue_{it} = \alpha + \beta_1 IGSGup_i + \beta_2 IGSGdown_i + \varphi K_{it} + \varepsilon_{it}$$

Sample: 2016 2022
Periods included: 7
Cross-sections included: 5
Total panel (unbalanced) observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.031285	0.038458	0.813508	0.4243
IGSGUP	-0.008622	0.085904	-0.100363	0.9209
IGSGDOWN	0.023207	0.060582	0.383058	0.7052
SIZE	1.94E-07	1.46E-06	0.133013	0.8953
LEV	0.028432	0.018466	1.539755	0.1373
PROF	-0.384429	0.278545	-1.380132	0.1808

R-squared	0.287017	Mean dependent var	0.035655
Adjusted R-squared	0.132020	S.D. dependent var	0.117482
S.E. of regression	0.109453	Akaike info criterion	-1.404653
Sum squared resid	0.275539	Schwarz criterion	-1.121765
Log likelihood	26.36747	Hannan-Quinn criter.	-1.316056
F-statistic	1.851763	Durbin-Watson stat	0.960531
Prob(F-statistic)	0.142380		

Source: Panel least square analysis using EViews software

Above regression result of either speculative grade to investment grade or investment grade to speculative grade broad rating changes indicate that coefficients β1 and coefficientsβ2 have different signs (β1 has negative sign, while β2 has positive sign); therefore, the null hypothesis is not rejected. This result implies that a recent upgrade to investment grade and net debt issuance have a negative relationship which is inconsistent with the Credit Rating-Capital Structure hypothesis (Kisgen 2006); however, a recent downgrade to speculative grade and net debt issuance has a positive relationship which is not consistent with earlier Credit Rating-Capital Structure hypothesis. This result can have impact due to small sample size as we found only 5 such incidences of all available data from CRISIL.

Similar with broad rating test, here also, three control variables are used in the analysis: **Leverage (LEV), Profitability (PROF) and Size (SIZE)**. If we remove the control variable, model is showing very less value of R-squared (less than 0.10) that proves that the control variables (LEV, PROF and SIZE) are significant variables that need to be considered while examining the impact of credit ratings on net debt issuance.

In the above results, calculated F statistics is greater than the critical value (Prop), that implies that the model is statistically significant.However, the value of adjusted R-squared (0.1320) is lower than earlier studies (US and Saudi markets) which were in the range of 0.28 to 0.38. Moreover, Durbin–Watson stat is 0.96 which indicates that there is positive serial correlation for the model. These results can have impact due to small sample size as we found only 5 such incidences of all available data from CRISIL.

Conclusion

The concept of credit rating serves as a critical mechanism for assessing the creditworthiness of debt issuers, enabling stakeholders to gauge an entity's ability to meet its financial obligations. For any company's management, credit rating is one of the key factors in taking financial decision, specially related to capital structure, as credit rating impacts the cost of borrowing as well as access to financial markets for any firm. However, there is no consensus among research finding that how credit rating affects the capital structure of any firm.

This study has adopted Kisgen's (2006) methodology for studying the impact of credit rating changes on capital structure of firms. Finding of this study is in consistent with Kisgen's (2016) and Bora & others (2019) studies related to broad rating changes. We have constructed three models to study changes. Based on the result of first model, we found that non-financial listed companies in India (listed on either Bombay Stock exchange or National Stock Exchange) on an average issue 1-2% less debt vs. equity post broad level ratings changes(For example: rating change from AAA to AA or AA to AAA). We found that in case of downgrade, companies issue 2% less debt relative to equity, while in case of broad rating upgrade, companies issue close to 1% less debt relative to equity. The possible explanation for this is related to potential cost-benefit associated with particular credit rating grade. Companies that have undergone recent broad rating upgrade may issue less debt to maintain or obtain the benefits of higher ratings as they do not want to be downgraded at earlier rating grade which may costs them more, while firms that have undergone recent broad rating downgrade may consider issuing relativelyless

amount of debt in order to evade the additional costs associateddue to the rating downgrade. Further, results of our second model revels that there is no evidence of less issue of debt relative to equity in case of notch rating changes (for example A+ to A-). This result is also in consistent with prior studies done for the US and Saudi Arabian markets. It implies that firms are less concern about change in notch changes in their rating as compared to broad rating changes. The possible explanation of this is related to the fact thatgenerally, rather than the notch rating, regulations are more concerned or associated with broad credit ratings change.Further, result of our third model was not inconsistent with the Credit Rating-Capital Structure hypothesis (Kisgen 2006) and indicated that there is a negative relationship between a recent credit rating upgrade to investment grade from speculative grade and issue of net debt. The possible explanation of this result is related to very small sample size in this case which might have impacted our result. Overall, this study had given new perspective to earlier studies by analysing and extending it for listed non-financial Indian companies.

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