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Impact of Inventory Turnover on the Profitability of Non-Financial Sector Firms in Pakistan

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Abstract

The purpose of the study is to investigate the effect of inventory turnover on firm profitability. Three dependent variables including return on asset, return on equity and net profitability margin ratio have been employed for analysis. The variable of interest is inventory turnover ratio and three control variables are sales growth, net working capital and firm size. The sample consists of 79 companies from cement, sugar and automobile sectors of Pakistan. Data ranges from the year 2006 to 2015. Generalized Method of Moment (GMM) has been applied to capture the endogeneity. Three hypotheses were developed to check the relationship between dependent and independent variables. The results of the study show that inventory turnover ratio does not significantly affect return on asset. However sales growth ratio, net working capital, and firm size are significantly affected by inventory turnover. In the second model, inventory turnover ratio, networking capital (NWC), log of sale (LOS) and sales growth ratio do not affect return on equity. In the third regression model, the inventory turnover ratio and NWC do not affect net profitability margin ratio but LOS affects it. The study recommends that the management should pay attention to those variables which play a pivotal role in determining the profitability of firms.

Keywords: Inventory turnover ratio, return on asset, return on equity, net profitability margin ratio.

JEL Classification: G31, G39

Introduction

1.1. Background

Inventory represents a major proportion of total assets of a company. It comprises 35% of total assets and 50% of current assets of retail

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business concerns (Yasin, Gao & Gaur, 2013)**.** In the prevailing dynamic environment of business, every organization has to perform the imponderable in their operations in order to sustain its existence in the market. Inventory turnover ratio reveals the number of times inventory sold in a year. There are different types of risks associated with the inventory, from purchasing the raw material to producing finished goods, therefore it requires a deep focus of management. These risks can be eliminated or overcome by applying different strategic techniques. The inventory has three major sub-components including raw material, work in process and finished goods.

Inventory management process can be seen separately in these three components. Management of raw material consists of logistic, storage and quantity management operations. Management of work in process includes all those operational activities that are performed during the production period. It may include checking the efficiency and effectiveness of machinery, TQM and other activities. Finally, inventory management also includes finished goods which are ready for sale. It may include the check and balance of final product; whether it is completed within the stipulated time period and the desired quality.

The profitability of firm depends upon various factors which directly or indirectly adhere to performance. These factors often shower their effects on profitability very strongly, such as cost of goods sold, interest rate, tax rate and inventory volume. The profitability of firms can be gauged with a number of financial ratios. These ratios depict the profitability from different angles, such as Return on Assets (ROA) shows the profit due to the use of assets, Return on Equity (ROE) represents the profit which occurs due to equity and Net Profitability Margin (NPM) ratio shows the profit earned due to the sale of one unit of final product. These ratios may correspond to inventory management and show a dynamic behavior of profitability due to changes in inventory levels.

The objective of this study is to check the effect of inventory turnover ratio on profitability ratios such as ROA, ROE and NPM ratios. This study also includes some other ratios which were taken as control variables i.e., sales growth ratio, net working capital and log of sale. In order to assess the desired relationship three hypotheses were developed. Data have been extracted from financial statement analysis

that is available on the website of the State Bank of Pakistan (2010). We do not find evidence to reject null hypothesis. Therefore we conclude that there is no impact of inventory turnover on a firm's profitability.

The study also enables us to check the effects of some other variables which were omitted in previous studies on Pakistani companies. The purpose of study is to examine the already set ideas about the inventory management and its effect on the firm profitability. The study is divided into four sections. The first section constitutes introduction, the second section includes literature review, third describes the data and methodology and the fourth section incorporates the conclusion, future directions and limitations of the current study.

1.2. Problem Statement

Large amount of funds are committed in the form of inventory for different organizational and production purposes. The organizations bear opportunity cost, carrying cost and other costs in the inventory management process. So, it is necessary to check whether inventory management ceaselessly affects the profitability and also to find out that whether effective inventory management proves beneficial or not.

