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# Interrelationship between Capital Structure and Profitability with Special Reference to Manufacturing Industry in India

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# ABSTRACT

The determination of a company's capital structure constitutes a difficult decision, one that involves several and antagonistic factors, such as risk and profitability. That decision becomes even more difficult, in times when the economic environment in which the company operates presents a high degree of instability. Therefore, the choice among the ideal proportion of debt and equity can affect the value of the company, as much as the return rates can. This study analyses how far the capital structure (cs) affects the Profitability (p) of corporate firms in India. The study tries to establish the hypothesized relationship as to how far the cs affect the business revenue of firms and what the interrelationship is between cs and Profitability. This study is carried out after categorizing the selected firms into three categories based on two attributes, viz. business revenue and asset size. First, firms are grouped into low, medium and high based on business revenue. Second, firms are classified into small, medium and large based on asset size to establish the hypothesized relationship that cs has significant impact on Profitability of Manufacturing firms in India. Regression Analysis in addition to descriptive statistics such as Mean, Standard Deviation, and Ratios has been used. The study proves that there has been a strong one-to-one relationship between Capital Structure variables and Profitability variables, Return on Assets (ROA) and Return on Capital Employed (ROCE) and the Capital Structure has significant influence on Profitability, and increase in use of debt fund in Capital Structure tends to minimize the net profit of the Manufacturing firms listed in Bombay Stock Exchange in India.

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# Introduction

Investment opportunities have expanded and financing options have widened in a wake of liberalization and globalization of economic policies across the world, and above all dependence on capital markets has increased. A new business requires capital and still more capital is needed if the firm is to expand. The required funds can come from many different sources and by different forms. Firms can use either debt or equity capital to finance their assets. The best choice is a mix of debt and equity. One of the most perplexing issues facing financial managers is the relationship between capital structure (cs), which is the mix of debt and equity financing, and stock prices. The debt is advantageous (relative to equity) if Debt Equity Ratio (der > 1), otherwise it is harmful.

A pecking order framework is intended to explain variations in Capital Structure (Myers 1984). The issue of external equity is seen as being the most expensive and also dangerous in terms of potential loss of control of the enterprise by the original owner-managers. The information advantage of the corporate managers will be minimized by issuing debt. Optimistic managers, who believe the shares of their firms are undervalued, will prefer immediately to issue debt and to avoid equity issue. As the requirement for external financing will increase, the firm will work down the pecking order, from safe to riskier debt, perhaps to convertible securities or preferred stock and finally to equity as a last resort (Myers and Majluf 1984). The modern theory of cs began with the paper of Modigliani and Miller (1958). They (mm) pointed out the direction that such theories must take by showing under what conditions the cs is irrelevant. Since then, many economists have followed the path they mapped. Now, some 50 years later, it seems appropriate to take stock of where this research stands and where it is going. Some other recent surveys include Taggart (1977), Masulis (1983), Miller (1988), Ravid (1988) and Allen (1991) and comments on Miller (1977) by Bhattacharya (1979), Modigliani (1982), Ross (1977), and Stiglitz (1974) and Masulis (1980), which are general surveys. Allen (1991) focuses on security design, and Ravid (1988) concentrates on interactions between cs and product market.

# Statement of the Problem, Significance and Scope

The present study mainly analyses how far the cs affects the profitability of corporate firms in India. Asset size and business revenue would appear to be the important factors in determining the profitability of corporate firms. First, firms are grouped into low, medium and high based on business revenue. Second, firms are classified into small, medium and large based on asset size to establish the hypothesized relationship that cs has significant impact on Profitability of Manufacturing firms in India.

The study constitutes an attempt to provide an empirical support to the hypothesized relationship between cs and does the cs affect the business revenue of firms, and what is the **interrelationship between cs and Profitability**?

# **Objectives and Hypotheses of the Study**

#### The present study is intended

1)To study the factors influencing cs of select firms based on asset size and business revenue.

2)To analyze the interrelationship between cs and Profitability based on asset size and business revenue.

cs on Profitability of Manufacturing firms in India? How far

H<sup>1</sup>O: There is no significant relationship between selected cs variables and Return on Asset (ROA) of Low Income Manufacturing firms, Medium Income Manufacturing firms, and High Income Manufacturing firms.

