IMPACT OF WORKING CAPITAL MANAGEMENT AND CAPITAL STRUCTURE ON PROFITABILITY: THE CASE OF KSE QUOTED AUTOMOBILE FIRMS*

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Abstract

For any business concern the net profit or bottom line for a particular time period is the end result of its investing, financing and operating activities. These activities can be visualized as being influenced by management's decisions and a host of internal and external environmental factors. This paper investigates how profitability of firms, in the automobile sector of Pakistan, is influenced by working capital management and capital structure of firms. The current ratio was taken as representative of the result of working capital management policy and financial leverage as the benchmark for capital structure. Supplementary analysis was also undertaken to assess the impact of operating leverage and firm size on profitability. The purpose of the research was to determine empirically, using pooled data analysis, whether the linkage of profitability with the selected indicators, is in line with the relevant generally accepted finance theory. Furthermore, the conclusions arrived through data analysis could be used in formulating some policy recommendations for a better management of profitability by automobile sector firms in Pakistan.

Key Words: Profitability, Operating Leverage, Financial Leverage, Firm Size, Liquidity, Pakistan's Automobile Industry, Panel Data
JEL Classification: C23, G32, G33

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I. Introduction

For managing liquidity efficiently, a company's management has to decide on the optimum level of current assets and current liabilities that it should carry. A comprehensive ratio which captures the relationship between the level of current assets and current liabilities is the current ratio, calculated as current assets / current liabilities. In this study, current ratio has been used as the indicator for firm liquidity.

Operating leverage measures the degree to which a business organization relies on fixed operating costs in its pursuit for maximizing its operating profit. Increase in profits results from spreading a given level of fixed operating costs over a larger number of units of the product. Thus, the degree of operating leverage is higher in those companies whose operating costs include a higher percentage of fixed operating costs. On the other hand companies whose operating costs comprise a relatively high percentage of variable costs have a low operating leverage.

The operating breakeven point is higher for companies with a larger proportion of fixed operating costs. This makes such companies more risky because if the level of sales is not sufficiently high, the fixed operating costs may not be adequately covered, thereby resulting in an operating loss or a low operating profit. Thus, while a high degree of operating leverage will increase operating profit in times of rising sales; operating profits will reduce rapidly when sales are showing a declining trend. A similar impact can be visualized on the bottom line or net profit for a company with a high degree of financial leverage. For the foregoing reasons, a company having high operating costs as percentage of its total costs and also having a high financial leverage, will expose investors to a high risk. It is, therefore, important to realistically forecast future sales, if risk is to be contained. If sales are not sufficiently high to adequately cover fixed costs, operating profit may be so low that fixed interest charges are not covered. This would result in a net loss or a negative return on equity.

Financial leverage is similar in nature to operating leverage except for the fact that the fixed cost in this case is the interest or financial charges and the positive effect is on earnings before tax. Financial leverage is higher in those companies which finance a larger percentage of their assets through debt. Conversely, financial leverage decreases as a company reduces debt financing and it's increases equity financing. Thus, the degree of financial leverage will be zero for an all equity financed company. Companies may opt for higher financial leverage for various reasons, e.g. their expectation of a poor response from the investing public for new equity issues or the advantage of tax shield on debt funds.

Firm size may possibly influence company profitability, liquidity and cash gaps. In our analysis, natural log of sales was taken as the proxy for company size (SZ). This helps in smoothing out changes in sales occurring across the years under review.

The empirical findings of the study are based on panel data of automobile sector companies listed on the Karachi Stock Exchange for the years 2000 to 2008. The core objectives of the study are two fold: First, to estimate whether the size of the company, operating leverage, financial leverage and liquidity exhibit a statistically significant linkage with profitability of the companies. Second, to ascertain whether automobile sector companies have some distinct traits which are different from other industries and vary from the generally accepted theory. By its nature, the automobile industry is a relatively capital intensive industry and needs heavy financial investment both for establishing a new manufacturing unit and for balancing, modernization or expansion of an existing unit.

The paper is divided as follows: Section 2 presents a brief industry profile. Section 3 presents the theoretical basis for the analysis and reviews some recent empirical studies in this area. Section 4 details the methodology, explanation of the variables, the econometric model and the data employed in the study. The estimated results are reported in Section 5. Finally, Section 6 concludes and presents the main findings with some policy recommendations.