1.3. Research Objective

The purpose of study is to extend the research of Mappanyuki & Sari(2017). This research focused on the relationship between the same variables (sales growth ratio, inventory turnover ratio, and growth opportunity) and profitability ratios which include ROA, NPM, and ROE in the Indonesian industrial context. The study aims to check their relationship in the context of Pakistan's economy. Additionally, two more variables, net working capital and firm size are also included in this study because working capital also has a strong part in determining the profitability of firm (Horne, 2000).

1.4. Research Questions

This study seeks to answer the following research questions:

- Is there any impact of inventory turnover ratio on firm profitability?
- Is there a relationship between inventory turnover ratio and shareholder returns: ROA and ROE ?

2. Literature Review

The major component of inventory is the raw material used in the production department for producing finished goods. Inventory is a major portion of current assets especially in a manufacturing company concern. An enormous part of funds goes to inventories to fulfill the needs of customers and ensure the smooth flow of production. However, carrying cost coupled with opportunity cost occurs in the case of holding sizeable inventories. Companies should only hold the quantity of raw material which sufficiently ensures the continuous working of production department (Coyle, Bardi & Langley, 2003).

Inventory represents the stock which is held by the organization to meet future transactions (Ghosh & Kumar, 2003). Manufacturing companies, which have a large inventory, are able to earn only a low profit on their stock as compared to those firms which have an ordinary inventory (Chen, Frank & Wu, 2005). Inventory turnover ratio has a negative relationship with net profit margin ratio which means that when inventory turnover ratio increases then net profit margin ratio decreases and vice versa. Inventory turnover ratio has a positive relationship with sales growth ratio (Gaur, Fisher & Raman, 2005).

There were different studies which checked the effect of inventory management on financial performance of companies. The study conducted by Agus and Noor (2006) explored different types of managerial process to inventory management and their relationship with industrial performance. There are also studies in which the relationship between inventory stock and profitability was checked and it was proved that if a firm has a low inventory, it would be able to earn more profit and that there is a significant relationship among them (Shah & Shin, 2007).

The chain management process can be explained in two steps i.e. the management of inventory and the distribution of inventory. The management of inventory shows the required level which has to be maintained for proper transactions, whereas the distribution of inventory involves the facilitation of location and procurement (Rajeev, 2008). Inventory turnover has a positive relationship with return on asset and also has a positive relationship with net profitability margin ratio (Kiraci, 2009). This provides support to the findings of this study.

The study conducted by Panigrahi (2013) found that there is a negative relationship between inventory turnover and a firm's ability to earn profit by its operations. However, there are other studies which posit that inventory turnover ratio has no effect on overall profitability of the firm. Profitability of firms is not significant related with change in inventory turnover (Shardeo, 2015). The results lack of significant between ROE and Inventory management. However, return on equity has a positive relationship with the sales growth ratio (Mappanyuki & Sari, 2017).

Rajagopalan and Malothra (2001) studied whether adaption of JIT principles decreased inventory turnover for manufacturers with time. They studied time trends in raw material inventory, work in process and finished goods inventory. They used aggregate inventory level time series data. As a sample they took data from U.S. Census Bureau for 20 industrial sectors for the years 1961-1994. Their study proved that raw material and work in progress inventories had a decreasing trend in the majority of industrial sectors. But they did not find any trend in finished goods inventories.

Chen at al., (2005) used data at firm level inventory data or public manufacturing firms for the years 1981-2000. They analyzed the data to check trends in inventory levels and found that raw material and work in process inventories had a significantly decreasing trend but finished goods inventory remained steady during that period. They also found that badly managed inventory predicts future low return. Fama and French (1993) showed that abnormally high and abnormally low inventories cause abnormally poor return on stock.

Literature review provides cognitive information about inventory management in different countries and with diverge types of industries. This study has checked these outcomes for Pakistan's industrial sectors. Our findings provide the similar results which confirm the finding obtained in other economies. The study will help and modify a manager's conceptual proceeding about inventory management.