H<sup>2</sup>O: There is no significant relationship between selected cs variables and ROA of Small Size Manufacturing firms, Medium Size Manufacturing firms, and Large Size Manufacturing firms.

H<sup>3</sup>O: There is no significant relationship between selected cs variables and Return on Capital Employed (ROCE) of Low Income Manufacturing firms, Medium Income Manufacturing firms, and High Income Manufacturing firms.

H<sup>4</sup>O: There is no significant relationship between selected cs variables and ROCE of Small Size Manufacturing firms, Medium Size Manufacturing firms, and Large Size Manufacturing firms.

 $H^5O$ : There is no significant relationship between selected cs variables and ROA of Overall Manufacturing firms.

H<sup>6</sup>O: There is no significant relationship between selected cs variables and ROCE of Overall Manufacturing firms.

#### **Review of Literature**

Berger, A. N. (2002) findings are consistent with the agency cost hypothesis-higher leverage, or a lower equity capital ratio is associated with higher profit efficiency, all else being equal. The relationship between performance and leverage may be reversed when leverage is very high due to the agency cost of outside debt. Profit efficiency is responsible to ownership structure of the firm consistent with agency theory and their argument that profit efficiency embeds agency costs. Hung (2002) found that high gearing reflects more of low equity base than high level of debts, which indicates that capital gearing is positively related with asset but negatively with profit margins.

Pandey's (2002) findings vindicated the saucer-shaped relationship between cs and Profitability because of the interplay of agency costs, costs of external financing and interest taxshield, and proved that the size and tangibility have a positive influence and growth, risk and ownership have a negative influence on cs. Bhaduri (2002) stated that the optimal cs choice can be influenced by factors such as growth, cash flow, size and product and industry characteristics, and confirmed the existence of restructuring costs in attaining an optimal cs. Voulgaris, Asteriou and Mirigianakis (2002) found that the growth of asset utilization, gross as well as net profitability, and to- tal assets have a significant effect on the cs. Ronny and Clarirette (2003) supported the pecking order theory and rejected the trade-off theory of cs. Further, the small role played by the Mauritian capital market as a source of long-term finance is evident from the results with respect to a number of explanatory variables including age, growth, risk and profitability. The strong and positive results for the size variable are consistent with the findings of other studies and with the trade-off theory.

Sarkar and Zapatero (2003) suggested that the speed of reversion differs by competitive environment and the time-series applications support the notion that the profitability is decreasing with the speed of reversion in profitability. Strebulaev (2003) argued that even though a positive relation between profitability and the optimal leverage ratio can be expected, there is a negative relation between profitability and the actual leverage ratio. Be- cause of transaction costs, firms do not rebalance their leverage ratios constantly; instead, they allow them to move within a range surrounding the optimal leverage ratios. Mesquita and Lara (2003) stated that the choice between the ideal proportion of debt and equity can affect the value of the company, as much as the return rates can. The results indicate that the return rates present a positive correlation with short-term debt and equity, and an inverse correlation with long-term debt. Azhagaiah and Premgeetha (2004) suggested that the rapid ability to acquire and dispose of debt provides the desired financial flexibility of firms with a goal for growth. The non-debt tax shield and growth rate are statistically significant, which means that these variables are the major determinants of the cs of Pharmaceutical Companies in India.

Hennessy and Whited (2005) argued that the dynamic tax considerations can also cause a negative relation between profitability and leverage ratios. Therefore, these firms are more likely to face internal fund-debt financing decisions. On the other hand, less profitable firms, due to lack of internal funds, are more likely to face the debt-equity financing decisions, and show that debt financing is relatively less attractive in the debtequity financing decision because of different tax rates. Pandey (2004) predicted that there will be a nonlinear relationship between cs and profitability. Firms at a lower level of profitability would employ more internal funds, as external funds are expensive and on debt tax shield (such as depreciation) may be more than enough to take advantage of tax benefits.

Chen and Zhao (2004) suggested that dynamic tax considerations are unlikely to be the main reason for the negative relation between profitability and leverage either. Deesomsak (2004) suggested that the cs decision of firms is influenced by the environment in which they operate, and finds a significant but diverse impact on firms' cs decision. Loof (2004) found the ideas that the more unique a firm's asset, is the thinner the market is for such assets. Hence one may expect that uniqueness be negatively related to leverage.

