



İZMİR KATİP ÇELEBİ ÜNİVERSİTESİ
İKTİSADİ VE İDARİ BİLİMLER FAKÜLTESİ
İŞLETME BÖLÜMÜ

İK2018

17. ULUSLARARASI KATILIMLI
İŞLETMECİLİK KONGRESİ

17th INTERNATIONALLY PARTICIPATED
BUSINESS CONGRESS

BİLDİRİLER KİTABI

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26-28 NİSAN 2018

ÇEŞME İZMİR



İzmir Kâtip Çelebi Üniversitesi Yayın No: 10

Bu eser, İzmir Kâtip Çelebi Üniversitesi Yönetim Kurulu'nun 13.11.2018 tarih ve 2018/28 sayılı toplantısında alınan 02 kararı uyarınca, elektronik kitap olarak yayımlanmasına karar verilmiştir.

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Kasım 2018

Sertifika No: 23705

Editörler: Hayrettin USUL
Şaban ÇELİK
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E-ISBN: 978-605-84722-9-7

Uluslararası Katılımlı İşletmecilik Kongresi (17. : İzmir : 2018)

İK2018 17. Uluslararası Katılımlı İşletmecilik Kongresi: Bildiriler kitabı, 26-28 Nisan 2018, Çeşme, İzmir = İK2018 17th Internationally Participated Business Congress, 26-28 April 2018, Çeşme, İzmir / Editörler: Hayrettin Usul, Şaban Çelik, Şuayyip Doğuş Demirci.- İzmir: İzmir Kâtip Çelebi Üniversitesi, 2018.

Çevrimiçi (XLV, 2055 sayfa). -- (İzmir Kâtip Çelebi Üniversitesi ; Yayın No: 10)
ISBN: 978-605-84722-9-7

1.İşletmecilik – Kongreler

I.Usul, Hayrettin II.Çelik, Şaban III.Demirci, Şuayyip Doğuş

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Eserin hukuki ve etik sorumluluğu yazarlara aittir. Tüm hakları saklıdır. Bu kitabın yayın hakkı İzmir Kâtip Çelebi Üniversitesi'ne aittir. İzinsiz kopyalanamaz ve çoğaltılamaz.

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EFFECT OF DEMAND UNCERTAINTY ON COST STRUCTURE OF TURKISH MANUFACTURING FIRMS

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Abstract

The structure of operating costs of Turkish manufacturing firms between years 1995 and 2014 is tested in terms of their “rigidity” in this paper. Rigidity is defined as the proportion of fixed costs to variable costs in cost structures. Additionally, the effect of demand uncertainty as measured by the standard deviation of net sales on the cost structure of operating costs is also tested. Results support that higher levels of demand uncertainty are associated with higher portions of fixed costs in the cost structure.

Keywords: Cost structure, cost rigidity, demand uncertainty, cost behavior

Talep Belirsizliğinin Türk İmalat Firmalarının Maliyet Yapısı Üzerindeki Etkisi

Özet

Bu çalışmada, Türkiye’de 1995-2014 döneminde faaliyet gösteren halka açık imalat firmalarının, faaliyet giderlerinin yapısı “maliyet katılığı” kavramı açısından incelenmektedir. Maliyet katılığı kavramı, firmaların sabit maliyetlerinin değişken maliyetlerine oranı olarak tanımlanmaktadır. Ayrıca net satışların standart sapması ile hesaplanan talep belirsizliğinin, faaliyet giderlerinin maliyet yapısı üzerine olan etkisi de test edilmiştir. Analiz sonuçlarına göre maliyet yapısı içerisinde sabit maliyetlerin oranının artmasının ya da daha katı maliyet yapısının, imalat firmaları için daha fazla talep belirsizliği kaynaklı olduğu tespit edilmiştir.

Anahtar Kelimeler: Maliyet yapısı, maliyet katılığı, talep belirsizliği, maliyet davranışı

1. INTRODUCTION

Understanding cost structure is crucial. Because it affects nearly all performance measures. Banker and Byzalov (2014) claim that understanding the cost structure and asymmetric cost behavior constitutes a new way of thinking not only about costs but also about earnings. Hence understanding the cost structure is one of the main pillars of budgeting.

It is posited in cost accounting textbooks that firms which have a higher portion of fixed costs in their cost structure, are more vulnerable to losses (Horngren et al. 2012). This implies that firms that are confronted with uncertainty would choose more elastic cost structure. However, this textbook knowledge out of intuition needs to be checked as stated by many authors (Banker, Byzalov and Plehn-Dujowich, 2014). Many attempts have been made to unravel the topic.