II. The Background of Pakistan's Automobile Industry

Following international trends, the automobile industry in Pakistan showed substantial growth in the years under review. The growth was aided by favourable government policies during this period and levy of lower import duties on raw material input and on intermediate products. A significant rise in the demand for automobiles, propelled at least partly by easy availability of auto leases and loans from banks and leasing companies at low financial cost, was instrumental in the fast growth of the sector. The expansion in the sector, besides boosting the country's industrial output, also provided significant direct and indirect employment opportunities.

Since the fiscal year 2001, there has been a high growth of more than 40 percent per year in the automobile market. The growth declined somewhat in 2008 and 2009 due mainly to a dip in demand because of rising prices and lease financing becoming expensive for consumers. This phenomenon resulted from a steep depreciation of Pakistan's currency viz a viz international currencies and increase in market interest rates / inflation. The growth in the automobile sector had naturally also given impetus to the allied automobile vendor industry, which also faced problems due to the recent fall in demand.

III. Leverage and Profitability: A review of the literature

The linkage of profitability to capital structure is seen differently by the two theories presented by Myers in 1984. These are the Static Trade-off Theory (STT) and Pecking Order Theory (POT). STT postulates that a company's capital structure is based on a target debt-equity ratio which is arrived at by evaluating the costs and benefits linked to level of debt. Determinants identified include tax impact, agency costs, financial distress costs etc. On the other hand, POT holds that companies base their capital structure on a hierarchy of decisions. They first use internal funds (retained earnings) for their financing needs. If fund requirements for investment projects can not be fully met from internal sources, a company goes for debt financing, while issuing equity would be considered as a last option for external financing. This means that as per POT, companies operating profitably, would generally not resort to debt financing for their new projects, since they have sufficient internal funds available for the purpose. On the other hand, according to STT, profitable companies would prefer raising debt financing to avail the benefit of tax shield on borrowed funds. Thus, STT supposes a direct relationship between profitability and leverage, while POT expects an inverse linkage between them. Moreover, STT argues that larger size companies would show greater preference for debt financing due to lower chances of going bankrupt. This is supported by the assumption that larger firms are more diversified, which also reduces the bankruptcy probability (see for details Titman and Wessels – 1988).

The signaling theory which was first presented by Ross (1977) argues that raising debt can be taken as a signal to the capital markets that a company is confident that its future net cash flows after debt servicing, are going to be positive. This is because a company is contractually bound to service its debt i.e. pay interest and repay principal from its cash flows. Thus, a higher level of debt reflects the management's as well as investor's positive expectations in respect of future cash flows of the company. With reference to POT, the issuance of equity by a company, rather than debt for financing its new projects, sends a negative signal to the market. This is because managers are expected to have more and superior information on the company and may, therefore, be tempted to issue equity when it is overpriced, thereby hurting the interests of equity investors.

Modigliani and Miller (1958) in the first version of their paper tried to identify the effect of capital structure on earnings and market value. They argued that in an economy without corporate and personal taxes, capital structure does not matter. In other words, they proved on the basis of a restrictive set of assumptions, that an un-leveraged firm has the same market value as a leveraged firm. They later added corporate taxes to their model and then demonstrated that earnings and market value of the firm can only be maximized by using 100% debt in their financing mix. Their findings were based on the assumptions that business risk can be fairly gauged by the standard deviation of operating income (EBIT) and also that all present and prospective investors have homogeneous expectations about corporate earnings and the riskiness of those earnings. They also assumed that capital markets in which companies' stocks and bonds are traded are perfect. Their most important assumption was that the debt of firms and individuals was riskless, so the interest rate on debt was a risk-free rate. Their model with corporate taxes demonstrated that benefits from debt arise because of tax deductibility of interest payments.

Gahlon and Gentry (1982) developed a model for estimating beta which is a measure of riskiness of an asset as compared to the risk of a market portfolio. The variables used in the model incorporated both operating and financial leverage as measured by DOL (degree of operating leverage) and DFL (degree of financial leverage). The model focused on the impact of operating and financing decisions on an asset's systematic risk and valuation. The model's findings confirmed that DOL and DFL are representative of asset risk and beta was shown to be a function of DOL / DFL.