Voulgoaris, Asteriou and Mirigianakis (2004) found that the prof- itability is one of the major determinants of cs for both smes and lses size groups. However, efficient assets management and assets growth are found essential for the debt structure of lses as opposed to efficiency of current assets (cas), size, sales growth and high fixed assets, which were found to affect substantially the credibility of smes. Joshua (2005) revealed a significantly positive relationship between the ratio of short term debt to total assets and roe. Song (2005) indicated that most of the determinants of cs suggested by cs theories appear to be relevant for Swedish firms. But one also finds significant differences in the determinants of long and short term forms of debt.

Harrington (2005) supported the theories of cs, which indicates that profitability is an important determinant of leverage. The results suggest that manufacturing firms in concentrated industries have a slower rate of mean reversion in profitability when compared to firms operating in a more competitive environment. Huang and Song (2006) found that, as in other countries, leverage in Chinese firms increases with firm size and fixed assets, and decreases with profitability, non-debt tax shield, growth opportunity, managerial shareholdings correlate with industries, and found that the ownership or institutional ownership has no significant impact on cs. Tang (2007) found that fixed assets, growth opportunities, and the joint effect of these two variables are the significant long-term debt determinants of the lodging industry.

Raheman, Zulfiqar and Mustafa (2007) indicated that the cs of the non-financial firms listed on Islamabad Stock Exchange have a significant effect on the profitability of these firms. Dragota and Semenescu (2008) proved that the pecking order theory seemed to be more appropriate for the Romanian capital market, but the signaling theory was not entirely rejected. Though many research studies have been undertaken in the field of cs and Profitability, very few studies have been undertaken to find the impact of cs on Profitability.

# Methodology

#### Sources of data

Secondary data were used for the study. The required data were collected from CMIE (Centre for Monitoring Indian Economy) Prowess Package.

The public Ltd firms with Low Income, Medium Income and High In- come groups based on the level of income from business, i. e., firms with Income < Rs.25 crore as Low, Income between Rs.25 crore and Rs.100 crore as Medium, and firms with business Income > Rs.100 crore is categorized as High income group. Firms with Total Assets (tas) worth below Rs.25 crore are termed as 'Small Size Firms,' firms with tas worth Rs.25 crore and above, but below Rs.100 crore are considered as 'Medium Size Firms,' and firms with tas worth Rs.100 crore and above are classified as 'Large Size Firms.'

#### Sampling design

Considering the availability of data and firms listed continuously for all the 8 years (2004–2005 to 2011–2012), 116 firms were selected as a sample (out of 116 firms removing the outliers of 6 firms i. e., the firms with extreme values are removed). Finally a sample of 110 Manufacturing firms was chosen by the Multi-Stage Sampling Technique.

# **Tools Used for Analysis**

The Statistical Techniques used for analysis are Pearson's Coefficient of Correlation (to analyze the relationship between cs and Profitability), Regression Analysis (ols Model to analyze the unique impact of cs on Profitability) in addition to descriptive statistics such as Mean, Standard Deviation, and Ratio.

Two dependent variables, Return on Assets (ROA) and Return on Capital Employed (ROCE) are considered as profitability variables (business revenue) for the study. The independent variables of Total Debt to Total Assets (td\_ta) and Debt-Equity Ratio (der) have been used as proxy for cs. The controlled variables, Expenses Ratios (exp\_inc) and Current Ratios (ca) are also used.

Independent and Dependent variables  $o^{\beta}$  the selected sample firms for the period of study:

# **Correlation analysis**

# **Multiple Regression Equation Model**

 $Ye = a + b1 \exp_{inc} + b2 td_{da} + b3cr + b4 der + e$ , where Ye =Profitability variables (ROA & ROCE),  $exp_{inc} = Expenses -$ Income,  $td_{ta} =$  Total Debt - Total Asset, cr = Current Ratio, a = Intercept, b1 ... b4 = Estimated Coefficient, and e = Residual Error.

#### Period of the Study

The data for a period of 8 years ranging from 2004–2005 to 2011–2012 have been collected and considered for analysis. Not all the Manufacturing firms were continuously listed, and the availability of data for the years together for the Manufacturing firms is 8 years.