Although the cost structure is an important issue in understanding cost behavior of Turkish manufacturing firms, no study was conducted about Turkish firms on this topic in the literature. This paper will be the first to relate cost structure of manufacturing firms and demand uncertainty for Turkish firms.

The aim of this paper is to examine the effect of demand uncertainty on the cost structure of Turkish firms. 147 Turkish manufacturing firms’, from 13 industries, financial statements data are analyzed between 1995 and 2014. In the framework of cost rigidity literature, uncertainty variables are included in different models as interaction terms for presenting the mediating effect of demand uncertainty on the cost structure. Due to the panel structure of data, models are estimated by using panel data techniques.

The remainder of the paper proceeds as follows: In the next section a relevant literature on cost rigidity is summarized. "Methodology and Data" section introduces the model and variables. Also hypotheses of study are developed and data gathering process is explained in detail in this section. Findings of the paper are presented in "Results" section and finally "Conclusion" section concludes by summarizing and discussing the findings.

2. LITERATURE REVIEW

One of the earliest work to question the relevance of volume-based cost drivers was carried out by Banker and Johnston (1993). Although their analysis did not aim at testing the proportionality assumption of activity volume and costs, they report that besides volume-based cost drivers, operations-based drivers are also significant in the airline industry. The implicit assumption that overhead costs are strictly proportional to activity volume was first tested by Noreen and Soderstrom (1994). They report that long run overhead costs are not proportional to activity and average cost declines with activity. In their following work, Noreen and Soderstrom (1997) examined the time series behavior of overhead costs. They report that very small portion of overhead costs is made up of variable costs (averaging around 20% for the years examined). This implies that costing systems that assume proportionality are likely to yield higher costs which will shadow the decision making and performance evaluation processes. Anderson, Banker, and Janakiraman (2003) was the first to name the diversion from proportionality hypothesis as cost stickiness in their work. Since then there is a bunch of literature (i.e. Calleja, Steliaros, and Thomas (2006), Balakrishnan and Gruca (2008), Banker and Byzalov (2014)) examining whether costs present a sticky or anti-sticky behavior.

The notion that the ratio of variable costs to fixed costs in the cost structure increases as firms face higher uncertainty is also implied by the real option theory. The role of uncertainty in cost behavior was investigated by Kallapur and Eldenburg (2005). Utilizing the real option theory, the authors focused on contribution margin uncertainty and argue that managers would prefer technologies with higher variable costs and lower fixed costs as uncertainty increases. This result is in line with the conventional thought.

Banker et al. (2014) investigated the role of demand uncertainty on cost structure and cost behavior both empirically and analytically. Banker et al. (2014) tested their hypothesis empirically at the firm level and industry level. As they include interaction term which captures the effect of demand uncertainty, slope β decreases which reveals that demand uncertainty and cost rigidity have a positive association. Their results show that firms and industries which face more demand uncertainty have a cost structure with higher portions of fixed costs and lower variable costs.

One recent research on cost behavior was conducted by Holzhacker, Krishnan and Mahlendorf (2015). Using California hospitals' data, they investigated the effect of demand uncertainty and financial risk on cost behavior. Furthermore, they investigated the mediation effect of three resource procurement choices, namely: outsourcing, leasing and hiring contract labor, on the cost structure. They conclude that demand uncertainty and financial risk are two important factors determining cost structure and that both of these factors increase the cost elasticity.

3. METHODOLOGY AND DATA

Banker et al. (2014) set up a cost model of two components: a fixed component, which was decided before the demand, has been observed (ex-ante) and a variable component, which was decided after the demand realization. They argue that firms with higher demand uncertainty have short-run cost structure with higher fixed costs and lower variable costs, which they call as a more "rigid" cost structure. This is caused by the optimal respond of managers on capacity choices to increased demand uncertainty. In the case of demand uncertainty, both exceptionally high and low demands become likely. In the case of exceptionally high demand realizations, fixed inputs will not be sufficient, and congestion cost will be incurred. To relieve this congestion in case of high demand realization, managers need to increase the proportion of fixed input which leads to a more rigid cost structure. In the case of exceptionally low demands, the variable portion of cost structure will shrink, but the fixed portion will remain constant since it was decided before the demand realization. Hence the proportion of fixed input to variable input will be higher leading to again a more rigid cost structure. Thus, we can express our hypotheses as follows:

H₀: Firms have more rigid cost structure as demand uncertainty increases.