The study by Mandelker and Rhee (1984) provides evidence regarding the linkage between DOL, DFL and beta. They proved empirically that between 38 to 48 percent changes in a cross-section of data are explained by DOL and DFL.

Mseddi and Abid (2004) explored the connection between company value and risk.They used panel data to estimate DOL and DFL of 403 non-financial USA firms over the period 1995 to 1999. They reported that both financial and operating risk have a significant positive impact on company value. They further provided evidence showing that the excess return is a positive and increasing function of DOL, DFL and systematic risk for all firms in the sample that exhibit a positive correlation between sales changes and market portfolio returns. Eljelly and Abuzar (2004) empirically examined the linkage of profitability with liquidity, as indicated by the current ratio and cash cycle (Inventory turnover in days + Receivables turnover in days – Payables turnover in days). They studied a sample of Saudi Arabian companies taken from the major economic sectors, excluding power generation and banking, covering the years 1996 to 2000.The correlation and regression analysis demonstrated a significant inverse relationship between company profitability and liquidity, while a direct strong relationship was identified between company size and profitability. This relationship, however, was more prominent within industrial sectors but not across all companies. Liquidity and size have more influence on profitability of capital intensive industrial sectors as compared to their impact on service sector organizations. Amongst the indicators of liquidity, the strongest influence on profitability was of the current ratio (CR), irrespective of industrial sector. However, when sectors were analyzed separately, liquidity indicated by the cash cycle was found to have a more significant impact on profitability. However, this impact was of lesser significance for service sector or labour intensive companies but more significant in case of manufacturing sector or capital intensive companies.

Larry et al. (1995) found an inverse relationship between a company's leverage and its growth rate. This relationship was more pronounced in the case of companies whose true growth potential was not given due recognition by capital markets or their perceived value was considered lower than that needed to override the effect of debt overhang. They also confirmed that leverage did not adversely affect growth of companies which were reputed to be highly profitable. For studying the leverage and growth linkage, data used covered a long time period of 20 years.

Employing regressions of investments on distinct parts of company cash flows, they found that reduction in operating flows did not adversely affect investment to such an extent as was the case when a comparable cash outflow was needed for debt servicing. The extent of leverage used depends on the management's own assessment of future growth. Thus, managers anticipating profitable growth opportunities might feel that raising external funds and subsequent associated cash outflows could be an impediment to growth. Resultantly, an inverse relationship between leverage and profitability could arise because of high growth companies' management's deliberate preference for a low leverage capital structure.

IV. Variable Description, Methodology, and Sample

This section explains the ways in which the variables are calculated and presents the null hypotheses, alongwith the methodology used to test the hypotheses besides discussing sample / data sources.

Explanation of Variables

Following the work of Eljelly and Abuzar (2004), we used four variables namely, size of the firm, DOL (degree of operating leverage), DFL (degree of financial leverage) and liquidity of the firm in our econometric model (as explained below) to identify their relative impact (negative or positive) on profitability of the automobile assembler firms. The measurement of the variables, in particular such as profitability, operating and financing leverage, itself is a matter of contention between financial economists and practitioners. Differences exist both in definition and method of computation of these variables. However, to be the part of that debate is beyond the scope of the study. Following the existing literature, we adopted simple but effective measures of the said variables.

Profitability (as a Dependent Variable)

Profitability refers to the ability of a company to earn profit. It is a relative measure of success for a business. We measured profitability (PF) as earning before interest and taxes (EBIT) and used it as a dependent variable in multivariate regression analysis to explore the relationship of the said variables with company profitability.

Size of the Firm

Company profitability, liquidity and cash cycle may possibly be influenced by firm size in more than one way. For instance, big companies may secure quantity discounts from inventory suppliers since they can afford to purchase larger quantities. Also these companies might be more successful in negotiating a longer repayment period. Furthermore, bigger size companies can be expected to be more resourceful and, therefore, efficient in collecting receivables from their own credit customers. All these factors contribute towards the greater ability of larger companies in maintaining lower levels of liquidity and cash cycle, as compared to smaller size companies.

