



## An Analysis on the Relationship between Capital Structure and Cost Adhesion of Sold Goods

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### **A B S T R A C T**

The main objective of this research is to examine cost adhesion of sold goods. The research also has investigated the impact of capital structure characteristics such as current liabilities, long-term liabilities, and total liabilities on the intensity of cost adhesion. The study is an applied research in terms of objectives and a correlational one in terms of method nature. The research results for the 130 companies in the temporal territory from 2012 to 2005 show that the cost of sold goods is adhesive. The findings suggest that there is a significant positive correlation between current liabilities and the intensity of cost adhesions of sold goods, while no significant positive relationship between long-term liabilities and the intensity of cost adhesions of sold goods and between total liabilities and the intensity of cost adhesions of sold goods were found.

**Keywords:** Capital Structure, Costs Adhesion, Cost of Sold Goods.

### **INTRODUCTION**

Knowing how costs behave in relation to changes in the activity level or sales level is important information for management decisions regarding budgeting, planning, pricing products, determining break-even point and other management cases. Some recent research suggests that the increase amount of costs while increasing activity level is more than the decrease amount of costs while reducing the volume of activity (Malehi, Pourmotahari, & Angali, 2015; Noreen & Soderstrom, 1997). Such behavior of costs is called "costs adhesion".

Planning and control are two important tasks of management. The information related to costs that managers need to perform these tasks may not be found from classified information reflected in the financial statements (Maines & McDaniel, 2000). Managers for planning and control objectives require being aware of costs behavior, i.e. how costs change. Costs behavior refers to how costs react to changes in the level of activity. In fact, costs changes can be explained by changes in the sales income through the association between cost and income (Kim, Lim, & Park, 2009).

The companies' activity environment is rapidly growing and highly competitive. Companies, in order to survive, have to compete with several factors at the national and international levels and expand their activities through new investments. Financial leverage reflects the company's

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ability to meet long-term and short-term commitments. These ratios are calculated by comparing fixed costs and earnings or by relating liabilities to assets.

This study aims to review the theoretical bases and previous research conducted in this regard, as well as pursue the following functional objectives, using an empirical analysis:

1. Investigation of cost adhesion of sold goods
2. Investigation of changes in the intensity of adhesion and its relation to the company's capital structure (financial leverage index)
3. Investigation of changes in the intensity of cost adhesion in different periods

## **LITERATURE**

Management accounting literature in terms of costs behavior states that cost variations depends only on the amount of change in activity level and does not correlate with the direction of the changes in activity level. For example, in 2003 cost adhesion discussion was introduced by Anderson et al, at first in an article titled a review on adhesion of general administrative and selling costs. This paper presented costs adhesion investigation main model that was used by other researchers for the subsequent papers. Empirical evidences of this research show that the rate of increase in some costs while increasing sales level is faster than the reduction rate in costs while reducing the level of sales(Anderson, Banker, Huang, & Janakiraman, 2007; Ibrahim & Ezat, 2017).

Subramaniam and Watson (2016), on a research have studied the relationship between sales changes and costs adhesion. This research has been conducted in Texas State, America. The research has examined the cost behavior in different levels of sales income changes. The research findings showed that:

1. General and administrative and selling and distribution costs and costs of sold goods are not adhesive in lower levels of sales income changes.
2. The amount of costs adhesion varies in different industries.
3. General and administrative and selling and distribution costs and costs of sold goods do not have adhesion behavior when they have low income changes(Less than 10%). But when sales income change to more than 10%, costs adhesion appear.

Bunker on another interesting research claimed that unlike traditional analyses to evaluate company performance, increased ratio of general, administrative and selling costs to net sales is not necessarily a minus sign of current and future performance of the company. They found some evidences that such analyses are valid only in income increasing periods. In periods of income declining fundamental analyses should be evaluated according to the behavior of costs adhesion(Banker & Chen, 2006).

In another study, Weiss examined the asymmetric impact of costs on analysts' earnings forecasts and the results showed that in companies that have more adhesive costs, the accuracy of earnings forecasts by analysts is less and costs adhesion effects on the analysts covering priorities. Investors in evaluating the firm value consider the adhesion of the costs(Weiss, 2010).

