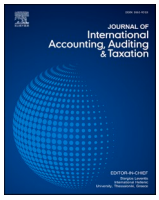
Journal of International Accounting, Auditing and Taxation 53 (2023) 100578

Contents lists available at ScienceDirect

Journal of International Accounting, Auditing and Taxation



Asymmetric cost behavior: Theory, meta-analysis, and implications☆

Vasilios-Christos Naoum [a], Dimitrios Ntounis [b], Georgios Papanastasopoulos [c,*], Orestes Vlismas [b]

[a] Department of Maritime Studies, University of Piraeus, 80 Karaoli & Dimitriou Street, 18534 Piraeus, Greece
[b] Department of Accounting and Finance and Accounting Information Systems Laboratory, Athens University of Economics and Business, 76 Patission Street, 10434 Athens, Greece
[c] Department of Business Administration, University of Piraeus, 80 Karaoli & Dimitriou Street, 18534 Piraeus, Greece

ARTICLE INFO

Keywords:
Asymmetric cost behaviour
Cost stickiness
Cost anti-stickiness
Managerial decisions
Meta-analysis

ABSTRACT

Asymmetric cost behavior is an emerging and dynamic research area within the context of contemporary cost management research. This study systematically reviews asymmetric cost behavior research published in ABS-ranked journals (53 English-speaking journals) between 2003 and 2020. Additionally, we provide a review of the econometric models and instruments employed in empirical asymmetric cost behavior research and a meta-analysis of prior empirical evidence for the main determinants of the direction and intensity of the asymmetric cost behavior phenomenon. Several research streams are recognized within two major themes of cost asymmetry empirical research: (i) determinants of the asymmetric cost behavior phenomenon, and (ii) cost asymmetry as a determinant of earnings behavior, earnings prediction, and other microeconomic and macroeconomic phenomena. Each major component of our review is accompanied by critical analysis and suggestions for future research. Meta-analysis of the existing body of cost asymmetry studies reveals no publication bias but increasing heterogeneity within existing empirical evidence for cost asymmetry.

1. Introduction

An emerging research stream within the field of cost accounting, and especially in the cost behavior literature, focuses on the asymmetric cost behavior phenomenon (Noreen, 1991; Anderson et al., 2003; Balakrishnan & Gruca, 2008; Banker & Byzalov, 2014; Chen et al., 2012; Kama & Weiss, 2013). The literature on asymmetric cost behavior is critical towards the traditional mechanistic perception that the behavior of variable costs is linear and symmetric either to increase or decrease of operating activity. Prior empirical evidence (e.g., Anderson et al., 2003; Banker et al; 2013; Calleja et al., 2006; Venieris et al. 2015; Liu et al., 2019; Ballas et al., 2020) documented that, on average, the behavior of variable costs is not symmetric towards activity changes, but the decline in the level of variable costs is lower (higher) for decreasing activity levels than the rise of cost for increasing (in absolute terms) activity levels.

Cost asymmetry[1] has been attributed to deliberate managerial commitment decisions to bear the costs of idle resources when activity volumes decline, taking into consideration the magnitude of resource adjustment costs (Banker & Byzalov, 2014; Banker et al., 2018). Based on this theoretical foundation, prior research has identified several factors that affect the intensity and direction of cost asymmetry (e.g., Anderson et al., 2003; Chen et al., 2012; Holzhacker et al., 2015b; Venieris et al., 2015; Ballas et al., 2020), or the relationship between cost asymmetry and earnings behavior and prediction (e.g., Banker & Chen, 2006; Weiss, 2010; Dierynck et al., 2012; Kama & Weiss, 2013; Banker et al., 2016; Hall, 2016).

After the seminal paper on asymmetric cost behavior by Anderson et al. (2003), there is an increasing trend in empirical asymmetric cost behavior research (see Table 1, Panel C). Empirical research on asymmetric cost behavior has been conducted at the international level. A

☆ The authors thank the Special Issue Guest Editor and two anonymous reviewers for insightful comments and suggestions. The usual disclaimer applies.
* Corresponding author.
E-mail addresses: vcnaoum@unipi.gr (V.-C. Naoum), ntounisdim@aueb.gr (D. Ntounis), papanast@unipi.gr (G. Papanastasopoulos), vlismas@aueb.gr (O. Vlismas).
[1] . Literature, usually, refers to the asymmetric cost behavior phenomenon using the phrase "cost stickiness." However, the asymmetric cost behavior includes both cost stickiness and anti-stickiness. Therefore, we adopt the phase cost asymmetry when we refer to asymmetric cost behavior phenomenon without explicit reference to the direction of cost behavior (i.e., cost stickiness or cost anti-stickiness). On the contrary, we employ the terms "cost stickiness" or "cost anti-stickiness," when we intent to explicitly emphasize the corresponding manifestation of asymmetric cost behavior phenomenon.

https://doi.org/10.1016/j.intaccaudtax.2023.100578

Available online 18 September 2023

Table 1
Studies included in the analysis.