Banker et al. (2014) characterize cost behavior in terms of "cost rigidity." They define cost rigidity as the "mix of fixed and variable costs in the short run cost structure of the firm." The degree of cost rigidity is measured by the estimation of the following equation:

Equation 1:

$$\Delta \ln COST_{i,t} = \beta_1 + \beta_2 \Delta \ln SALES_{i,t} + \gamma_0 \text{controlvariables}_{i,t} + \varepsilon_{i,t}$$

The slope β_2 in the regression of changes in sales on changes in costs is the measure of cost rigidity.

Since the regression variables are expressed in log changes, β_2 indicates the percentage change in cost for a 1% change in sales. A less rigid short-run cost structure is associated with a greater slope β_2 , where costs are subjected to a change in a greater extent for the same degree of change in sales.

To test the effect of demand uncertainty on the cost structure, we decomposed the slope β_2 in Equation 1 which is the measure of cost rigidity by including an interaction variable ($UNCERT \times \Delta \ln SALES$) into Equation 1.

Equation 2:

$$\Delta \ln COST_{i,t} = \beta_1 + \beta_2 \Delta \ln SALES_{i,t} + \beta_3 \Delta \ln SALES_{i,t} * UNCERT_i + \gamma_0 \text{controlvariables}_{i,t} + \varepsilon_{i,t}$$

The dependent variable of the model $\Delta \ln COST_{i,t}$ is calculated as the log-change of operating costs for firm i , from year $t-1$ to year t . $\Delta \ln SALES_{i,t}$ is calculated as log-change of net sales for firm i , from year $t-1$ to year t . We used deflated operating costs and net sales following prior studies like Anderson et al. (2003), Kallapur and Eldenburg (2005), Banker et al. (2014). The impact of inflation on financial variables were removed by deflating all years to 1998 values by using appropriate coefficients of GDP deflator taken from World Bank.

Our uncertainty measure is $UNCERT$. $UNCERT$ is the nominal values for each firm demand uncertainty during the sample period and is calculated as the standard deviation of log-changes in sales ($\Delta \ln SALES_{i,t}$) in the entire sample period. So $UNCERT$ is a time-invariant variable and unique to firms in all period. Our control variable is GDP growth used to capture the macroeconomic effects on the cost structure.

In this model β_2 and β_3 together measures the degree of cost rigidity. In the extreme case when there is no uncertainty, $\beta_2 + \beta_3$ will be equal to β_2 , and as β_3 is significant, β_2 will be moderated. Thus, the β_3 will be the focus of interest in our analysis which indicates the effect of demand uncertainty on the cost structure.

After introducing our model and variables, we can modify and reformulate our **H₀** hypotheses as follows:

H_{0a}: β_3 is negative when $UNCERT$ interacts with $\Delta \ln SALES$ which indicates that firms have more rigid cost structure as demand uncertainty increases.

Our sample consists of Turkish manufacturing firms between 1995 and 2014. We went through several elimination procedures. Firstly, since our model requires working with differences from the previous period to current period, firms whose current or lagged operating costs or sales data are missing were discarded for that specific period from the sample. In line with the literature (Banker et al. (2014), Anderson et al. (2003)) firm-year observations which have an operating loss (i.e., operating costs exceed sales) were also discarded. Since our "uncertainty" measure is calculated as the standard deviation of sales, following Banker et al. (2014), we discarded firms with less than ten years of sales data from our sample. Finally, to eliminate the effect of outlier observations on the results, 1 percent of each tail of sample were also discarded. The elimination of outliers enhanced the skewness and kurtosis of variables. The elimination procedure yielded 147 Turkish manufacturing firms from 13 industries through 20 years between 1995 and 2014 and 2.656 firm-year observations. The descriptive statistics are presented in Table 1.

Table 1 - Descriptive Statistics

	Mean	Median	Max.	Min.	St.Dev.
Dependent variable					
$\Delta \ln \text{COST}$	0.013	0.017	0.847	-0.799	0.230
Independent variables					
$\Delta \ln \text{SALES}$	0.002	0.015	0.732	-1.074	0.240
UNCERT	0.273	0.225	1.127	0.100	0.162

4. RESULTS

Considering the panel structure of our data, we estimated our model by using panel data techniques over pooled OLS. Fixed effect specification with cross section GLS weights were employed in our regressions to control for firm-specific and time-invariant factors. Moreover, to control for cross-section heteroscedasticity, cross section weights were used. Regression results are presented in Table 2.