Since automobile companies are normally capital intensive, we expect a direct linkage of company size with profitability. In our analysis, natural log of sales was taken as the proxy for company's size (SZ). In this way the changes in sales occurring across the years under review are smoothened out.

Degree of Financial Leverage (DFL)

Financial leverage comes into play when a part of the company's assets is financed through debt. Through this, a company may try to magnify its EBT (earning before taxes) but losses can also be magnified if the financial charges after acquiring debt are more than EBIT (earning before interest and taxes). As debt carries a fixed cost, the greater the proportion of company assets financed by debt, the higher is the financial leverage. Financial leverage of a company may be computed in different ways. For instance some theorists consider the amount of long term debt as representative of financial leverage. The ratios of long term debt to total assets and total debt to total assets are also measures of financial leverage. For the purpose of our study, we have used the ratio of earnings before taxes (EBT) to earnings before interest and taxes (EBIT) for calculating degree of financial leverage (DFL). We preferred this measure since it focuses directly on the impact of interest on income before taxes.

Degree of Operating Leverage (DOL)

DOL indicates the extent to which a company's operating costs are fixed. A higher proportion of fixed costs implies a higher operating leverage and vice-versa if variable operating costs are a larger component out of the total operating costs.

Exactly similar to financial leverage, a higher operating leverage can magnify operating profit. However, if the operating performance of a company, having a high operating leverage declines, the reduction in operating profit is also magnified. Thus, both high operating and financial leverage result in a greater variability of returns representing a higher risk for the company.

We can calculate the degree of operating leverage (DOL) by using the ratio of contribution margin (Sales less Variable Cost) to earnings before interest. However, due to data constraints, an alternative measure of DOL i.e., ratio of percentage change in EBIT to percentage change in sales has been used.

Operating and financial leverage normally move in the same direction; they both increase expected return on equity, but they also increase the risk faced by the shareholders. The business risk part of total risk is affected by operating leverage, whereas financial leverage affects financial risk thus affecting the total risk of the firm.

Liquidity

For managing liquidity efficiently, a company's management has to decide on the optimum level of current assets and current liabilities it should carry. Very low levels of current assets expose the company to the risk of not having enough cash for meeting its maturing liabilities, losing customers through a strict credit policy or running out of inventory when an unanticipated upsurge in demand for its products occurs. Conversely carrying very high levels of current assets would reduce aforementioned risks but adversely affect profitability due to excessive investment in these assets, which at least in part would remain unproductively tied up, either as cash or inventory. Thus, the issue of liquidity management boils down to the management deciding on the appropriate trade-off between risk and return. As explained by Eljelly and Abuzar (2004), if efficient liquidity management improves profitability, an inverse relationship should be expected between liquidity and profitability indicators; current ratio (current assets / current liabilities) and EBIT in our case.

Sample:

The main object of the study is to know whether the leverage (both operating and financial) affects the profitability of the firms in the automobile sector of Pakistan. In order to achieve this objective we tested the following hypothesis alongwith two other hypotheses:

(1) Hypothesis (Ho): Higher degree of leverage does not lead to change in profitability in automobile firms listed on the Karachi Stock Exchange.

(2) Hypothesis (Ho): Firm size does not affect profitability.

(3) Hypothesis (Ho): Profitability of the firm is not significantly affected by the liquidity as measured by its current ratio.

We ran the panel regression to test the above hypotheses over the period 2000 to 2008 (data is given in Annexure B). Cross-sectional and time series data can be conveniently analyzed through panel data analysis. In pooled regression or constant coefficient model, intercepts and slopes are taken to be constant. Assuming the absence of any significant cross sectional or inter temporal effects, the cross sectional firm data and time series data are pooled together under a single column. Specifically, the econometric model is defined as follows:

$$PF = b_0 + b_1 DOL + b_2 SZ + b_3 DFL + b_4 LQ + e \qquad (1)$$

Where

PF = Profitability

DOL = Degree of Operating Leverage

DFL = Degree of Financial Leverage

SZ = Firm Size measure by Log of Sales

LQ = Liquidity measured by Current Ratio

e = the error term with zero mean and constant variance

The possible expected effects of the said variables on firm's profitability are reported in Table 1.