Panel A: Frequency distribution of asymmetric cost behavior studies per journal

A/A	Abbreviation	Journal's title	Number of Studies
1.	AAR	Australian Accounting Review	2
2.	ABR	Accounting and Business Research	1
3.	ACFI	Accounting & Finance	4
4.	AE	Applied Economics	3
5.	AIA	Advances in Accounting, incorporating Advances in International Accounting	1
6.	AMA	Advances in Management Accounting	4
7.	APJAE	Asia-Pacific Journal of Accounting and Economics	3
8.	ARA	Asian Review of Accounting	1
9.	ARJ	Accounting Research Journal	1
10.	AUD	Auditing: A Journal of Practice and Theory	1
11.	AJM	Australian Journal of Management	1
12.	BS	Business and Society	1
13.	CAR	Contemporary Accounting Research	6
14.	CJAR	China Journal of Accounting Research	2
15.	CJAS	China Journal of Accounting Studies	3
16.	EAR	European Accounting Review	2
17.	EBR	Eurasian Business Review	1
18.	EFM	European Financial Management	1
19.	EMFT	Emerging Markets Finance and Trade	2
20.	FRL	Finance Research Letters	2
21.	IJMFA	International Journal of Managerial and Financial Accounting	1
22.	IJPPM	International Journal of Productivity and Performance Management	1
23.	JAAF	Journal of Accounting, Auditing and Finance	4
24.	JAAR	Journal of Applied Accounting Research	2
25.	JAR	Journal of Accounting Research	3
26.	JAEE	Journal of Accounting in Emerging Economies	2
27.	JAE	Journal of Accounting and Economics	2
28.	JAOC	Journal of Accounting and Organizational Change	1
29.	JBEM	Journal of Business Economics and Management	1
30.	JBE	Journal of Business Ethics	1
31.	JBR	Journal of Business Research	1
32.	JCF	Journal of Corporate Finance	2
33.	JFQA	Journal of Financial and Quantitative Analysis	1
34.	JIAAT	Journal of International Accounting, Auditing and Taxation	1
35.	JIBS	Journal of International Business Studies	1
36.	JIAP	Journal of Accounting and Public Policy	1
37.	JIC	Journal of Intellectual Capital	1
38.	JMAR	Journal of Management Accounting Research	10
39.	JoMaC	Journal of Management Control	3
40.	JMTM	Journal of Manufacturing Technology Management	1
41.	MAJ	Managerial Auditing Journal	1
42.	MAR	Management Accounting Research	4
43.	MIR	Management International Review	1
44.	MDE	Managerial and Decision Economics	1
45.	NAJEF	North American Journal of Economics and Finance	1
46.	RAS	Review of Accounting Studies	2
47.	RIE	Review of International Economics	1
48.	RMS	Review of Managerial Science	2
49.	RQFA	Review of Quantitative Finance and Accounting	2
50.	TAR	The Accounting Review	9
51.	TIJA	The International Journal of Accounting	2
52.	TASM	Technology Analysis and Strategic Management	1
53.	TMP	Tourism Management Perspectives	1
Total number of studies:			**110**

Panel B: Asymmetric cost behavior studies included in the analysis (per chronological order)

A/A	Study	Author(s)	Journal	Year
1.	Are selling, general, and administrative costs "sticky"?	Anderson et al	JAR	2003
2.	Does capacity utilization affect the "stickiness" of cost?	Balakrishnan et al.	JAAF	2004
3.	Predicting earnings using a model based on cost variability and cost stickiness	Banker and Chen	TAR	2006
4.	A note on cost stickiness: some international comparisons	Calleja et al.	MAR	2006
5.	Cost behavior and fundamental analysis of SG&A costs.	Anderson et al.	JAAF	2007
6.	Cost stickiness and core competency: A note	Balakrishnan and Gruca	CAR	2008
7.	The information content of the SG&A ratio	Baumgarten et al.	JMAR	2010
8.	Cost behavior and analysts' earnings forecasts	Weiss	TAR	2010
9.	The agency problem, corporate governance, and the asymmetrical behavior of selling, general, and administrative costs	Chen et al.	CAR	2012
10.	Do managerial incentives drive cost behavior? Evidence about the role of the zero earnings benchmark for labor cost behavior in private Belgian firms	Dierynck et al.	TAR	2012
11.	Use of precedent and antecedent information in strategic cost management	Anderson et al.	JBR	2013
12.	Employment protection legislation, adjustment costs and cross-country differences in cost behavior	Banker et al.	JAE	2013
13.	Do earnings targets and managerial incentives affect sticky costs?	Kama and Weiss	JAR	2013

(*continued on next page*)

Table 1 (*continued*)

Panel B: Asymmetric cost behavior studies included in the analysis (per chronological order)