#### Limitations and Scope for Further Study

• Analysis of the study is based on finance data collected from the CMIE Prowess Package. The quality of the study depends purely upon the accuracy, reliability and quality of secondary data. **0** 

• A detailed trend covering a lengthy period could not be done due to lack of resources.

• For the availability of data and analysis, the size of sample is also restricted to 110, out of 116 software firms. The analysis is based on business revenue (low income below Rs.25 crore, medium in- come between Rs.25 to Rs.100 crore and high income – above Rs.100 crore); based on assets size (small size below Rs.25 crore, medium size between Rs.25 to Rs.100 crore and large size above Rs.100 crore) to make the sample distribution somewhat normal, removing firms with unrealistic value (outliers); 110 firms were ultimately selected..

#### Industry Analysis and Major Findings

The study is based only on manufacturing firms. Therefore, the inferences and results will be of much use for further analysis by covering firms in other sectors also.

• Studies could be carried out covering other firms, and varying inferences could be ascertained.

• Studies could be carried out to find out whether there is any significant relationship between sizes of corporate firms other than manufacturing firms in respect of cs and Profitability.

• Studies could also be carried out in order to find out whether there is any significant relationship between fixed assets, assets structure, investment, and volatility, advertising expenditure, the probability of bankruptcy, and uniqueness of the product, earnings volatility of corporate firms etc., in respect of cs and Profitability.

In respect of the relationship between cs and Profitability of the small size Manufacturing firms, the correlation of exp\_inc with ROA, and that of td\_ta with ROA is negatively significant; and that of td\_ta with ROA. Among the individual  $\beta$  Coefficient, only the Coefficient of expense ratio ( $\beta = -0.2018$ , t = -10.44, p 0 < 0.01) and Coefficient of td ta ( $\beta = -0.1940$ , t = -4.05, p < 0.01); (R2 = 0.3426, F = 30.62, p < 0.01) is negatively significant (see table 2). Hence, H2O: 'There is no significant relationship between selected cs variables and ROA of Small Size Manufacturing firms' is rejected. Profitability of medium size Manufacturing firms is inversely affected by the use of debt fund in cs, the  $\beta$  Coefficient with negative sign, (-0.0978) for exp inc (t = -6.37, p < 0.01), ( $\beta = -0.0574$ ) for td ta (t = -2.50, p < 0.01), ( $\beta = -0.2043$ ) for cr (t = -3.03, p < 0.01) and ( $\beta =$ -2.2249) for der (t = -2.31, p < 0.01) are significant. Hence,  $H^2O$ : in respect of medium size manufacturing firm is rejected.

The increase in use of debt fund in cs tends to reduce the net profit scaled by tas for large size Manufacturing firms. The ROA is negatively significant, correlated with der; td\_ta; der; exp inc ( $\beta$  = -0.9763, t = -16.66, p < 0.01); der ( $\beta$  = -8.7959, t = -2.38, p < 0.01). Hence, H<sup>2</sup>O in respect of Large Size Manufacturing firms also is rejected. The relationship between cs and Profitability for all selected Manufacturing firms [ROA with exp\_inc, td\_ta; cr is negatively significant. Profitability measured as a net profit relative to tas tends to decline with increase in td proportionate to tas when there has been an increase in er, and cr. The  $\beta$  Coefficient, (-0.1789) for exp\_inc ( $\beta = -0.1789$ , t = -13.83, p < 0.01); ( $\beta = -0.0954$ ) for td ta (t = -4.68, p < 0.01), and  $\beta$  = -0.1542, t = -2.80, p < 0.01 for cr are negatively significant (see table 2). Hence H<sup>5</sup>O: 'There is no significant relationship between selected cs variables and ROA of Overall Manufacturing firms' is rejected. There is no significant relationship between selected cs variables and ROCE of low income manufacturing firms.

Profitability by capital employed is inversely and significantly influenced by expenditure and independent of the cs of low income Manufacturing firms Hence,  $H^{3}O$  'There is no significant relationship between selected cs variables and ROCE of low income Manufacturing firms' is accepted. The fit of regression is good (F = 24.12 at 1% level), however the R2 value is very low (0.2137), which gives support for accepting the  $\mathrm{H}^{3}\mathrm{O}$ .