2.1. Theoretical Background

The following theories of financial management deal with inventory management. Their brief description is given below.

2.1.1. Just in Time Theory

JIT theory states that companies should maintain a minimum level of inventory or just the material which fulfills the current need of production. Excess material creates opportunity cost and holding cost. This theory focuses on inventory control and provides an assumption to maintain a low level of inventory.

2.1.2. Levelized Production Theory

This theory focuses on basic inventory management. According to this theory, companies should hold a steady inventory of raw material to meet customer demand in time. If raw material is insufficient or not available at the right time then this will result in additional labor charges for the overtime required to hasten production to meet the customer demand.

2.1.3. Agency Theory

The relationship between managers and stockholders of company is known as agency relation in whom the investor is the principal and the manager acts as its agent. The primary concern for managers is to manage the funds invested by the shareholders who elect managers for the purpose of managing the share capital and reporting about management activities.

2.2. Hypotheses Development

The followings hypotheses were developed to check the relationship between the dependent and independent variables.

H_1: There is a significant relationship among return on assets and inventory turnover.

H_2: There is a significant relationship between return on equity and inventory turnover.

H_3: There is a significant relationship between net profitability margin ratio and inventory turnover.

2.3. Detail of Variables

In this study, the following variables have been used as explained and explanatory variables. The details of variables, their measurement and source is depicted in the following table.

Table 1
Variables Description

Variables	Name	Measure	Source
Dependent Variables	Return on Asset (ROA)	Net profit before tax/Total asset	(Mappanyuki & Sari, , 2017)
	Return on Equity (ROE)	Net profit before tax/ Shareholder equity	
	Net Profitability Margin ratio (NPM)	Net profit after tax/ Total sales	
Independent Variable	Inventory Turnover Ratio (ITO)	Cost of goods sold /Average inventory	(Mappanyuki & Sari,, 2017)
	Sale Growth Ratio (SGR)	Sales this year-sales last year/Sales last year	
	Net Working Capital (NWC)	Current assets-current liabilities	
	Size of Firm (LOS)	Log of sales	

3. Data and Methodology

The data used in analysis is secondary data available on the website of The State Bank of Pakistan in the form of Financial Statement Analysis (FSA) of three major non-financial sectors. To check the effects of

inventory turnover ratio on profitability, the following variables are used.

3.1. Variables

3.1.1. Return on Assets (ROA)

It is about the ability of a company to earn profit by utilizing its assets. It is an important profitability ratio which is used to interpret effectively the management of assets, both current and non-current assets. ROA takes account of managerial decisions about the management of assets. It is used as a dependent variable.

3.1.2. Return on Equity (ROE)

It is about the earning capacity by using shareholder's funds. It is the responsibility of managers to effectively manage the equity. ROE explains net earnings by using the equity given by the shareholders. It also indicates the portion of total assets provided by shareholder equity. It is taken up as a dependent variable.

3.1.3. Net Profitability Margin Ratio (NPM)

It elaborates the ability of a company to earn a certain amount of profit by selling a single unit of their product item after deducting all direct and indirect expenses. It also reveals other micro factors such as control on cost of production, efficiency of production department and managerial outcomes of sales department. It is also taken up as a dependent variable.

3.1.4. Inventory Turnover Ratio (ITO)

It is a broader term which not only expresses the time interval required for selling and converting raw material into finished goods but also effectively covers the management of this process. ITO explains the number of times raw material is converted into finished goods and sold in a specific time period. It is included as an independent variable.

3.1.5. Net Working Capital (NWC)

The residual amount obtained by subtracting the current liabilities from current assets is called Net Working capital. It has been used as a control variable. This study will check the effect of NWC on firm profitability.

3.1.6. Log of Sales (LOS)

Total sales volume of any organization represents the size of firm. LOS is taken up to convert nonlinear data into a linear form. Sales include both credit and cash sales.