A/A	Study	Author(s)	Journal	Year
14.	Cost structure and sticky costs	Balakrishnan et al.	JMAR	2014
15.	Demand uncertainty and cost behavior	Banker et al.	TAR	2014
16.	The moderating effect of prior sales changes on asymmetric cost behavior	Banker et al.	JMAR	2014
17.	Asymmetric cost behavior	Banker and Byzalov	JMAR	2014
18.	SG&A cost stickiness and equity-based executive compensation: Does empire building matter?	Brüggen and Zehnder	JoMaC	2014
19.	Determinants of "sticky costs'': An analysis of cost behavior using United States air transportation industry data	Cannon	TAR	2014
20.	Sticky cost behaviour: Evidence from small and medium sized companies	Dalla Via and Perego	ACFI	2014
21.	External auditor types and the cost stickiness of listed companies	Liang et al.	CJAS	2014
22.	Discussion of asymmetric cost behavior - Sticky costs: Expenses versus cash flows	Shust and Weiss	JMAR	2014
23.	Audit fee stickiness	de Villiers et al.	MAJ	2014
24.	Implications of asymmetric cost behaviour for analysing financial reports of companies in China	Bu et al.	CJAS	2015
25.	Cost stickiness in Australia: Characteristics and determinants	Bugeja et al.	AAR	2015
26.	The impact of changes in regulation on cost behavior	Holzhacker et al.	CAR	2015
27.	Unraveling the black box of cost behavior: an empirical investigation of risk drivers, managerial resource procurement, and cost elasticity.	Holzhacker et al.	TAR	2015
28.	Organisation capital and sticky behaviour of selling, general and administrative expenses	Venieris et al.	MAR	2015
29.	Mergers, CEO hubris, and cost stickiness	Yang	EMFT	2015
30.	Are costs really sticky? Evidence from publicly listed companies in the UAE	Zanella et al.	AE	2015
31.	The confounding effect of cost stickiness on conservatism estimates	Banker et al.	JAE	2016
32.	Does stock price informativeness affect labor investment efficiency?	Ben-Nasr and Alshwer	JCF	2016
33.	Implications of cost behavior for analysts' earnings forecasts	Ciftci et al.	JMAR	2016
34.	Non-cancellable operating leases and operating leverage	Dogan	EFM	2016
35.	Does ownership structure affect labor decisions?	Hall	TAR	2016
36.	Culture and cost stickiness: A cross-country study	Kitching et al.	TIJA	2016
37.	Managerial discretion and agency cost in Indian market	Namitha and Shijin	AIA	2016
38.	Additional evidence on the sticky behavior of costs	Subramaniam and Watson	AMA	2016
39.	Earnings management, corporate governance and expense stickiness	Xue and Hong	CJAR	2016
40.	The sticky cost phenomenon at the local government level: Empirical evidence from Greece	Cohen et al.	JAAR	2017
41.	Sticky cost behavior: evidence from Egypt	Ibrahim and Ezat	JAEE	2017
42.	Product market competition and cost stickiness	Li and Zheng	RQFA	2017
43.	Organizational capital, intellectual capital and cost stickiness (evidence from Iran)	Mohammadi and Taherkhani	JIC	2017
44.	Are costs really sticky and biased? Evidence from manufacturing listed companies in China	Xu and Sim	AE	2017
45.	Managerial incentives, options, and cost-structure choices	Aboody et al.	RAS	2018
46.	Do managers forecast asymmetric cost behaviour?	Bradbury and Scott	AJM	2018
47.	Does access to capital affect cost stickiness? Evidence from China	Cheng et al.	APJAE	2018
48.	Is the asymmetric cost behavior affected by competition factors?	Cheung et al.	APJAE	2018
49.	Stickiness in costs and voluntary disclosures: Evidence from management earnings forecasts	Ciftci and Salama	JMAR	2018
50.	Board characteristics and asymmetric cost behavior: Evidence from Egypt	Ibrahim	ARJ	2018
51.	Have estimates of cost stickiness changed across listing cohorts?	Loy and Hartlieb	JoMaC	2018
52.	Asymmetric cost behavior in local public enterprises: Exploring the public interest and striving for efficiency	Nagasawa	JoMaC	2018
53.	State ownership, socio-political factors, and labor cost stickiness	Prabowo et al.	EAR	2018
54.	Aggregate cost stickiness in GAAP financial statements and future unemployment rate	Rouxelin et al	TAR	2018
55.	The relationship between cost stickiness and financial reporting quality in Tehran Stock Exchange	Salehi et al.	IJPPM	2018
56.	On the medical loss ratio (MLR) and sticky selling general and administrative costs: Evidence from health insurers	Belina et al.	JAP	2019
57.	The effect of shared auditors in the supply chain on cost stickiness	Cai et al.	CJAR	2019
58.	Market competition, audit fee stickiness, and audit quality: Evidence from China	Chang et al.	AUD	2019
59.	Operating leverage, profitability, and capital structure	Chen et al.	JFQA	2019
60.	A contextual analysis of the impact of managerial expectations on asymmetric cost behavior	Chen et al.	RAS	2019
61.	Institutional investors and cost stickiness: Theory and evidence	Chung et al.	NAJEF	2019
62.	The magnitude of sales change and asymmetric cost behavior	Ciftci and Zoubi	JMAR	2019
63.	Operating leases, operating leverage, operational inflexibility and sticky costs	Cook et al.	FRL	2019
64.	Globalization and firm-level cost structure	Ding et al.	RIE	2019
65.	Cost behavior around corporate tax rate cuts	Haga et al.	JIAAT	2019
66.	Corporate social responsibility and cost stickiness	Habib and Hasan	BS	2019
67.	Do auditors constrain intertemporal income shifting in private companies?	Höglund and Sundvik	ABR	2019
68.	Improving predictions of upward cost adjustment and cost asymmetry at the firm-year level	Kaspereit and Lopatta	JMAR	2019
69.	CEO-director ties and labor investment efficiency	Khedmati et al.	JCF	2019
70.	Internal control weakness and the asymmetrical behavior of selling, general, and administrative costs	Kim et al.	JAAF	2019
71.	Attracting and retaining core competency: A focus on cost stickiness	Kuiate and Noland	JAOC	2019
72.	Stakeholder orientations and cost management	Liu et al.	CAR	2019
73.	Does religion shape corporate cost behavior?	Ma et al.	JBE	2019
74.	The role of operational stickiness in impacting new venture survival	Shi et al.	JMTM	2019
75.	Market reaction to asymmetric cost behavior: The impact of long-term growth expectations	Silge and Wöhrmann	RMS	2019
76.	Do accruals earnings management constraints and intellectual capital efficiency trigger asymmetric cost behaviour? Evidence from Australia	Yang	AAR	2019
77.	Why is asset-light strategy necessary? An empirical analysis through the lens of cost stickiness	Zhang et al.	TMP	2019
78.	IPO over-funding and cost stickiness	Zhang et al	APJAE	2019
79.	The effect of strategy on the asymmetric cost behavior of SG&A expenses	Ballas et al.	EAR	2020
80.	Sticky behaviour of selling, general, and administrative costs and earnings management practices: An international comparative perspective	Balios et al.	IJMFA	2020
81.	Anomalous operating performance during economics slowdowns	Banker et al.	JMAR	2020
82.	The effect of international takeover laws on corporate resource adjustments: Market discipline and/or managerial myopia?	Cannon et al.	JIBS	2020

(*continued on next page*)

Table 1 (*continued*)

Panel B: Asymmetric cost behavior studies included in the analysis (per chronological order)

A/A	Study	Author(s)	Journal	Year
83.	Customer-base concentration, investment, and profitability: The U.S. government as a major customer	Cohen and Li	TAR	2020
84.	Labor adjustment costs and asymmetric cost behavior: An extension	Golden et al.	MAR	2020
85.	Is cost stickiness associated with sustainability factors?	Golden et al.	AMA	2020
86.	Are operating lease costs sticky for retail firms?	Gray	AMA	2020
87.	Is cost stickiness associated with management earnings forecasts?	Han et al.	ARA	2020
88.	Does community social capital affect asymmetric cost behaviour?	Hartlieb et al.	MAR	2020
89.	The effect of generalized trust on cost stickiness: Cross-country evidence	Hartlieb et al.	TIJA	2020
90.	Asymmetric cost behavior and dividend policy	He et al.	JAR	2020
91.	Linguistically induced time perception and asymmetric cost behavior	Huang and Kim	MIR	2020
92.	Resource adjustment costs, cost stickiness, and value creation in mergers and acquisitions	Jang and Yehuda	CAR	2020
93.	Choice of R&D strategy and asymmetric cost behaviour	Ko et al.	TASM	2020
94.	Competitiveness and cost behaviour: Evidence from the retail industry	Krisnadewi and Soewarno	JAAR	2020
95.	Political uncertainty and cost stickiness: Evidence from national elections around the world total	Lee et al.	CAR	2020
96.	Banking competition and cost stickiness	Lee et al.	FRL	2020
97.	Rollover risk and managerial cost adjustment decisions	Li and Zheng	ACFI	2020
98.	Managerial risk appetite and asymmetry cost behavior: Evidence from China	Li et al.	ACFI	2020
99.	The effect of management control mechanisms through risk–taking incentives on asymmetric cost behavior	Li et al.	RQFA	2020
100.	Managerial style in cost asymmetry and shareholder value	Lopatta et al.	MDE	2020
101.	A look on the bright side – the real effect of mood on corporate short-term resource adjustment decisions: Research note	Loy and Hartlieb	AMA	2020
102.	Operating cash flow asymmetric timeliness in Australia	Lu et al.	ACFI	2020
103.	Sticky cost behavior: evidence from small and medium sized enterprises in Turkey	Özkaya	EBR	2020
104.	Research note: An analytical perspective on market decisions and asymmetric cost behavior	Riegler and Weiskirchner-Merten Merten	RMS	2020
105.	How different cost behaviour is in emerging economies? Evidence from Argentina	Stimolo and Porporato	JAEE	2020
106.	Cost stickiness and stock price crash risk: Evidence from China	Tang et al.	EMFT	2020
107.	Are governmental expenditures also sticky? Evidence from the operating expenditures of public schools	Wu et al.	AE	2020
108.	Tax avoidance and asymmetric cost behavior	Xu and Zheng	JAAF	2020
109.	Staying idle or investing in prevention: The short-term and long-term impact of cost stickiness on firm value	Yang et al.	CJAS	2020
110.	The influence of corporate financialization on asymmetric cost behavior: weakening or worsening	Zhu et al.	JBEM	2020