In Model 0, the log-change of deflated net sales ($\Delta \ln \text{SALES}$) is regressed against the log-change of deflated operating costs ($\Delta \ln \text{COST}$) and the control variable GDP growth was also included. This model is used to test the cost structure of the firms in the sample. In other words, how much “rigid” is the operating costs of the firms is tested by this model. Results show that β_2 is equal to 0.45 which indicates that a 1% change in the sales results in an average of 0.45% change in operating costs in the same direction.

The main aim of this study is to test the effect of demand uncertainty on the cost structure of firms. Thus, uncertainty variable is included in the models as interaction term. Model 1 tests the main hypotheses that cost structure becomes more rigid as the demand uncertainty increase. The significantly negative coefficient of β_3 of -0.248 (t statistics -2.829) for the interaction term supports our hypotheses.

Table 2 – Regression Results

Variables	Model 0	Model 1
Dependent Variable		
$\Delta \ln \text{COST}$		
Independent Variables		
Intercept	0.003	0.002
	(0.717)	(0.579)
$\Delta \ln \text{SALES}$	0.447	0.526
	(29.346)***	(16.936)***
$\Delta \ln \text{SALES} * \text{UNCERT}$		-0.248
		(-2.829)***
GDPgrowth	0.229	0.222
	(3.139)***	(3.027)***
Adjusted R-Square	0.295	0.299
*Significance at the 10% level using a one-tailed test. **Significance at the 5% level using a one-tailed test. ***Significance at the 1% level using a one-tailed test.		

5. CONCLUSION

The motivation of this study is to understand the cost structure under uncertainty circumstances for a sample of Turkish manufacturing firms. For this purpose, 147 Turkish manufacturing firms’ financial statements are used between 1995 and 2014. Due to the panel structure of data, models are estimated by using panel data techniques. Fixed effect specification with cross section GLS weights was employed in all regressions.

The first findings indicate that a one percent change in the sales results in an average of 0.45% change in operating costs in the same direction. This result emphasizes that the elasticity of operating costs is

low. The main aim of this study is to examine the effect of demand uncertainty on the cost structure of firms. Therefore, the uncertainty variable is included as interaction term. The estimation results show that when the demand uncertainty increases, cost structure becomes more rigid.

References

- ANDERSON, M. C., BANKER, R. D. and JANAKIRAMAN, S. N. (2003). Are selling, general, and administrative costs ‘‘sticky’’? *Journal of Accounting Research* 41 (1): 47–63.
- BALAKRISHNAN, R., and GRUCA. T. (2008). Cost stickiness and core competency: A note. *Contemporary Accounting Research* 25 (4): 993–1006.
- BANKER, R., and BYZALOV. D. (2014). Asymmetric cost behavior. *Journal of Management Accounting Research* 26 (2).
- BANKER, R. D., BYZALOV, D. and PLEHN-DUJOWICH, J. M. (2014). Demand uncertainty and cost behavior. *The Accounting Review* 89 (3): 839–865.
- CALLEJA, K., STELIAROS, M. and THOMAS, D. C. (2006). A note on cost stickiness: Some international comparisons. *Management Accounting Research* 17.2: 127-140.
- HOLZHACKER, M., KRISHNAN, R. and MAHLENDORF, M. D. (2015). Unraveling the black box of cost behavior: An empirical investigation of risk drivers, managerial resource procurement, and cost elasticity. *The Accounting Review*, 90(6), 2305-2335.
- HORNGREN, C. T., DATAR, S. M. and RAJAN, M. V. (2012). *Cost Accounting: A Managerial Emphasis*. 14th edition. Upper Saddle River, NJ: Pearson/Prentice Hall.
- KALLAPUR, S. and ELDENBURG, L. (2005). Uncertainty, real options, and cost behavior: Evidence from Washington State hospitals. *Journal of Accounting Research* 43 (5): 735–752.
- NOREEN, E., and SODERSTROM, N. (1994). Are overhead costs strictly proportional to activity? Evidence from hospital departments. *Journal of Accounting and Economics* 17 (1): 255–278.
- NOREEN, E., and SODERSTROM, N. (1997). The accuracy of proportional cost models: Evidence from hospital service departments. *Review of Accounting Studies* 2 (1): 89–114.