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ARTICLE



Sticky cost theory and firm's evolution

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ABSTRACT

The present study investigates the cost behaviour across a firm's life cycle. Following firms' evolution, we incorporate a medium to long-term strategic frame on the examination of the association between costs and revenues examining different types of operating costs and controlling for evolution from growth to maturity life cycle stage.

KEYWORDS

Life cycle; listed firms; cost asymmetry; anti-stickiness

JEL CLASSIFICATION

M41; G31

I. Introduction

While the asymmetric cost behaviour has been studied across many contexts (i.e. industries by Li et al. 2020; corporate tax expenses by Guo et al. 2020; countries by Banker and Byzalov 2014) the interest in the relationship between firms' cost behaviour and firm's evolution is relatively recent (Silge and Wöhrmann 2019). In the current study, we control for the movement of firms across specific stages of a firm's life cycle and for differences in the association between sales and costs across life cycle stages. Moreover, we explore the sticky cost behaviour for both a longer period than previous studies and across distinct types of costs.

We confirm the existence of asymmetric cost behaviour for the whole sample of US firms examined and we find differences in sticky cost pattern across a firm's life cycle. However, in contrast to Lee (2018), cost stickiness is evident only during the introduction and expansion stage of a firm, while our findings imply the existence of anti-stickiness behaviour of cost for mature firms and firms in the decline phase. Finally, our results reinforce the argument that firms focus on the improvement of cost allocation during the maturity stage.

II. Materials and methods

According to the 'sticky cost' theory, costs exhibit asymmetric behaviour if they decrease less when sales volume declines than they rise when activity

increases. Literature built on Anderson, Banker, and Janakiraman (2003) study explained the sticky cost phenomenon with economic and agency factors. Regarding agency factors, cost stickiness has been associated to empire-building incentives and incentives to meet earnings targets (Dierynck, Landsman, and Renders 2012; Chen, Lu, and Sougiannis 2012; Balios et al. 2020). According to the economic view, anticipations for the future level of activity, expectations about future uncertainty, optimism in managerial estimations, managerial resource commitment decisions and adjustment costs drive sticky cost behaviour (i.e. Banker, Byzalov, and Plehn-Duhowich 2014; Banker and Byzalov 2014; Holzhacker, Krishnan, and Mahlendorf 2015; Venieris, Naoum, and Vlismas 2015; Ballas, Naoum, and Vlismas 2020).

Assuming that strategic focus on sales growth at earlier stages of life cycle, at the expense of operational efficiency (profitability) through irreversibility of investment and excess investment (Spence 1977), is reversed during the maturity stage, Jenkins, Kane, and Velury (2004) found differences in the incremental value relevance of changes in sales and changes in profitability across life cycles. Moreover, the gradual introduction of managerial tools that focus on the deviation between financial performance and targets for young firms (Davila and Foster 2007) is consistent with the reduced importance of profitability during initial life stages. Changes in organizational structure in later stages

of a corporate's life cycle drive the incorporation of advanced accounting tools, such as activity based costing (Kallunki and Silvola 2008), that increase operational efficiency through improved cost allocation. Therefore, given that the association between costs and sales is not similar across life stages, lack of respective control might bias the coefficient estimate that captures the association between costs and sales.

Expecting that operating efficiency, which is depicted by the matching between expenses and sales, differ across life stages and that strategic focus drive irreversibility of investments framed by growth opportunities (Silge and Wöhrmann 2019) at earlier stages of life cycle we hypothesize that

H1: *The association between sales and costs is not similar across life stages*

H2: *Cost stickiness is more likely to prevail in earlier stages of a firm's life cycle*