Panel C: Frequency distribution of asymmetric cost behavior studies per time period

Time period	Number of Studies
2003–2008	6
2009–2014	17
2015–2020	87
Total number of studies:	**110**

Notes: This table exhibits the frequency distribution of asymmetric cost behavior studies per journal (**Panel A**) and an analytical list of the asymmetric cost behavior studies in our analysis (**Panel B**), and the frequency distribution of asymmetric cost behavior studies per time period (**Panel C**). A computer search on electronic journal databases (e.g., EBSCO) using several keywords, such as "*cost stickiness,*" "*cost anti-stickiness,*" "*cost behavior,*" "*cost behaviour,*" "*asymmetric cost behavior,*" "*asymmetric cost behaviour phenomenon,*" and "*sticky cost phenomenon*" was performed. We identified studies between 2003 and 2020 published in 53 English-language accounting journals with ABS ranking.

growing number of empirical studies have documented that cost asymmetry is observed across different national settings, such as the U.S. (Anderson et al., 2003; Kama & Weiss, 2013; Shust & Weiss, 2014), Canada (Balakrishnan & Gruca, 2008), China (Bu et al., 2015; Xu & Sim, 2017; Cheng et al., 2018; Cai et al., 2019), and Belgium, France, Germany, the United Kingdom (UK), and other European countries (Calleja et al., 2006; Dierynck et al., 2012; Prabowo et al., 2018). Furthermore, cost asymmetry has been observed in different industries such as physical therapy clinics (Balakrishnan et al., 2004), the health industry (Balakrishnan & Gruca 2008), health insurance firms (Holzhacker et al., 2015b; Belina et al., 2019), and the air transportation industry (Cannon 2014) and in different categories such as selling and general administrative (SG&A) expenses (Anderson et al., 2003), labor costs (Prabowo et al., 2018), advertising costs (Venieris et al., 2015; Ballas et al., 2020), cost of goods sold (COGS), operating costs (Kama & Weiss, 2013; Banker et al., 2014a; Subramaniam & Watson, 2016), operating costs paid in cash (Shust & Weiss, 2014), and interest expenses (Dogan et al., 2016). Thus, the asymmetric cost behavior phenomenon and its implications on earnings are of great interest, and a literature review of this field may serve as a departure for research initiatives within different cost categories, specific industries, national settings, or across different countries.

We intend to develop a comprehensive literature review of recent findings and insights on asymmetric cost behavior that expands prior relevant reviews, responds to growing academic interest, and provides challenges and opportunities for future research. A few literature reviews have attempted to map different aspects of the scientific landscape of cost asymmetry research. Guenther et al. (2013) provided a brief literature review in light of determinants, such as reasons associated with the legal system, reasons caused by social and personnel policy, reasons caused by business and operating policy, and psychological and agency-related reasons that generate fluctuations in resource adjustment costs and, thus, in the manifestation of cost asymmetry. However, Guenther et al. (2013) provided a literature review that emphasized

empirical research documenting the existence and determinants of cost asymmetry.[2] Banker and Byzalov (2014) attempted to synthesize the growing literature on cost asymmetry. Consequently, they exhibited an economic theory for rationalizing asymmetric cost behavior, discussed several issues for empirical cost asymmetry research, and provided empirical evidence of cost asymmetry and various related hypotheses within the context of globally listed firms. Banker et al. (2018) underlined the importance of asymmetric cost behavior in the field of cost management research and discussed the implications of cost asymmetry to understand issues in cost, managerial, and financial research. Finally, Ibrahim et al. (2022) provided a literature review of asymmetric cost behavior research for the period 1994 to 2020 that explored six aspects of the related literature: classification of studies, historical development, research impact, frequency of research by cost category, theory, and country. In addition, Ibrahim et al. (2022) analyzed the determinants of the economic consequences of cost asymmetry.

We attempt to synthesize prior literature reviews on asymmetric cost behavior and expand them in several ways. Our study exhibits significant differences with respect to the last published literature review by Ibrahim et al. (2022). Ibrahim et al. (2022) emphasized the qualitative dimensions of the cost asymmetry literature, providing a quantitative descriptive analysis of the research impact by journal classification and by citations accompanied with frequency distributions of theories and studies by country of interest and cost category. Our study provides a literature review of cost asymmetry, emphasizing an extensive qualitative analysis of the econometric specifications for cost asymmetry, determinants of cost asymmetry, and consequences of cost asymmetry on earnings behavior and other economic phenomena. More importantly, our literature review is framed by a *meta*-analysis, which is a dynamic analysis tool that enables us to evaluate various dimensions of mainstream empirical research concerning variations in cost asymmetry manifestation by cost items, differences across national settings and institutions, and corporate governance mechanisms. We also investigated the presence of publication bias for different aspects of empirical research, such as alternative econometric specifications, quality of journals, and prestigious universities affiliated with the authors of each study. Several robustness tests were conducted to address the file drawer problem and publication bias.

The remainder of this paper is organized as follows. The article selection process is described in Section 2. Section 3 emphasizes systematic analyses and presents an economic theory of asymmetric cost behavior and econometric methods and instruments of empirical asymmetric cost behavior research. Section 4 systematically reviews studies exploring the effects of various determinants on the intensity and direction of cost asymmetry. This review is accompanied by a *meta*-analysis in Section 5. Section 6 reviews the studies that analyze the effects of cost asymmetry on earnings, behavior, forecasting, and other economic phenomena. Finally, Section 7 summarizes and concludes the study.