Cannon (2014), has studied the determinants of costs adhesion in America aeronautical transportation companies. The result was such that if the marginal cost of increasing the capacity when demand increases, is more than the marginal benefit of reducing the capacity while demand reduces, costs adhesion increases, and since the decline in product price decrease while demand decreases is more than product price increase when demand increases, costs adhesion is more in demand decrease state(Cannon, 2014).

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Hirst, Koonce, and Venkataraman (2008), has investigated a research entitled a review on earnings forecast error and market adjusted returns using cost behavior. Empirical evidence in this study indicates the cost adhesion behavior and the cost of Tehran Stock Exchange, Which is consistent with research conducted by Anderson and Madirus. The evidence also shows that the difference observed in the adhesion intensity is caused by the differences in the nature of fixed assets of their future operations. The less the possibility of lowering and adjusting the level of operating assets in income decrease periods is, the more is the adhesion intensity. Managers can identify and monitor the companies' costs adhesion. Through concluding appropriate contracts for leasing operating assets and hiring employees, they can reduce sale level and lower the intensity of costs adhesion.

### **Research hypotheses**

*First hypothesis:* Cost of sold goods is adhesive relative to sales revenue changes.

*Second hypothesis:* The amount of current liabilities of the company (the ratio of current liabilities to total assets) has a positive and significant impact on the adhesion intensity of sold goods cost.

*Third hypothesis:* The amount of long term liabilities (long-term liabilities to total assets ratio) has a positive and significant impact on the adhesion intensity of sold goods cost.

*Fourth hypothesis:* The amount of total liabilities (total liabilities to total assets ratio) has a positive and significant impact on the adhesion intensity of sold goods cost.

## **METHODOLOGY**

The present study is an applied research in terms of objectives and in terms of methodology is a descriptive study and evaluates the correlation between variables and in terms of time dimension it an Ex-Post Facto approach is implemented. Also, the study is a quasi-experimental research in the field of PAT research. It will be performed using multivariate regression model and econometric patterns. To study the theoretical bases of the research library method was used. For data processing Eviews 7 and Excel software are employed.

The study population includes companies listed in Tehran Stock Exchange since the beginning of 2005 until the end of 2012, an eight year period, during which they have preserved their membership in the stock exchange. To achieve reliable results, companies that entered the stock exchange after 2005 or those that exit the stock exchange during the research period are not included in the research population. In addition, to achieve the desired statistical sample systematic elimination method is used. Therefore, the statistical population is adjusted using the following conditions:

1. Investment, insurance and financial intermediaries companies are excluded from the sample.
2. The end of the financial year of the company must be March.
3. Financial information of the company must be available on the study period.
4. The sample companies must be audited and their audit report must not be fail.

Due to the expressed limitations 130 companies were selected as the target population.

## **RESULT**

In order to achieve the research objective that is to investigate the relationship between capital structure and costs adhesion in companies listed in Tehran stock exchange the results are obtained as follows:

*The first hypothesis of the study:* The first hypothesis of the study evaluates the adhesion of sold goods cost. To test this hypothesis, a multivariate regression model was used, where the dependent variable is the logarithm of the growth rate of sold goods cost ( $\ln \text{Cost}_t / \text{Cost}_{t-1}$ ) and the

independent variable is the logarithm of the growth rate of sales revenue ( $\ln \text{Sales}_t/\text{Sales}_{t-1}$ ). According to the results in Table [1], the F-statistic is significant with 99% confidence level. In addition, the adjusted determination coefficient obtained from the model test is 0.2635. This figure represents that approximately 26% of the variability of the dependent variable that is the logarithm of the growth rate of sold goods cost is due to changes in the explanatory variables included in the model and the other 74% percent of the variation is due to other factors. Dummy variable coefficient of the sales change rate is -0.0899, i.e. with an increase of 1% in the dummy variable, the sold goods cost will decrease by 8 percent. The results show that the sold goods cost has been adhesive relative to sales revenue changes. Thus, the first hypothesis of the research has also been approved.