3.1.7. Sale Growth Ratio (SGR)

It provides the comparison of sales growth between two years. It tells the percentage by which the current year's sale has increased as compared to the previous year. SGR is a strong tool for comparing sales increment in any specific production period. It has been taken up as a control variable. These variables are used in analyzing the effect of inventory turnover on firm profitability. The current research is based on the above mentioned seven variables.

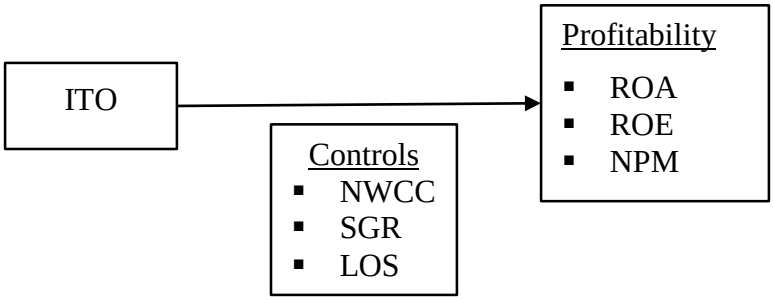

*Figure1.*Theoratical Framework

The three profitability ratios which are ROA, ROE and NPM ratio depend on the inventory turnover while NWC, LOS and SGR are control variables in our frame work.

3.2. Research Models and Results

General Model

$$Y_{it} = \alpha_{\circ} + \sum_{j=1}^{n} \beta_j X_{ji} t + \gamma_j Y_{(it-1)} + \cup_{it} \quad (1)$$

3.2.1. Regression Model 1

The Generalized Method of Moments (GMM) is used in the study because dependent variable not only depends upon the simple independent variables but also on the lags. The instruments used in this model are listed here as ITO_{t-1}, LOS_{t-1}, NWC_{-1}, SGR_{-1} and ROA_{t-1}.

$$ROA_{it} = \beta_{\circ} + \beta_1 ITO_{it} + \beta_2 LOS_{it} + \beta_3 NWC_{it} + \beta_4 ROA_{(it-1)} + \beta_5 SGR_{it} + \varepsilon_i \quad (2)$$

where

ROA= return on asset

ITO= inventory turnover

LOS= log of sale

NWC= net working capital

SGR= sales growth ratio

Table 2
Results of 1st Regression Model

Variables	Coefficient	T-statistics	Probability
ITO	0.0062	1.3723	0.1727
LOS	0.0732	1.7903	0.0773
NWC	2.2400	2.0136	0.0476
SGR	0.0463	2.0568	0.0431
$ROA_{(-1)}$	0.2829	2.5036	0.0144
R-Squared			0.8044
Adjusted R-square			0.6901
Durbin Watson Test			2.4400
Mean Dependent Variable			0.0698
S.D. Dependent Variable			0.1303

The findings of panel GMM reveals that t-value of inventory turnover is 1.37 which shows that ROA is not dependent on inventory turnover ratio. The probability value also shows lack of impact ITO on ROA. The insignificant value of inventory turnover conjectures that profit made due to the utilization of assets has no relation with the efficient inventory management. This phenomenon occurs due to the fact that inventory of a company does not have sufficient effect to be the reason of change in its profitability. The t-stats value of LOS is 1.79 which shows a significant effect of the firm size on ROA. The firms which enjoy a high volume of sales have the capacity to earn more profit. Large firms earn more profit than small firms. NWC has a t-stat value of 2.0l and SGR 2.05 which indicates that ROA is strongly dependent on both these variables. A company which has more current

assets relative to its current liability and more SGR makes more profit than others. The t-value of ROA_{-1} which is lag of ROA is 2.50. It is the indication that ROA also depends upon its own lag. The value of R-square is 80% which shows explanatory ability of the model. Durbin Watson test is 2.44 which reveals that there is no auto-correlation between dependent and independent variables. Adjusted R-square is 69% which shows the strength of regression among dependent and independent variables. Mean of dependent variables is 0.06 which shows the central point of variables. Standard deviation is 0.13 which shows the extent to which members or numbers of a group are far from their mean. Haussmann test was applied to decide the application of fix or random effect in GMM.