2. Article selection

After the seminal paper on asymmetric cost behavior by Anderson et al. (2003), there is an increasing trend in published papers that emphasize the empirical measures of asymmetric cost behavior. Initially, we conducted a computer search on electronic journal databases (e.g., EBSCO) using several keywords to encapsulate relevant articles published in journals, such as: "*cost stickiness*," "*cost anti-stickiness*," "*cost behavior*," "*cost behaviour*," "*asymmetric cost behavior*," "*asymmetric cost behavior phenomenon*," and "*sticky cost phenomenon.*" We focused on accounting journals with ABS rankings.[3] Working papers were excluded from our dataset for the following reasons: (i) the working papers were either in the review or editorial process and might be published in a different form; (ii) many researchers published an initial version of the Social Science Research Network (SSRN); and (iii) it was rather difficult to capture all working papers to eliminate sample selection bias.[4] We also reviewed the existing literature review studies on asymmetric cost behavior (Guenther et al., 2013; Banker & Byzalov, 2014; Banker et al., 2018; Ibrahim et al., 2022).

Articles published between 2003 and 2020 in 53 English-language journals were identified. The final number of publications on management accounting included in the analysis was 110. Panel A of Table 2 shows the frequency distribution of asymmetric cost behavior studies per journal, Panel B shows the analytic list of the studies included in our paper, and Panel C shows the frequency distribution of asymmetric cost behavior studies per period.

A relatively large number of studies on asymmetric cost behavior appears in a relatively small number of journals. In addition, studies on cost asymmetry appear in journals not specializing in management accounting. Approximately 22.72% of the asymmetric cost behavior studies in our analysis were published in three journals: *Journal of Management Accounting Research* (JMAR: 10 out of 110 studies), *The Accounting Review* (TAR: 9 out of 110 studies), and *Contemporary Accounting Research* (CAR: 6 out of 110 studies). Another 28.18% of the studies in our analysis were published in nine journals: *Accounting & Finance* (ACFI: 4 out of 110 studies), *Applied Economics* (AE: 3 out of 110 studies), *Advances in Management Accounting* (AMA: 4 out of 110 studies), *Asia-Pacific Journal of Accounting and Economics* (APJAE: 3 out of 110 studies), *China Journal of Accounting Studies* (CJAS: 3 out of 110 studies), *Journal of Accounting, Auditing, and Finance* (JAAF: 4 out of 110 studies), *Journal of Accounting Research* (JAR: 3 out of 110 studies), *Journal of Management Control* (JoMaC: 3 out of 110 studies), and *Management Accounting Research* (MAR: 4 out of 110 studies). Cumulatively, 50.90% (56 out of 110 studies) of the studies included in our analysis were published in approximately 22.64% (12 out of 53 journals) of the journals included in our analysis.

Growing research interest in the asymmetric cost behavior phenomenon is documented in Panel C of Table 1. Only six of the 110 studies in our analysis were published between 2003 and 2008, whereas 17 were between 2009 and 2014, and 87 were between 2015 and 2020. This increasing trend in the number of studies of cost asymmetry is expected to be robust in the future.

3. Econometric methods for the asymmetric cost behavior phenomenon

The asymmetric cost behavior phenomenon has been attributed to deliberate managerial resource commitment decisions when the level of operating activity changes in different directions. Banker and Bylazov (2014) proposed an economic theory for cost asymmetry that focuses on the primitives of cost behavior: resource adjustment costs and managerial decisions.

[2] . Guenther et al.'s (2013) emphasis on the determinants of cost asymmetry is justified by the fact that until 2013 the empirical cost asymmetry research provided limited evidence for the implications of cost asymmetry. Our review indicated that until 2013, only three empirical studies were published in ABS ranked journals examining the implications of cost asymmetry on: (i) return on equity forecast models (Banker and Chen, 2006), (ii) operating efficiency (Anderson et al., 2007), and (iii) analyst behavior and market response (Weiss, 2010).

[3] . ABS Academic Journal Guide (2018): https://facultystaff.richmond.edu/~tmattson/AJG%202018%20Journal%20Guide.pdf.

[4] . The exclusion of working papers might introduce publication bias since studies with significant results were more likely to be published than those without significant results (Habib, 2012). In accounting *meta*-analysis, this problem is called as the "file-drawer," which requires the calculation of the fail-safe number to combat the publication bias for our findings. We deal with these issues in Section 5.

Table 2
Econometric methods and instruments of empirical asymmetric cost behavior research.

Panel A: Modelling asymmetric cost behavior

Model	Specification	Description
Simple log-linear model:	$\log(EX_{i,t}/EX_{i,t-1}) = b_0 + b_1\log(RV_{i,t}/RV_{i,t-1}) + b_2 DS_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \varepsilon_{i,t}$	Where $EX_{i,t}$ represents the cost item,$RV_{i,t}$ the sales revenue, b_1 the cost elasticity coefficient and b_2 the cost asymmetry coefficient. $DS_{i,t}$ is a dummy variable coded 1 if $RV^{j}_{i,t} < RV^{j}_{i,t-1}$ and 0 otherwise. The empirical testing for cost stickiness implies that $b_1 > 0$ and $b_2 < 0$ ($b_1 > b_1 + b_2$) and for cost anti-stickiness implies that $b_1 > 0$ and $b_2 > 0$ ($b_1 < b_1 + b_2$).
Extended log-linear model with three-way interactions:	$\log(EX_{i,t}/EX_{i,t-1}) = b_0 + b_0^k F_{i,t} + b_1\log(RV_{i,t}/RV_{i,t-1}) + \left(b_2 + b_2^k F_{i,t}\right) DS_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \varepsilon_{i,t}$	An extension of the simple log-linear econometric specification in which the constant term b_0 and the cost asymmetry coefficient b_2 are functions of various observable determinants of cost asymmetry (vector $F_{i,t}$). The extended log-linear model with three-way interactions is adopted by exploratory studies focusing on the effects of various environmental, firm, or managerial specific factors on the intensity and the direction of cost asymmetry. The significance and the sign of the estimated coefficient b_2^k indicates the effects of k^{th} factor on the intensity and the direction of cost asymmetry.
Extended log-linear model with two-way and three-way interactions:	$\log(EX_{i,t}/EX_{i,t-1}) = b_0 + b_0^k F_{i,t} + (b_1 + b_1^k F_{i,t})\log(RV_{i,t}/RV_{i,t-1}) + \left(b_2 + b_2^k F_{i,t}\right) DS_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \varepsilon_{i,t}$	An extension of the simple log-linear econometric specification in which the constant term b_0, the cost elasticity b_1, and the cost asymmetry coefficient b_2 are functions of various observable determinants of cost asymmetry (vector $F_{i,t}$). The significance and the sign of the estimated coefficient b_2^k indicates the effects of k^{th} factor on the intensity and the direction of cost asymmetry. The significance and the sign of the estimated coefficient b_1^k indicates the effects of k^{th} factor on the intensity and the direction of cost elasticity.
Linear specification (Balakrishnan et al., 2014):	$(EX_{i,t} - EX_{i,t-1})/EX_{i,t-1} = b_0 + b_1 (RV_{i,t} - RV_{i,t-1})/RV_{i,t-1} + b_2 DS_{i,t}(RV_{i,t} - RV_{i,t-1})/RV_{i,t-1} + \varepsilon_{i,t}$	The linear specification is an alternative to the (simple or extended) log linear econometric specifications emerged by the critique that the standard log linear econometric specification does not explicitly control for a firm's cost structure due to the curvature of the log function (Balakrishnan et al., 2014).