Following extant methodology (Anderson, Banker, and Janakiraman 2003), we empirically examine model 1¹

$$\begin{aligned}
 \log\left(\frac{CS_{i,t}}{CS_{i,t-1}}\right) = & b_0 + b_1 \log\left(\frac{RS_{i,t}}{RS_{i,t-1}}\right) + b_2 d_{i,t} \log \\
 & \left(\frac{RS_{i,t}}{RS_{i,t-1}}\right) + b_3 d_{i,t} \log\left(\frac{RS_{i,t}}{RS_{i,t-1}}\right) \log\left(\frac{ES_{i,t}}{RS_{i,t}}\right) \\
 & + b_4 d_{i,t} \log\left(\frac{RS_{i,t}}{RS_{i,t-1}}\right) \log\left(\frac{AS_{i,t}}{RS_{i,t}}\right) \\
 & + b_5 d_{i,t} \log\left(\frac{RS_{i,t}}{RS_{i,t-1}}\right) ds_{i,t} + b_6 d_{i,t} \log\left(\frac{RS_{i,t}}{RS_{i,t-1}}\right) GNP_t \\
 & + b_7 d_{i,t} \log\left(\frac{RS_{i,t}}{RS_{i,t-1}}\right) FCF_t + b_8 \log\left(\frac{ES_{i,t}}{RS_{i,t}}\right) \\
 & + b_9 \log\left(\frac{AS_{i,t}}{RS_{i,t}}\right) + b_{10} ds_{i,t} + b_{11} GNP_t + b_{12} FCF_t + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

where coefficient b_1 captures cost sensitivity after a percentage increase in sales revenue and coefficient b_2 captures the asymmetric behaviour of cost for a percentage decrease in sales. Based on Jensen (1986), we expect that agency problems arising from increased free cash flows are expected to be more

Table 1. Variables.

CS	Any examined cost (SGA, CGS or OPER)
RS	Sales revenues
ES	Number of employees
AS	Total assets
GNP	Percentage growth in real Gross National Product
FCF	Free cash flow
d	Equals 1 if sales decrease in year t ; otherwise, it is equal to zero.
ds	Equals 1 if sales decrease for two consecutive years; otherwise, it is equal to zero.
dm	Equals 1 if a firm is classified as a mature firm; otherwise, it is equal to zero (if a firm is in a growth stage).

severe for mature firms that tend to have higher free cash flows (Hribar and Yehuda 2015). In other words, cost stickiness might be more prevailed for mature firms. Following Chen, Lu, and Sougiannis (2012) and, in order to control for variation of sticky cost phenomenon for agency reasons, we have included 'FCF' in the examined empirical model. We explore the asymmetric behaviour of various operating costs such as selling, general and administrative expenses (SGA), cost of goods sold (CGS) and total operating expenses (OPER). In Table 1, we present definitions of variables used in empirical models.

Our sample includes US listed firms (from Datastream) covering the period 1997 to 2017, while we follow related studies on sample selection (i.e. Banker and Byzalov 2014) and firms' classification in life cycle stages (Dickinson 2011). Based on non-tabulated descriptive statistics, the mean (median) value of scaled SGA equals to 18.5% (20.4%) while the mean (median) scaled CGS equals to 64.2% (50.6%). Average value of scaled SGA seems to be lower to respective ratios reported in earlier studies (i.e. Chen, Lu, and Sougiannis 2012) while mean value of scaled CGS seem to be broadly comparable to results presented by Banker and Byzalov (2014).

III. Results

Findings from Table 2 confirm results from extant literature regarding cost sticky behaviour of US listed firms. Specifically, coefficient b_2 that captures the cost asymmetry is negative and significantly different from zero, while non-tabulated results confirm reduction of cost stickiness when changes are viewed over longer periods (Anderson, Banker, and Janakiraman 2003).

¹Our empirical analysis is based on standard errors that are clustered by firm.:

Table 2. Life cycle.