Table 3
Chi-square Analysis

Test summary	Chi-sq. Statics	Chi-sq. D.F	Probability
Cross-section random	19.5354	5	0.0015

There are two hypotheses developed for deciding the application of either fix or random effect.

H_o: random effect will be applied

H_1: fixed effect will be applied

As the prob. value is 0.0015, which is less than 0.05 as shown in the table, so the alternate hypothesis is accepted. I shall fix the cross section while applying GMM.

3.2.2. Regression Model 2

The respective equation is run and GMM is applied to check the results. The instruments of model are ITO_{-1}, LOS_{-1}, NWC_{-1}, SGR_{-1} and ROE_{-2}.

$$ROE_{it} = \beta_{\circ} + \beta_1 ITO_{it} + \beta_2 LOS_{it} + \beta_3 NWC_{it} + \beta_4 ROE_{(it-1)} + \beta_5 SGR_{it} + \varepsilon_{it} \quad (3)$$

where

ROE= return on equity

$ROE_{(it-1)}$ = lag of return on equity

The statistical outcomes of the model are presented in the following

Table 4

Results of 2nd Regression Model

Variables	Co-efficient	T-statics	Probability
NWC	4.4300	00.7806	0.4374
IT0	0.0171	00.7367	0.4635
LOS	0.1728	00.8350	0.4063
SGR	-0.1567	-10.3282	0.1880
ROE_{t-1}	-0.8295	-11.0102	0.0000
R-squared			0.7592
Adjusted R-squared			0.6185
Mean dependent variable			0.0792
S.D. dependent variable			0.6042
Durbin Watson test			1.9929

The results show the significance or insignificance of variables. The t-statistics of different variables also reveal that NWC has t-stat 0.78 which is less than 2, which indicates that ROE is not affected by NWC. NWC also represents that the liquidity position of the company does not change ROE because equity relates with investment decision of firms not with liquidity position. Inventory turnover is 0.73 which means that it is insignificant and ROE also remains unaffected by the change in inventory turnover ratio. The funds which company acquires by equity financing may be used for other purposes and not for inventory purpose. So, change in inventory turnover or efficient management of inventory does not enhance or reduce the profitability which occurs due to equity. The t-value of LOS is 0.83 which is insignificant and shows that ROE is not dependent on the firm size. The volume of company does not mediate ROE because size does not matter for profitability. SGR has t- value of -1.32 which is insignificant and depicts that even if a company experiences sales growth, still its profitability may not change. Equity financing may be used in asset purchasing and not in production of unit, so profit on equity financing

will only be made when the company efficiently manages its assets and not from sales growth.

The value of t-stats of ROE_{t-1} is -11.01 which is the indication that ROE is strongly dependent on its own lag but the association is negative. The value of R-square is 75% which shows the explanatory strength of the model. The mean value is 0.07 which indicates the central tendency of dependent variables. The standard deviation is 0.60 which reflects the extent to which the numbers of statistical group are far from the group mean. Durbin Watson is 1.99 which shows that there is no auto-correlation among the variables. Haussmann Test is applied to decide whether fixed or random effect should be applied.

Table 5
Haussmann Test Results

Test summary	Chi-sq. Statics	Chi-sq. D.F.	Probability
Cross-section random	208.9396	5	0.0000

Ho: random effect will be applied in GMM

H1: fixed effect will be applied in GMM

The probable value is 0.000 which is less than 0.05. Hence, alternate hypothesis will be accepted.