Panel B: Specialized econometric approaches for specific determinants of asymmetric cost behavior

Model	Specification	Description
Managerial expectations for future operating activity and cost asymmetry (Banker et al., 2014):	$\log(EX_{i,t}/EX_{i,t-1}) = b_0 + IN_{i,t-1}[b_1^{Incr}\log(RV_{i,t}/RV_{i,t-1}) + b_2^{Incr} DS_{i,t}\log(RV_{i,t}/RV_{i,t-1})] + DS_{i,t-1}[b_1^{Decr}\log(RV_{i,t}/RV_{i,t-1}) + b_2^{Decr} DS_{i,t}\log(RV_{i,t}/RV_{i,t-1}))] + \varepsilon_{i,t}$	A two-period model employed to investigate the relation of managerial expectations for future operating activity with cost asymmetry. $IN_{i,t-1}(DS_{i,t-1})$ is a dummy variable coded 1 in case of a prior period sales increase (decrease), and 0 otherwise. Optimistic managerial expectations for future operating activity imply that the estimated value of the coefficient b_1^{Incr} is higher than the estimated value of the coefficient b_1^{Decr} (i.e., managers with optimistic expectations are less hesitant about expanding resource levels), the estimated value of the coefficient b_2^{Incr} is negative (i.e., optimistic managerial expectations lead to cost stickiness), and the estimated value of the coefficient b_2^{Decr} is positive (i.e., pessimistic managerial expectations lead to cost anti-stickiness).
Asymmetric cost behaviour and magnitude of current period's sales change (Ciftci and Zoubi, 2019):	$\log(EX_{i,t}/EX_{i,t-1}) = \beta_0 + \beta_{01} DS_{i,t} + \alpha_0 SMI\_SMD_{i,t} + \alpha_{01} SMI\_SMD_{i,t} DS_{i,t} + \delta_0 MED\_MMD_{i,t} + \delta_{01} MED\_MMD_{i,t} DS_{i,t} + \alpha_1 SMI\_SMD_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \alpha_2 SMI\_SMD_{i,t} DS_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \delta_1 MED\_MMD_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \delta_2 MED\_MMD_{i,t} DS_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \beta_1\log(RV_{i,t}/RV_{i,t-1}) + \beta_2 DS_{i,t}\log(RV_{i,t}/RV_{i,t-1}) + \varepsilon_{i,t}$	This model is proposed to investigate the effects of the magnitude of current period's sales change on the intensity of asymmetric cost behavior. $SMI\_SMD_{i,t}$ ($MED\_MMD_{i,t}$) is an indicator variable coded 1 when there is a small (medium) decrease or increase in current sales changes, and 0 otherwise; coefficients a_0 and δ_0 denote the difference between small (medium) and large current period sales revenues increases; β_{01} describes the large current period sales revenue decreases; a_{01} and δ_{01} denote the difference in the intercepts between small (medium) current sales revenue increases and small (medium) current sales revenue decreases; β_2 describes the magnitude of cost stickiness for large current sales changes; $a_2(\delta_2)$ is the difference in the magnitude of cost stickiness between small (medium) and the large current period sales revenue changes.

Panel C: Exploring the economic consequence effects of asymmetric cost behavior

(*continued on next page*)

Table 2 (*continued*)

Panel A: Modelling asymmetric cost behavior

Model	Specification	Description
Model	Specification	Description
The cost driven earnings behaviour model (Banker and Chen, 2006):	$NI_{i,t}/MV_{i,t-1} = a_0 + b_1 DS_{i,t} + b_2 \Delta RV_{i,t}/MV_{i,t-1} + b_3 DS_{i,t}(\Delta RV_{i,t}/MV_{i,t-1}) + \varepsilon_{i,t}$	The cost driven earnings behavior model was developed to examine the effects of cost asymmetry on earnings behavior. $NI_{i,t}/MV_{i,t-1}$ is the level of earnings ($NI_{i,t}$) scaled with the market value of equity at the beginning of the fiscal year ($MV_{i,t-1}$), $\Delta RV^{j}_{i,t}$ is the annual change on the level of sales revenue, and $DS_{i,t}$ is a dummy variable coded 1 if $RV_{i,t} < RV_{i,t-1}$, and 0 otherwise.
The cost stickiness and asymmetric timeliness integrated model (Banker et al., 2016):	$NI_{i,t}/MV_{i,t-1} = a_0 + a_1 DR_{i,t} + a_2 RET_{i,t} + a_3 DR_{i,t} RET_{i,t} + b_1 DS_{i,t} + b_2 \Delta RV_{i,t}/MV_{i,t-1} + b_3 DS_{i,t}(\Delta RV_{i,t}/MV_{i,t-1}) + \upsilon_{i,t}$	The cost driven earnings behavior model had been integrated with the asymmetric timeliness model to explore the confounding effect of cost stickiness on conditional conservatism. $RET_{i,t}$ is the market-adjusted stock return, and $DR_{i,t}$ is a dummy variable coded 1 if the market-adjusted stock return is negative.