	Whole sample	Introduction	Growth	Mature	Decline	Shake-Out
b₀	0.026** (2.53)	0.033*** (3.48)	0.0163 (0.89)	0.011** (2.29)	-0.031 (-1.22)	0.036** (1.98)
b₁	0.282*** (95.28)	0.163** (1.98)	0.470*** (16.26)	0.506*** (39.38)	0.069*** (4.21)	0.188*** (4.13)
b₂	-0.055** (-2.00)	-0.061*** (-10.14)	-0.032*** (-2.59)	0.366*** (4.21)	0.209*** (7.73)	-0.124 (-0.90)
b₃	0.028*** (2.89)	0.094*** (3.77)	0.232*** (4.69)	0.168*** (7.96)	-0.007 (-0.27)	-0.114** (-2.23)
b₄	-0.130*** (-14.58)	-0.139*** (-0.59)	-0.219*** (-4.49)	-0.334*** (-12.50)	-0.075*** (-3.26)	0.005 (0.12)
b₅	0.001 (0.10)	-0.029 (-0.90)	0.254*** (3.92)	0.137*** (4.28)	-0.020 (-0.68)	0.045 (0.67)
b₆	0.006 (0.68)	0.045* (1.52)	0.004 (0.82)	0.044 (1.50)	0.071 (1.11)	0.011 (1.08)
b₇	0.027* (1.59)	-0.003 (-0.92)	0.010*** (3.78)	0.058** (1.94)	-0.032 (-1.40)	0.004 (0.70)
b₈	-0.005*** (-3.40)	-0.008 (-1.27)	-0.001 (-0.44)	-0.001 (-0.59)	-0.017* (-1.71)	0.005 (0.69)
b₉	0.027*** (14.94)	0.043*** (6.87)	0.013*** (3.25)	-0.001 (-0.05)	0.056*** (6.26)	0.021** (2.43)
b₁₀	-0.022*** (-2.73)	-0.063*** (-5.99)	-0.023*** (-3.44)	-0.010*** (-3.79)	-0.051*** (-4.68)	-0.039*** (-6.95)
b₁₁	-0.001 (-0.72)	-0.003 (-0.23)	-0.004 (-0.52)	0.017 (0.43)	-0.004 (-1.28)	0.001 (0.26)
b₁₂	0.003 (1.07)	-0.001** (-1.96)	0.001* (1.85)	0.004 (0.81)	-0.067* (-1.71)	0.200* (1.94)
Industry FE	Included	Included	Included	Included	Included	Included
Year FE	Included	Included	Included	Included	Included	Included
Observations	34,318	3,754	9,552	15,969	1,899	3,144
Adj. R-Squared	0.186	0.158	0.269	0.191	0.172	0.207

*, **, *** denote coefficient estimates that are, respectively, significantly different from zero at 10%, 5% and 1%; t – stat are presented in parentheses. FE denotes fixed effects.

The positive estimated value of b_1 ranging from 0.069 (decline stage) to 0.506 (mature stage), indicates that, for one-year periods, costs increase from 0.069% to 0.506% after a percentage increase in sales revenue. Variation of the sign of the coefficient estimate of b_2 across life stages implies that SGA exhibit cost stickiness (**anti-stickiness**) for firms in the introduction and in the growth stage (**in the mature and in the decline stage**) as the sign of the coefficient is negative (**positive**) and equals to -0.061 and -0.032 (0.366 and 0.209), respectively. For firms in the shake-out stage, the statistically insignificant estimated value of coefficient b_2 (-0.124) implies a symmetric behaviour. Results related to the sticky behaviour of cost across early phases of a firm's evolution and the anti-sticky behaviour across later stages of a firm's life cycle are strongly supported for firms that remain in the same life cycle for two or three consecutive years (non-tabulated results).

In Table 3, we examine an extended model that incorporates a dummy variable which captures the sensitivity across growth and mature stage. In Panel B of Table 3, we confine our sample to

mature and growth firms that are in the same life cycle for at least two consecutive years. In Panel C of Table 3, we report results over 2 years aggregated period changes for firms that during the first 4 years are within the introduction or growth stage and then they move into the mature stage for 4 years. The negative and statistically significant estimate of b_{1a} (Table 3) implies that for mature firms an increase in sales results to an increase in SGA that is lower than a respective increase in the growth stage. This is consistent with a shift in focus towards operational efficiency by containing operational costs when moving into later phases of a firm's cycle and confirm H_1 . Coefficient b_{2a} is positive and greater in absolute terms to coefficient b_2 . The magnitude and the sign of b_{2a} is in accordance to earlier results regarding the anti-sticky cost behaviour when mature firms face sale decreases (H_2) and verify our expectation for cost constraint strategies followed by mature firms.