Table-1: Expected Relationships

Variable	Measure (proxy)	Expected Relationship with Leverage
DOL	% change in EBIT / % change in sales	Positive/Negative
Size	Log of Sales	Positive
DFL	EBT / EBIT	Positive/Negative
Liquidity	Current Assets / Current Liabilities	Negative/No effect

The study was confined to the automobile sector of Pakistan. Due to data constraints seven out of the thirteen companies listed on the Karachi Stock Exchange were included in the study. Financial data of these firms over years 2000 to 2008 was used (the data sheet on company-wise variables is given as Annexure-A). Hence, we had 63 firm-year observations for panel regression. The data was obtained from the sample firms' published audited annual accounts.

V. Results

This section presents the descriptive statistics and the results of regression analysis. The interpretation and detailed discussion of the empirical findings are also reported in this section. Finally, some explanations, on the basis of economic/ financial theory, are given to justify the empirical findings.

Prior to start of formal analysis, we present descriptive statistics in Table 2. The table shows the information at the level of the variables. It is noticeable that degree of operating leverage has a lower mean value but is more volatile as compared to financial leverage. Surprisingly, both are, however, negatively skewed approximately with the same magnitude. It can be seen from the table that the liquidity ratio follows almost a normal distribution as the value of skewness is close to zero and the value of kurtosis is 3 approximately. Finally, the table shows that the measure of profitability is negatively skewed; implying that profitability gradually increases and then sharply declines.

Table-2: Descriptive Statistics

	Liquidity	Degree of Operating Leverage	Degree of Financial Leverage	Size of Firm	Profitability*
Mean	143.8283	5.087437	0.614713	3.711342	6.026138
Median	133.0000	0.434423	0.891576	3.800000	6.133246
Maximum	284.1000	109.2500	12.75000	4.617250	8.206667
Minimum	17.70000	-15.75000	-20.33000	1.990000	-0.105361
Std. Dev.	66.25912	20.13022	3.396467	0.564771	1.418718
Skewness	0.288659	4.479933	-3.659782	-1.119210	-1.528673
Kurtosis	2.512263	22.37142	31.54348	4.661084	7.792624

* Here the measure of profitability is in natural logarithm form.

Using pooled regression technique, we ran the regression of the profitability on the degree of operating leverage, the degree of financial leverage, the size of the firm and the liquidity ratio (CR) with the aim of investigating whether these four variables have significant explanatory power. The measures of profitability and sales are used in log form. The remaining three variables namely degrees of financial/operating leverage and equity ratio are, however in percentage form and there is no need to resort to the log form. The regression estimates thus provide the information about the elasticity rather than the slope of the relevant variables. The estimated results are reported in Table 3.

Table-3: Pooled Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.079745	0.690048	-0.115565	0.9085
Degree of Operating Leverage	-0.015180	0.004887	-3.106362	0.0032
Degree of Financial Leverage	0.120429	0.030459	3.953789	0.0003
Liquidity	0.005236	0.001684	3.108952	0.0032
Size of Firm	1.443156	0.206611	6.984902	0.0000
R-squared	0.769392	**Mean dependent variable**		6.026138
Adjusted R-squared	0.750174	**S.D. dependent variable**		1.418718
S.E. of regression	0.709111	**Akaike info criterion**		2.239980
Sum squared residual	24.13627	**Schwarz criterion**		2.425857
Log likelihood	-54.35947	**F-statistic**		40.03631
Durbin-Watson stat	1.681634	**Prob(F-statistic)**		0.000000

*Here the dependent variable, profitability, and the measure of the size of the firm are in natural logarithm form.

It can be observed from the table that the estimated value of the R-square is approximately 0.76. This implies that about three quarters of the variation in profitability of the firms is jointly determined by the said four variables. The value of F-statistic (40.04) indicates that the overall model is good. The Durbin-Watson statistic is also close to 2 which implies that the successive values of estimated residuals are not dependent on each other. This means that there is evidence to accept the null hypothesis that there is no autocorrelation problem in the estimated model.