Panel D: Research instruments for measuring the intensity of cost asymmetry

Model	Specification	Description
Model proposed by Weiss (2010):	$STICKY^{j}_{i,t} = \log(\Delta EX^{j}_{i,t}/\Delta RV^{j}_{i,t})_{i,T(-)} - \log(\Delta EX^{j}_{i,t}/\Delta RV^{j}_{i,t})_{i,T(+)}$, $T(-)$, $T(+) \in \{t, \cdots, t-3\}$	This model is based on quarterly data using the difference between the change in cost scaled by revenues measured in the recent quarter with decreasing sales and the corresponding change of cost scaled by revenues measured in recent quarter with increasing sales. A negative (positive) value of $STICKY^{j}_{i,t}$ associated with higher (lower) intensity of asymmetric cost behavior.
Cost asymmetry measuring approach proposed by Kaspereit and Lopatta (2019):	$\log(EX_{i,t}/EX_{i,t-1}) = b_0 + b^{1}_{0} DS_{i,t} + (b_1 + b^{x}_{1} F_{i,t}) \log(RV_{i,t}/RV_{i,t-1}) + (b_2 + b^{x}_{2} F_{i,t}) DS_{i,t} \log(RV_{i,t}/RV_{i,t-1}) + \varepsilon_{i,t}$, $T \in \{T,\ldots,T\text{-}4\}$ $UPW\_SCORE = b_1 + b^{x}_{1} F_{i,t}$ $ASY\_SCORE = b_2 + b^{x}_{2} F_{i,t}$	UPW_SCORE (upward adjustment costs) captures how firms adjust costs in case of a 1% increase in sales revenue; ASY_SCORE (downward adjustment costs) captures the percentage decrease in costs following a 1% decrease in sales revenue; b^{x}_{1} and b^{x}_{2} denote the coefficients of various observable determinants of cost asymmetry (vector $F_{i,t}$).

Notes: This table demonstrates the econometric methods and instruments of empirical asymmetric cost behavior research and more specifically: (i) the mainstream econometric approaches for exploring cost asymmetry (**Panel A**), (ii) specialized econometric approaches for specific determinants of asymmetric cost behavior (**Panel B**), (iii) research approaches for exploring the economic consequences of asymmetric cost behavior (**Panel C**), and (d) research instruments for measuring the intensity of cost asymmetry (**Panel D**).

Adjustment costs are incurred when managers decide to change the available resource capacity. Adjustment costs include explicit expenditure and implicit organizational, psychological, personal, and opportunity costs. On average, adjustment costs are higher when available resource capacity decreases than when it increases (He et al., 2020).[5] Banker and Byzalov (2014) argued that the level of adjustment costs and, subsequently, resource commitment decisions depend on (i) the level of concurrent sales, (ii) the resource levels of the prior period and the associated level of adjustment costs, (iii) managerial expectations for future sales and the associated level of future adjustment costs, and (iv) various agency and behavioral factors.

When demand decreases, managers weigh the cost of retaining the idle capacity of resources against the adjustment cost of disposing of these resources. If the level of adjustment costs is higher than the level of retaining costs, managers decide to retain idle capacity. They continue to retain idle capacity until they are indifferent to retaining and removing the marginal resource unit (Banker & Byzalov, 2014). In this case, variable costs exhibit cost stickiness because the decline in their level is lower than the rise in cost for activity levels increase. Unless managers decide to dispose of idle capacity, variable costs exhibit cost stickiness, even if the level of adjustment costs is lower than the level of retaining costs. Furthermore, if the level of adjustment costs is lower than that of retaining costs, managers are expected to dispose of idle capacity. In this case, variable costs exhibit cost anti-stickiness because the decline in their level is higher for decreasing activity levels than the rise in cost for increasing activity levels (for details see online appendix).

3.1. Modelling asymmetric cost behavior

Empirical asymmetric cost behavior research has formulated a standard approach to diagnose the presence of cost asymmetry and explore the effects of various factors on the intensity and direction of asymmetric cost behavior. The basic econometric specification for testing the asymmetric cost behavior hypothesis is the log-linear model (Anderson et al., 2003):

$\log(EX_{i,t}/EX_{i,t-1}) = b_0 + b_1 \log(RV_{i,t}/RV_{i,t-1}) + b_2 DS_{i,t} \log(RV_{i,t}/RV_{i,t-1}) + \varepsilon_{i,t}$ Simple log−linear model

Where $EX_{i,t}$ represents the cost item, $RV_{i,t}$ is the sales revenue, b_1 is the cost elasticity coefficient, b_2 is the cost asymmetry coefficient, and $DS_{i,t}$ is a dummy variable coded one if $RV^{j}_{i,t} < RV^{j}_{i,t-1}$, and zero otherwise. The empirical testing for cost stickiness implies that $b_1 > 0$ and $b_2 < 0$ ($b_1 > b_1 + b_2$), and for cost anti-stickiness implies that $b_1 > 0$ and $b_2 > 0$ ($b_1 < b_1 + b_2$). The subscripts i and t denote firm and time dimensions, respectively.

The simple log-linear model is properly extended to test the effects of various factors of interest on the intensity and direction of cost asymmetry. The extended log-linear model with three-way interactions is an

[5] . When we refer to the level of adjustment costs, we assume that these costs stem from either explicit or implicit factors. The implicit factors come to the light when current sales fall, in which managers are more eager to retain (dispose) idle capacity when the level of adjustment cost exceeds (stands below) the level of retaining cost. Typical examples of the implicit category are severance payments for dismissed workers and training costs for new hires (Banker & Byzalov, 2014). Explicit factors depend on: (i) resource levels of prior period, (ii) the expected level of future sales volume, and (iii) psychological, personal and opportunity costs. Typical examples of the implicit category are the managerial expectations and empire building behavior.

extension of the simple log-linear econometric specification, in which the constant term b_0 and the cost asymmetry coefficient b_2 are functions of various observable determinants of cost asymmetry (vector $F_{i,t}$). Studies explore the effects of various environmental, firm, and managerial factors on the intensity and direction of cost asymmetry (Banker et al., 2013; Banker & Bylazov, 2014). The significance and sign of the estimated coefficient b_2^k indicate the effects of the k^{th} factor on the intensity and direction of cost asymmetry.

$$\log\left(EX_{i,t}/EX_{i,t-1}\right) = b_0 + b_0^k F_{i,t} + b_1 \log\left(RV_{i,t}/RV_{i,t-1}\right) + \left(b_2 + b_2^k F_{i,t}\right) DS_{i,t} \log\left(RV_{i,t}/RV_{i,t-1}\right) + \varepsilon_{i,t} \quad \text{Extended log-linear model with three-way interactions}$$

The three-way interaction model omits the interaction coefficient of cost elasticity with the determinants of cost asymmetry and can induce estimation bias. The extended log-linear model with two-way and three-way interactions is an extension of the simple log-linear econometric specification, in which the constant term b_0, cost elasticity b_1, and sales asymmetry coefficient b_2 are functions of various observable determinants of cost asymmetry (vector $F_{i,t}$). The significance and sign of the estimated coefficient b_2^k indicate the effects of the k^{th} factor on the intensity and direction of cost asymmetry. The significance and sign of the estimated coefficient b_1^k indicate the effects of the k^{th} factor on the intensity and direction of cost elasticity.