However, there is a significant relationship between cs variables and ROCE for medium income Manufacturing firms (R2 = 0.5650, F = 50.34, p < 0.01). The negative sign for td\_ta and der indicates that the proportion of debt in cs plays a vital role in net earnings and increase in use of debt fund in cs, which tends to significantly reduce the net earnings of this group of firms. Hence, H<sup>3</sup>O in respect of medium income manufacturing firms is rejected. There is a significant relationship between use of debt fund in cs and ROCE of High income Manufacturing firms (R2 = 0.1588, F = 13.74, p < 0.01). Hence, h3 in respect of High income manufacturing firms is also rejected. The profitability of small size Manufacturing firms is inversely affected by the use of debt fund in cs. ROCE is significant with R2 value of 0.3641 and with F value of 33.63 (p < 0.01); (exp inc) ( $\beta = -0.1747$ , t = -8.92, p < 0.01); and there is an increase in td proportionate to tas ( $\beta = -0.3761$ , t = -7.75, p < 0.01). The profitability measured by ROCE is negatively significant, affected by the use of debt fund in cs for small size manufacturing firms. Hence, H<sup>4</sup>O: There is no significant relationship between selected cs variables and ROCE of Small Size Manufacturing firms is rejected. The increase in use of debt fund in cs tends to reduce the net earnings significantly for medium size manufacturing firms. The results of regression on ROCE with expense, liquidity and cs ratios for medium size Manufacturing firms (exp inc) ( $\beta$  = -0.0663, t = -4.69, p < 0.01); cr ( $\beta$  = -0.2103, t = -3.38, p < 0.01); and der ( $\beta$  = -2.8458, t = -3.20, p < 0.01) is negatively significant at 1 per cent level, and that of td\_ta ( $\beta = -0.0492$ , t = -2.33, p < 0.01). Hence, H<sup>4</sup>O in respect of Medium Size Manufacturing firms is rejected. The use of debt fund in cs of large size manufacturing firms is less profitable.

The results of regression for ROCE with selected explanatory variables for large size Manufacturing firms (R2 = 0.3173, F = 31.02, p < 0.01) are negatively significant. The large size Manufacturing firms with use of more debt fund in cs are less profitable during the study period. Therefore, H<sup>4</sup>O in respect of Large Size Manufacturing firms is rejected. The net profit against capital employed tends to decline with the increase in te, td, cas, and cls, and the  $\beta$  Coefficient for all explanatory variables, except for der are negatively significant. ROCE with exp inc (r = -0.3763, p < 0.01), td ta, cr, and ROA. The  $\beta$ Coefficient, (-0.1240) for exp inc, t = -11.11, p < 0.01); ( $\beta =$ -0.0979) for td ta (t = -5.56, p < 0.01), and  $\beta = -0.1700$ , t = -3.57, p < 0.01 for cr are negatively significant. It is inferred that cs has a significant impact on profitability of manufacturing firms in India. Hence, H<sup>6</sup>O: There is no significant relationship between selected cs variables and ROCE of Overall Manufacturing firms is rejected.

#### Conclusion

Based on the business revenue, the study proves that low income Manufacturing firms with low expenses are highly profitable, but profitability of these groups of firms is independent of the level of debt fund in their cs. Therefore, profitability by capital employed is inversely and significantly influenced by expenditure and is independent of the cs of low income manufacturing firms. The medium income Manufacturing firms have performed well by generating substantial income with less debt.

The cs of manufacturing firms with medium income from business have a significant impact on profitability. The proportion of debt in cs plays a vital role in net earnings, and the increase in use of debt fund in cs tend to significantly reduce the

net earnings of this group of firms. Manufacturing firms belonging to the high business revenue group have shown better performance in managing cs but most of the revenue has been expended. Hence the use of debt fund in cs has a significant negative impact on profitability generated through application of assets in the case of High income manufacturing firms. On the whole, it is inferred that the increase in td proportionate to ta tend to decrease the net earnings relative to capital employed when there has been an increase in total expenses and increase in use of cas for Manufacturing firms belonging to the high business revenue group. Based on the size of business, it is inferred that the small size Manufacturing firms have not performed well in generating revenue. Profitability is inversely affected by the increase in total expenses and increase in td proportion- ate to tas. CS has a significant unique impact on profitability when there has been a remarkable negative influence of total expenses on profitability for small size manufacturing firms. On the whole, it is found from the regression results that profitability measured by ROCE is significantly negatively affected by use of debt fund in cs for small size manufacturing firms.