*The second hypothesis of the study:* The second hypothesis of the study evaluates the impact of current liabilities rate on the adhesion intensity of sold goods cost. The dependent variable is the logarithm of the growth rate of sold goods cost ( $\ln \text{Cost}_t/\text{Cost}_{t-1}$ ) and the independent variable is the logarithm of the growth rate of sales revenue ( $\ln \text{Sales}_t/\text{Sales}_{t-1}$ ) and damper variable is the ratio of current liabilities to total assets. According to the results in Table2, the F-statistic is significant with 99% confidence level. Therefore, the research fourth model is significant generally and the independent variables are able to explain the dependent variable. In addition, the adjusted determination coefficient obtained from the model test is 0.3168. This figure represents that approximately 31% of the variability of the dependent variable that is the logarithm of the growth rate of sold goods cost is due to changes in the explanatory variables included in the model and the other 69% percent of the variation is due to other factors. The results show that the cost of sold goods is adhesive relative to sales revenue changes and by increasing the current liabilities level, the adhesion intensity of sold goods cost increases. Negative  $\beta_2$  coefficient indicates the adhesion of sold goods cost and negative  $\beta_3$  coefficient indicates the increased intensity of adhesions when increasing the current liabilities level. This means that with 1% increase in sales revenue, sold goods cost will increase 18% and with 1% decrease in sales revenue, sold goods cost will decrease 14.25% = (2.84 - 0.89% -18%). Thus, the second hypothesis of the study has been approved.

*The third hypothesis of the study:* The third hypothesis of the study evaluates the impact of the amount of long term liabilities on the adhesion intensity of sold goods cost. The dependent variable is the logarithm of the growth rate of sold goods cost ( $\ln \text{Cost}_t/\text{Cost}_{t-1}$ ) and the independent variable is the logarithm of the growth rate of sales revenue ( $\ln \text{Sales}_t/\text{Sales}_{t-1}$ ) and damper variable is the ratio of long-term liabilities to total assets. According to the sixth model significance test results and the coefficients in Table [3], the F-statistic is significant with 95% confidence level. Therefore, the research sixth model is significant generally and the independent variables are able to explain the dependent variable. In addition, the adjusted determination coefficient obtained from the model test is 0.1686. This figure represents that approximately 16% of the variability of the dependent variable that is the logarithm of the growth rate of sold goods cost is due to changes in the explanatory variables included in the model and the other 84% percent of the variation is due to other factors. The results show that the cost of sold goods is adhesive relative to sales revenue changes, but increasing the long-term liabilities level, the adhesion intensity of sold goods cost does not increase. Negative  $\beta_2$  coefficient indicates the adhesion of sold goods cost and negative  $\beta_3$  coefficient indicates the increased intensity of adhesions when increasing the long-term liabilities level. Thus, the third hypothesis of the study has not been approved.

*The fourth hypothesis of the study:* The fourth hypothesis of the study evaluates the impact of total liabilities rate on the adhesion intensity of sold goods cost. The dependent variable is the

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logarithm of the growth rate of sold goods cost ( $\ln \text{Cost}/\text{Cost}_{t-1}$ ) and the independent variable is the logarithm of the growth rate of sales revenue ( $\ln \text{Sales}_t/\text{Sales}_{t-1}$ ) and damper variable is the ratio of total liabilities to total assets. According to the eighth model significance test results and the coefficients in Table [4], the F-statistic is significant with 95% confidence level. Therefore, the research eighth model is significant generally and the independent variables are able to explain the dependent variable. In addition, the adjusted determination coefficient obtained from the model test is 0.1253. This figure represents that approximately 12% of the variability of the dependent variable that is the logarithm of the growth rate of sold goods cost is due to changes in the explanatory variables included in the model and the other 88% percent of the variation is due to other factors. The results show that the cost of sold goods is adhesive relative to sales revenue changes, but by increasing the total liabilities level, the adhesion intensity of sold goods cost does not increase. The variable coefficient of sales revenue variations rate is less than the sum of three variation coefficient of sales and dummy variables of sales changes and the total liabilities ( $\%4.36 \leq (\%4.36 - \%0.32 + \%11.68)$ ). Thus, the fourth hypothesis of the study has not been approved.