Our results are qualitatively unchanged when we examine CGS or OPER, and control for industry and year.

Table 3. Growth and mature firms.

	PANEL A	PANEL B 2 years growth and 2 years maturity	PANEL C 4 years introduction/growth and then 4 years maturity (Two-Years Period aggregation)
b_0	0.021*** (5.37)	-0.003 (-0.23)	0.052*** (7.67)
b_1	0.240*** (6.18)	0.209*** (7.73)	0.265*** (3.26)
b_{1a}	-0.024** (-2.40)	-0.008** (-2.00)	-0.012*** (-7.67)
b_2	-0.044*** (-18.61)	-0.043*** (-4.42)	-0.017* (-1.74)
b_{2a}	0.286*** (3.14)	0.110*** (2.78)	0.118** (2.19)
b_3	0.028*** (2.89)	-0.078*** (-9.01)	-0.016*** (-8.33)
b_4	-0.130*** (-14.58)	0.013 (0.068)	-0.019* (-1.85)
b_5	0.001 (0.099)	0.003 (1.49)	0.013 (0.62)
b_6	0.011 (1.59)	0.003 (0.86)	0.005* (1.80)
b_7	0.010 (1.63)	0.005* (1.80)	0.026** (2.53)
b_8	0.027*** (14.94)	0.059 (0.83)	0.093 (1.31)
b_9	-0.081 (-0.28)	-0.002*** (-4.22)	-0.013*** (-5.15)
b_{10}	-0.001** (-2.56)	0.007 (0.71)	0.001* (1.86)
b_{11}	0.024*** (4.19)	-0.011* (-1.86)	-0.015*** (-2.59)
b_{12}	0.002 (0.84)	-0.006* (-1.87)	-0.004 (-0.27)
b_{13}	0.005 (1.48)	-0.001 (-1.19)	0.057 (0.66)
Industry FE	Included	Included	Included
Year FE	Included	Included	Included
Observations	25,521	11,635	1,524
Adj.	0.247	0.183	0.159
R-Squared			

IV. Conclusions

We confirm that cost stickiness is an inherent characteristic of firms during earlier stages of a firm's life cycle but we detect cost anti-stickiness during later stages. Following expectations related to the shifting of focus towards operational efficiency, we provide empirical results consistent with the existence of a greater sensitivity in the adjustment of expenses during sales decreases than sales increases for firms in the maturity stage.

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No potential conflict of interest was reported by the author(s).

References

Anderson, M. C., R. D. Bunker, and S. Janakiraman. 2003. "Are Selling, General and Administrative Cost "Sticky"?" *Journal of Accounting Research* 41: 47–63. doi:10.1111/1475-679X.00095.

Balios, D., N. Eriotis, V. C. Naoum, and D. Vasiliou. 2020. "How Earnings Management Drive the Sticky Behavior of Selling General and Administrative Costs; an International Comparative Perspective." *Journal of Managerial and Financial Accounting*, 12: 242. (forthcoming). doi:10.1504/IJMFA.2020.112336.

Ballas, A., V. C. Naoum, and O. Vlismas. 2020. "The Effect of Strategy on Asymmetric Cost Behavior of SG&A Expenses." *European Accounting Review* 1–39. (forthcoming). doi:10.1080/09638180.2020.1813601.

Banker, D., and D. Byzalov. 2014. "Asymmetric Cost Behavior." *Journal of Management Accounting Research* 25 (2): 43–79. doi:10.2308/jmar-50846.