Regarding the significance of individual variables, the empirical results show that the firms' profitability is positively significantly associated with the degree of financial leverage. The P-value is 0.0003, as can be seen from the table. This implies that the null hypothesis (that the degree of financial leverage has no significant impact on profitability) is rejected at 1 percent level of significance. A one percent increase in financial leverage leads to about 0.12 percent growth in profitability, as the estimated coefficient of the degree of financial leverage is 0.120.

This piece of evidence is in line with the Static Tradeoff Theory that states that more profitable firms have lower expected bankruptcy costs and higher tax benefits (see, for details Jensen (1986) and Hart and Moore (1995)). This implies that the automobile sector firms in Pakistan prefer to use more debt as compared to equity in their financial structure. However, these findings are in contrast to the Pecking Order Theory, which postulates a negative correlation between the profitability and the degree of the financial leverage (see, for detail Myers (1984) and Myers and Majluf (1984)).

The estimated model also shows that there is a statistically significant and negative association between the profitability of the automobile sector and operating leverage. On the basis of P-value of 0.003, we reject the null hypothesis that the degree of operating leverage has no statistical significant effect on the profitability. The sign of the coefficient is negative which shows a negative relationship, which is in line with the Dynamic Tradeoff theory (see, for details Fischer et al. (1989) and Strebulaeve (2003).

The probable explanation for the opposite signs of linkage of profitability to financial and operating leverage is that during the later part of the years under review, most of the automobile firms were expanding their production capacity. However, automobile demand witnessed a downward trend mainly due to slow down in economic growth and lease financing becoming expensive due to a rising interest rates. Thus, the increased fixed production cost was spread over a relatively lower number of units due to decline in capacity utilization, thereby resulting in a negative relationship between profitability and operating leverage. Despite this, financial leverage and profitability had a positive relationship, indicating that auto firms continue to enjoy such large profit margins that firms using a higher proportion of debt in their capital structure, were still more profitable than firms using a lower proportion of debt.

An interesting finding in the paper is that the profitability of the automobile sector firms is positively and significantly related to the size of the firms. It is noticeable that the highest coefficient is that of the size of the firm. A one percentage increase in the sales of the firms leads to almost 1.44 percent growth in the profitability of the firms. Large size companies are usually diversified and, therefore, less likely to go bankrupt. Firm size could, therefore, be inversely related to bankruptcy and thus directly related to profitability. The significance of the coefficient of the size variable suggests that the firms in the automobile sector increase their profitability by increasing the sales, either by enhancing the volume or the prices per unit.

Finally, profitability is observed to be positively associated with liquidity (CR). The estimated magnitude is 0.583 that is statistically significant at 5 percent level of significance. This goes against the theory. However, this finding seems to be due to the peculiar circumstances of Pakistan's automobile sector, wherein a seller's market has been prevailing for a number of years, due to this automobile firms routinely get 100% cash advances months before the actual delivery, thereby significantly improving their liquidity (CR). This suggests that for profitability growth, it is necessary to increase the current assets as compared to current liabilities (as the liquidity is measured by the ratio of current assets to current liabilities). The level of profitability can be enhanced by adopting active and effective liquidity management strategies.

Diagnostic Checking

To check whether the values of estimated parameters of the model remain consistent through the examined time period, we ran the Chow's test on an overlapping sample by sequentially adding ten points of data and computed the F-statistic and log likelihood. The estimated results are reported in Table 4.

Table-4: Estimates of Chow's Test

Chow Breakpoint Test: 10			
F-statistic	0.897586	Prob.	0.491394
Log likelihood ratio	5.261600	Prob. Chi-Square	0.384795
Chow Breakpoint Test: 20			
F-statistic	1.110105	Prob. F(5,48)	0.369228
Log likelihood ratio	6.434462	Prob. Chi-Square	0.266208
Chow Breakpoint Test: 30			
F-statistic	2.737076	Prob. F(5,48)	0.031133
Log likelihood ratio	14.64476	Prob. Chi-Square	0.011993
Chow Breakpoint Test: 40			
F-statistic	2.245963	Prob. F(5,48)	0.066810
Log likelihood ratio	12.29763	Prob. Chi-Square	0.030929

Based on the calculated statistics, both F-statistic and log likelihood ratio, the study is unable to reject the null hypothesis that estimated parameters are consistent over time. This implies that there is no structural break in the model, before 30 break-points and F-statistics do not support the hypothesis of structural break at 40break point. Another way to check the reliability of the model is to determine whether the estimated residuals are white noise. To proceed with this, we applied the augmented Dickey-Fuller (ADF) test to the estimated residual from the model (presented in equation (1)). The results are presented in Table 5.