**Table 1.** Results of the first hypothesis test in pooled data level

Description	Coefficient		t	p
Fixed coefficient (intercept)	$\beta_0$	-0.0892	-4.0289	0.0021
$\ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right)$	$\beta_1$	0.2108	3.9927	0.0187
$\text{Dec} * \ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right)$	$\beta_2$	-0.0899	-3.7726	0.0391
R-squared				0.2816
Adjusted R-squared				0.2635
F-static				4.9806
F (p-value)				0.001
D-W				2.1984

**Table 2.** Results of the second hypothesis test in pooled data level

Description	Coefficient		t	p
Fixed coefficient (intercept)	$\beta_0$	-0.0078	-3.3481	0.0238
$\ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right)$	$\beta_1$	0.1892	3.5106	0.0028
$\text{Dec} * \ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right)$	$\beta_2$	-0.0089	-5.2891	0.001
$\text{Dec} * \ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right)$	$\beta_3$	-0.0284	-2.6739	0.0318
R-squared				0.3309
Adjusted R-squared				0.3168
F-static				6.2793
F (p-value)				0

**Table 3.** Results of the third hypothesis test in pooled data level

Description	Coefficient		t-static	p-value
Fixed coefficient (intercept)	$\beta_0$	-0.0004	-1.3548	0.0945
$\ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right)$	$\beta_1$	0.1106	3.2178	0.0208
$\text{Dec} * \ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right)$	$\beta_2$	-0.0433	-2.9172	0.0392
$\text{Dec} * \ln \left( \frac{\text{sales}_{i,t}}{\text{sales}_{i,t-1}} \right) * \ln \left( \frac{\text{long\_term\_debt}_{i,t}}{\text{asset}_{i,t}} \right)$	$\beta_3$	0.0894	4.0162	0.0197
R-squared				0.1699

Adjusted R-squared	0.1686
F-static	3.6993
F (p-value)	0.0280

**Table 4.** Results of the fourth hypothesis test in pooled data level

Description	Coefficient		<i>t-static</i>	<i>p-value</i>
Fixed coefficient (intercept)	$\beta_0$	-0.0032	-2.8311	0.0442
$\ln\left(\frac{sales_{i,t}}{sales_{i,t-1}}\right)$	$\beta_1$	0.0436	3.6899	0.0327
$Dec * \ln\left(\frac{sales_{i,t}}{sales_{i,t-1}}\right)$	$\beta_2$	-0.0032	-4.0042	0.0281
$Dec * \ln\left(\frac{sales_{i,t}}{sales_{i,t-1}}\right) * \ln\left(\frac{total\ debt_{i,t}}{Asset_{i,t}}\right)$	$\beta_3$	0.1168	2.6982	0.0444
R-squared			0.1407	
Adjusted R-squared			0.1253	
F-static			2.8357	
F (p-value)			0.0319	

## CONCLUSION

The empirical evidences of this study indicate the adhesion behavior of sold goods cost in active companies in Tehran Stock Exchange. What can be stated in summarizing and general conclusions of research hypotheses test based on the cost adhesion of sold goods as well as the impact of capital structure characteristics (factors such as current liabilities, long-term liabilities, total liabilities) on the intensity of costs adhesions in the period of 2005 to 2012 is that the cost of sold goods is adhesive. This must be taken into considerations in analyses of managers and when reviewing the work of managers. The amount of current liabilities of the company has a positive and significant impact on the adhesion intensity of sold goods cost while the amount of long term liabilities and the amount of total liabilities of the company has no positive and significant impact on the adhesion intensity of sold goods cost.

According to the survey results, some recommendations based on the findings of the research hypotheses are as follows:

1. The results of this study indicated the adhesive behavior of sold goods costs. Corporate managers are recommended considering costs adhesion and their intensity in planning and budgeting activities of the company to predict future costs. So, they can present a more accurate forecasting and more comprehensive budgeting.
2. The auditors in the presentation of financial statements are recommended evaluating the amount of given costs with regard to the adhesive behavior of costs and their asymmetric behavior with changes in sales revenue and level of the company's activity related to the discovery of any error or fraud.

### Subject recommendations to future researchers:

1. Evaluation of the effect of shareholders combination on the intensity of costs adhesions
2. An analysis on the relationship between corporate governance and costs adhesions

Analysis and evaluation of the effects of the economic lifecycle on the intensity of costs adhesions

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