Banker, R. D., Byzalov, D., & Plehn-Dujowich, J. M. (2014). Demand uncertainty and cost behavior. *The Accounting Review*, 89(3): 839–865. doi:10.2308/accr-50661

Chen, C. X., H. Lu, and T. Sougiannis. 2012. "The Agency Problem, Corporate Governance, and the Asymmetrical Behavior of Selling, General, and Administrative Costs." *Contemporary Accounting Research* 29: 252–282. doi:10.1111/j.1911-3846.2011.01094.x.

Davila, A., and G. Foster. 2007. "Management Control Systems in Early-stage Startup Companies." *The Accounting Review* 82 (4): 907–937. doi:10.2308/accr.2007.82.4.907.

Dickinson, V. 2011. "Cash Flow Patterns as a Proxy for Firm Life Cycle." *The Accounting Review* 86 (6): 1969–1994. doi:10.2308/accr-10130.

Dierynck, B., W. R. Landsman, and A. Renders. 2012. "Do Managerial Incentives Drive Cost Behavior? Evidence about the Role of the Zero Earnings Benchmark for Labor Cost Behavior in Private Belgian Firms." *The Accounting Review* 87 (4): 1219–1246. doi:10.2308/accr-50153.

Guo, F., S. Gan, W. Yang, and P. Kuang. 2020. "Are Sales and Taxes 'Sticky'? Empirical Evidence of the Impact of Tax Enforcement on Tax Revenue Growth in China." *Applied Economics Letters* 28 (8): 663 –667. doi: 10.1080/13504851.2020.1770675.

Holzhacker, M., R. Krishnan, and M. D. Mahlendorf. 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. doi:[10.2308/accr-51092](https://doi.org/10.2308/accr-51092).

Hribar, P., and N. Yehuda. 2015. "The Mispricing of Cash Flows and Accruals at Different Life-cycle Stages." *Contemporary Accounting Research* 32 (3): 1053–1072. doi:[10.1111/1911-3846.12117](https://doi.org/10.1111/1911-3846.12117).

Jenkins, D. S., G. D. Kane, and U. Velury. 2004. "The Impact of the Corporate Life-cycle on the Value-relevance of Disaggregated Earnings Components." *Review of Accounting and Finance* 3 (4): 5–20. doi:[10.1108/eb043411](https://doi.org/10.1108/eb043411).

Jensen, M. C. 1986. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers." *The American Economic Review* 76 (2): 323–329.

Kallunki, J. P., and H. Silvola. 2008. "The Effect of Organizational Life Cycle Stage on the Use of Activity-based Costing." *Management Accounting Research* 19 (1): 62–79. doi:[10.1016/j.mar.2007.08.002](https://doi.org/10.1016/j.mar.2007.08.002).

Lee, J. H. 2018. "Empirical Analysis of Asymmetric Cost Behavior." Unpublished doctoral thesis, University of Calgary.

Li, Z., Q. Ying, Y. Chen, and X. Zhang. 2020. "Managerial Risk Appetite and Asymmetry Cost Behavior: Evidence from China." *Accounting & Finance* 60 (5): 4651–4692. doi:[10.1111/acfi.12692](https://doi.org/10.1111/acfi.12692).

Silge, L., and A. Wöhrmann. 2019. "Market Reaction to Asymmetric Cost Behavior: The Impact of Long-term Growth Expectations." *Review of Managerial Science* 15 (2): 309 - 347. doi: [10.1007/s11846-019-00341-8](https://doi.org/10.1007/s11846-019-00341-8).

Spence, A. M. 1977. "Entry, Capacity, Investment and Oligopolistic Pricing." *The Bell Journal of Economics* 8: 534–544. doi:[10.2307/3003302](https://doi.org/10.2307/3003302).

Venieris, G., V. C. Naoum, and O. Vlismas. 2015. "Organisation Capital and Sticky Behavior of Selling, General and Administrative Expenses." *Management Accounting Research* 26 (1): 54–82. doi:[10.1016/j.mar.2014.10.003](https://doi.org/10.1016/j.mar.2014.10.003).