Table-5: Augmented Dickey-Fuller Test Results

Null Hypothesis: Residual has a unit root
Exogenous: Constant
Lag Length: 2 (Fixed)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.459716	0.000
Test critical values:	1% level	-3.581152	-3.5885	
	5% level	-2.926622	-2.9297	
	10% level	-2.601424	-2.6031	

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Residual (-1)	-0.925919	0.124123	-7.459716	0.0000
C	-0.053514	0.088430	-0.605154	0.5482

R-squared	0.558443	Mean dependent variable	-0.057163
Adjusted R-squared	0.548407	S.D. dependent variable	0.892477
S.E. of regression	0.599750	Akaike info criterion	1.857897
Sum squared residual	15.82680	Schwarz criterion	1.937403
Log likelihood	-40.73162	F-statistic	55.64736
Durbin-Watson stat	1.527974	Prob(F-statistic)	0.000000

The ADF test results provide strong evidence to reject the null hypothesis that the estimated residual has a unit root. This implies that the residuals are stationary. It means that the mean and variance of the residuals do not vary with time.

V. Conclusion and Policy Implications

The study used sample data of 17 firms out of 13 automobile sector companies quoted on the Karachi Stock Exchange. The data used covered the period 2000 to 2008. We have thus gathered strong evidence to show that:

1. Financial leverage has a significant positive impact on the profitability of the firms.
2. Operating leverage has a negative and statically significant influence on profitability.
3. The growth of profitability is positively associated with the size of the firm, and finally
4. An increase in liquidity ratio (CR) leads to an increase in firm profitability.

The robustness of these findings are tested by running Chow's test and applying the augmented ADF unit root test to the residual series derived from the estimated model. We found evidence that the association between the profitability and the said variables is stable over the examined sample period. ADF results strongly support the finding of the Chow's test by showing that the residuals are stationary. This shows that the estimated model is not only overall statistically significant but also yields consistent parameters. The estimates thus can be used for explaining the variation in profitability and in designing effective managerial strategies to further enhance the profitability of the automobile sector.

The results relating to impact of size of the firms on profitability are consistent with the results of Eljelly and Abuzar (2004). The firm size is found to have a significant and direct effect on profitability of automobile firms in Pakistan. However, the evidence regarding liquidity of the firm is in contrast to their findings, that is, liquidity in our case is found to have a positive impact on the profitability of firms. The reason for this, as already elaborated above, is mainly the peculiar prevailing seller's market situation in Pakistan's automobile industry. Thus, a firm can enhance its profitability either by increasing its current assets or by reducing its current liabilities. The degree of operating leverage appears to be statistically significantly linked to profitability in our model; the negative sign of the coefficient being in line with the Dynamic Tradeoff Theory. This is understandable because the increase in capacity of the auto firms in the later part of the years under review could not be supported by increased sales due to a slump in demand. There might be some room for further profit maximization by increasing financial leverage but it is not an endless possibility, i.e., a point may be reached where excess financial leverage would start reducing the profit or magnifying the losses. The key factor for improving industry profitability in the future appears to be an increase in capacity utilization which can get further impetus if interest rates also decline.

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Company-wise Data (Annexure A)