3.2.3. Regression Model 3

The following equation exemplifies the third model in which NPM ratio is used as the dependent variable. The Generalized Method of Moment (GMM) model has been applied. The LOS_{-1}, ITO_{-1}, NWC_{-1} and NPM_{-2} are used as instruments in this regression model.

$$NPM_{it} = \beta_{\circ} + \beta_1 ITO_{it} + \beta_2 LOS_{it} + \beta_3 NWC_{it} + \beta_4 NPM_{(it-1)} + \varepsilon_{it} \quad (4)$$

where

NPM= *Net Profitability Margin ratio*

$NPM_{(it-1)}$ = one year lag of NPM

Table 6
Results of 3rd Regression Model

Variables	Co-efficient	T-statics	Probability
NWC	-8.6500	-1.3274	0.1871
ITO	0.0052	1.0750	0.2857
LOS	0.0899	3.1304	0.0022
NPM_{-1}	0.3474	2.9912	0.0034
R-squared			0.1682
Adjusted R-square			0.1380
Mean dependent variable			0.0191
S.D dependent variable			0.1366
Durbin Watson test			1.7123

As the result shows, the value of t-static of NWC is -1.32 which narrates that it has no effect on NPM ratio of the company. The excess of current assets over current liability may not affect the profit margin because a company which has more liabilities but also has a high sale volume can earn more profit. The t-stats value of inventory turnover is 1.07 which means that NPM ratio is not dependent on inventory turnover ratio. It depends upon the final sale volume but not on the inventory which is still a part of the company in the form of raw material, work in process or finished goods. The variance in inventory turnover ratio does not affect the net profitability ratio. LOS, which shows the size of firm, has t- value of 3.13 which explains that net profitability ratio strongly depends upon the size of firm. A large size firm will be able to earn more profit as compared to a small size firm. The last variable in table is NPM_{-1} which has t-stats value 2.99 which shows that NPM ratio also depends upon its own lag value.

The value of adjusted R-square is 13% which shows the percentage of regression between dependent and independent variables. The value of adjusted R-square is very low because NPM ratio normally depends upon sale volume and other variables of the model have a very low regression with NPM. The low regression values of other variables become the reason of overall low regression. The mean

value is 0.01 which shows the central point of dependent variables. Standard deviation is 0.13 which shows the distance from the central tendency of data. Durbin Watson value is 1.77 which explains that there is no auto-correlation among variables. Results of Haussmann Test decide whether fixed or random effect should be applied.

Table 7
Results of Haussmann Test

Test summary	Chi-sq. Statistic	Chi-sq. D.F.	Probability
Cross-section random	17.6627	4	0.0014

H_o: random effect will be applied

H_1: fixed effect will be applied

The result shows that the probability value is less than 0.05. So, the alternate hypothesis is accepted and fixed effect will be applied.

4. Conclusion

The study has enlightened and magnified some managerial decisions about inventory management. It has identified key variables like NWC, LOS, SGR and their effects on profitability ratios. Profitability is not only increased by sales volume or by decreasing the cost of production or some other operational technique but also by managing and focusing on specific ratios. The firm or a manager which focuses on such ratios can get competitive benefits in market. It is often suggested that the inventory management has a major contribution in determining the profitability of firms. But the results of this study note that there exists no correlation among profitability and inventory management. The profitability of firms is affected by other ratios in the econometric model however it is not concluded that inventory management has no role in firm profitability. Ultimate conclusion is that inventory management has no effect on company profitability. It may affect indirectly by reducing the transaction cost, maintenance charges and also by reducing the account receivables.

The conclusion of statistical results strengthens some basic views about the relationship among different financial ratios. The tactics and tools used by finance managers in the basic financial management of corporations are modified in this research. The results

will help in understanding the different types of relationship among the different financial ratios.

4.1. Research Limitations and Future Recommendations

Data constraint is the limitation in this research. Only ten years data 2006-2015 has been used which was available in the form of financial statement analysis on the website of The State Bank of Pakistan. Future research can be performed by adding more ratios like gross profit to cost earnings ratio as a dependent variable on the same or other critical independent variables. We have made combined analysis of three industrial sectors. Each industry may have a different trend with regard to inventory management. So, future researches may take into account the industrial attributes and the impact of the underlying relationship.

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