In respect of manufacturing firms belonging to the medium size group, the study proves that the net earnings have stood at 10 per cent to their tas and capital employed, and debt in cs is lesser for medium size Manufacturing firms. Therefore, the profitability of medium size manufacturing firms is inversely affected by the use of debt fund in cs, and the increase in the use of debt fund in cs tends to decrease the net income significantly. The increase in the use of debt fund in cs tends to reduce the net earnings significantly for medium size manufacturing firms. As far as the large size Manufacturing firms are concerned, the study reveals that the large size Manufacturing firms have never relied on debt fund in their cs. They have yielded better net profit by use of less debt fund. Further, the increase in the use of debt fund in cs tends to reduce the net profit scaled by tas for large size Manufacturing firms in India, and they, by use of more debt fund in cs, are less profitable during the study period.

**0** The relationship between cs and Profitability, as well as the unique impact of cs on Profitability across the classes by income and assets reveals that the profitability of selected Manufacturing firms listed in BSE decreases significantly with decrease in either spending out of business revenue (exp\_inc) or decrease in total debt proportionate to tas or decrease in cr. cs has a significant impact on profitability of Manufacturing firms in India.

Hence, it is concluded that there has been a strong one-toone relationship between cs variables and Profitability variables (ROA and ROCE), and the cs has a significant influence on Profitability, and increase in the use of debt fund in cs tends to reduce the net profit of the Manufacturing firms listed in Bombay Stock Exchange in India

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# Table 1 Results of Regression Analysis for Return on Assets (ROA) of low Income, medium income, and high income Manufacturing Firms

Variable	Coefficient for low	Coefficient for Medium	Coefficient for High
	income firms	income firms	income firms
Intercept	16.7369	101.2607	126.4997
exp_inc	0.1037	-0.8993	-1.1508
td_ta	-0.0258	0.2309	0.0010
Cr	-0.0241	-0.2829	-0.0610
Der	-0.0536	-1.5052	-11.6766
R2	0.2270	0.7728	0.5792
Adjusted R2	0.2183	0.7669	0.5734
F Statistic	26.07	131.78	100.15
P Value (F Statistic)	0.000	0.000	0.000

 Table 2
 Results of Regression Analysis for Return on Asset (roa) of small size, medium size, large size and overall Manufacturing

Firms						
Variable	Coefficient for	Coefficient for	Coefficient for Large	Coefficient for		
	small size firms	Medium size firms	size firms	<b>Overall firms</b>		
Intercept	28.4528	24.4195	110.3241	34.7189		
exp_inc	-0.2018	0.0978	-0.9763	-0.1789		
td_ta	0.1940	-0.0571	-0.0272	-0.0954		
cr	0.0308	-0.2043	0.2050	-0.1542		
der	0.0417	-2.2249	-8.7959	-0.2660		
R2	0.3426	0.1853	0.5783	0.2282		
Adjusted R2	0.3315	0.1744	0.5720	0.2244		
F Statistic	30.62	17.00	91.55	59.94		
P Value (F Statistic)	0.0000	0.0000	0.0000	0.0000		

 Table 3 Results of regression analysis for return on capital employed (ROCE) of low income, medium income, and high income

 Manufacturing Firms

0						
Variable	Coefficient for low	Coefficient for Medium	Coefficient for High			
	income firms	income firms	income firms			
Intercept	12.4991	78.9195	53.4934			
exp_inc	0.0797	-0.5890	-0.3290			
td_ta	-0.0192	-0.4669	-0.1745			
Cr	-0.0133	-0.4984	-0.7391			
Der	0.1149	-3.2573	5.0630			
R2	0.2137	0.5650	0.1588			
Adjusted R2	0.2048	0.5538	0.1473			
F Statistic	24.12	50.34	13.74			
P Value (F Statistic)	0.0000	0.0000	0.0000			

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