AL-GHAZI TRACTORS LTD.	Year	DOL	Log of Sales	DFL	CR	Profitability (EBIT)
	2000	2.04	3.79	1	145.4	1046.1
	2001	0.41	3.66	0.99	209.8	937.2
	2002	1.57	3.56	0.99	284.1	624.3
	2003	2.38	3.74	1	271.8	1401.5
	2004	0.27	3.83	1	246.5	1490.5
	2005	-0.15	3.89	0.89	270.2	1461.4
	2006	0.117423	3.95532761	1.282127	190	1489.852
	2007	1.096349	3.9581485	1.275881	224	1500.496
	2008	-0.52798	4.00465982	1.192779	262	1410.941
ATLAS HONDA LTD	Year	DOL	Log of Sales	DFL	CR	Profitability (EBIT)
	2000	109.25	3.59	0.29	169.1	101.9
	2001	-1.71	3.22	0.29	149.2	202.9
	2002	0.33	3.8	0.31	152	394.6
	2003	2.42	3.91	0.22	141	650.9
	2004	0.7	4.06	0.18	146.3	842.5
	2005	0.29	4.15	0.96	123.9	898.9
	2006	NA	NA	NA	NA	NA
	2007	NA	4.22032814	1.021626	131	982.943
	2008	0.311729	4.31922134	0.757105	129	1061.299
DEWAN FAROOQUE MOTORS LTD	Year	DOL	Log of Sales	DFL	CR	Profitability (EBIT)
	2000	0	3.05	1	101.4	68.7
	2001	0.15	3.6	-0.14	99.1	95.7
	2002	6.9	3.69	0.14	87.3	247.5
	2003	5.55	3.74	0.51	72.5	409.5
	2004	-0.01	3.89	0.81	79.8	407.3
	2005	1.93	4.01	1.32	87.4	674
	2006	0.506657	3.95436955	0.502276	95	631.16
	2007	1.374001	3.85946627	0.215551	103	460.93
	2008	5.952816	3.72287198	2.071211	105	-279.52

Company-wise Data (Cont'd)

GHANDARA INDUSTRIES LTD	Year	DOL	Log of Sales	DFL	CR	Profitability (EBIT)
	2000	-2.79	2.23	1	59.5	-88.5
	2001	2.65	2.02	-20.33	54.2	0.9
	2002	57.99	1.63	1.45	45.3	-30.1
	2003	-0.5	2.41	0.77	44.4	45.6
	2004	0.37	2.81	0.72	40.7	70.4
	2005	-0.14	3	-0.02	53.6	64.86
	2006	3.66552	3.17778748	3.052295	102	182.887
	2007	0.962323	3.27238147	0.891576	119	225.716
	2008	96.34876	3.26882547	0.609034	124	48.375
GHANADARA NISSAN LTD	Year	DOL	Log of Sales	DFL	CR	Profitability (EBIT)
	2000	0.66	1.82	-1.85	35	-137.1
	2001	0.18	2.39	1.92	46.3	-205.2
	2002	0.67	1.9	1.73	29	-111.8
	2003	-15.75	1.99	-0.22	19.7	294.9
	2004	-0.06	3.07	12.75	17.7	106.6
	2005	0.92	3.54	1.08	100.5	297.48
	2006	2.515687	3.64740351	0.785818	127	497.431
	2007	0.817912	3.46162246	0.803529	136	355.828
	2008	0.086375	3.56924384	0.76794	133	364.471
HONDA ATLAS CARS (PAK) LTD	Year	DOL	Log of Sales	DFL	CR	Profitability (EBIT)
	2000	0.57	3.62	1	215.9	290.5
	2001	0.07	3.72	0.99	213.6	296.3
	2002	4.62	3.83	1	204.2	657.4
	2003	1.11	3.7	1	216.3	476.3
	2004	0.34	3.98	1	195.6	622.5
	2005	-1.19	4.22	0.32	126.3	83.5
	2006	23.04835	4.40889597	0.622115	108	1133.704
	2007	3.677835	4.23185465	1.83675	94	-262.229
	2008	15.03599	4.16777488	0.228301	79	278.654

Company-wise Data

INDUS MOTOR COMPANY LTD	Year	DOL	Log of Sales	DFL	CR	Profitability (EBIT)
	2000	-2.4	3.93	1	175.3	280.2
	2001	4.46	3.97	0.83	146.1	406.5
	2002	-3.86	3.92	0.93	159.5	571.1
	2003	2.73	4.21	0.96	120.5	2023.4
	2004	0.34	4.37	0.97	118.7	2325.9
	2005	-0.43	4.44	0.93	131.7	2134.22
	2006	2.313707	4.5469932	1.163565	149	3500.256
	2007	0.434423	4.59174587	1.153923	183	3665.306
	2008	-2.71307	4.61725039	1.155975	256	3063.83