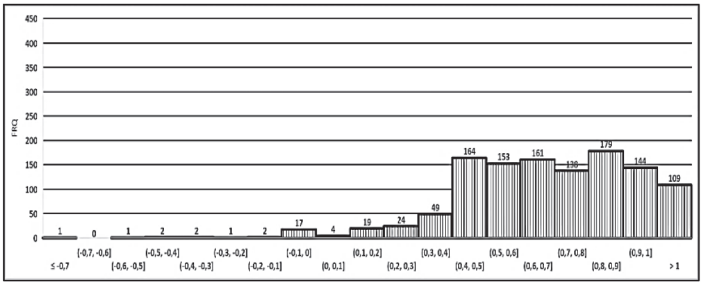
$$\log\left(EX_{i,t}/EX_{i,t-1}\right) = b_0 + b_0^k F_{i,t} + (b_1 + b_1^k F_{i,t}) \log\left(RV_{i,t}/RV_{i,t-1}\right) + \left(b_2 + b_2^k F_{i,t}\right) DS_{i,t} \log\left(RV_{i,t}/RV_{i,t-1}\right) + \varepsilon_{i,t} \quad \text{Extended log-linear model with two-way and three-way interactions}$$

The standard specification of the econometric models above includes at least the following determinants of cost asymmetry: asset intensity, employee intensity, level of macroeconomic activity, and managerial expectations for future sales. Employee and asset intensity are proxied as the log of the ratio of the number of employees to sales revenue and the log of the ratio of total assets to sales revenue, respectively. The level of macroeconomic activity is measured as gross domestic product (GDP) growth. Finally, pessimistic managerial expectations for future sales are proxied when a firm experiences a decrease in sales revenue for two consecutive fiscal years.

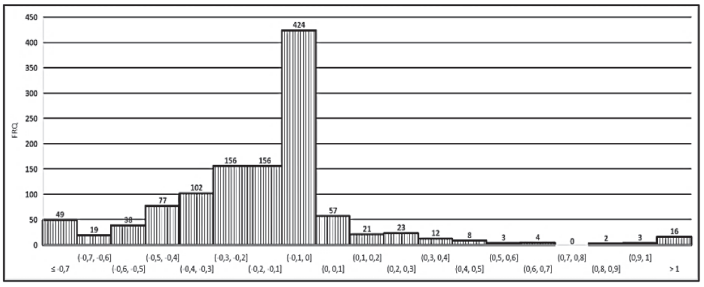
Fig. 1 graphically shows the frequency distributions of the estimated values of the cost elasticity coefficient (b_1) and those of the cost asymmetry coefficient (b_2), which are reported in the regression analyses performed by the studies in our analysis. The distribution of the estimated values of the cost asymmetry coefficient (b_2) is right-skewed. Cost stickiness appears substantially more frequently than cost anti-stickiness or symmetric cost behavior in empirical cost asymmetry research.

Similarly, Fig. 2 graphically shows the frequency distributions of the estimated values of the primary determinants of cost asymmetry such as asset intensity, employee intensity, level of macroeconomic activity, and managerial expectations for future sales. Panels A and B (Fig. 2) show the frequency distributions of the estimated values of the coefficients for asset and employee intensity, respectively. Both distributions are right-skewed, which indicates that empirical research diagnoses more frequently that asset and employee intensity increase (decrease) cost stickiness (anti-stickiness). This finding is consistent with the theoretical expectations of the effects of asset and employee intensity on cost

Panel A: Frequency distribution of the estimated values of the cost elasticity coefficient (b_1)



Panel B: Frequency distribution of the estimated values of the cost asymmetry coefficient (b_2)



Panel C: Frequency distribution of the sum of the estimated values of the cost elasticity coefficient (b_1) and the cost asymmetry coefficient (b_2)

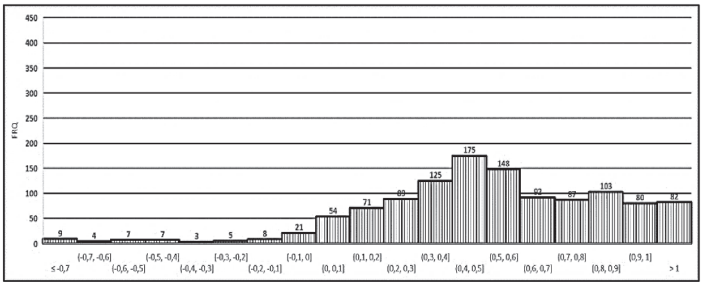
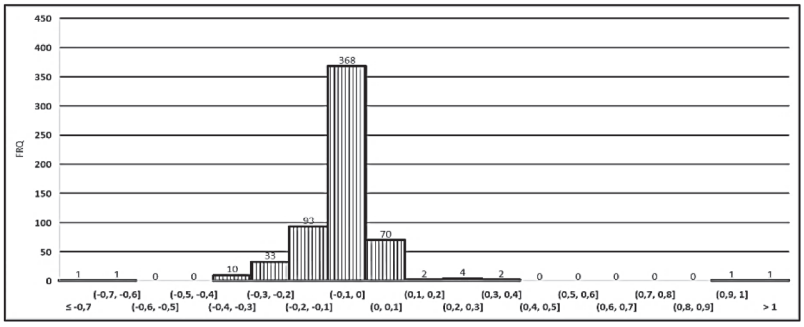
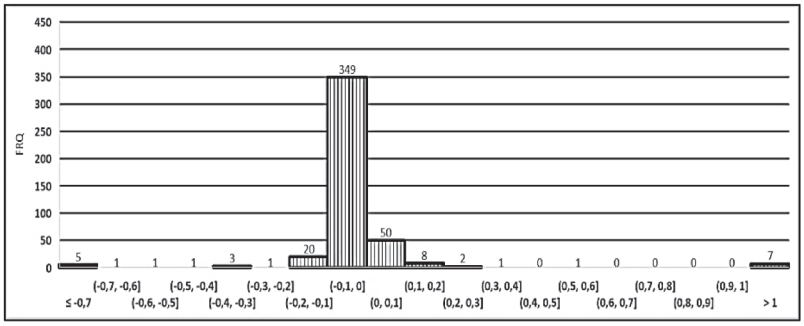


Fig. 1. Frequency distributions of the estimated values of the cost elasticity coefficient (b_1) and of the estimated values of the cost asymmetry coefficient (b_2).

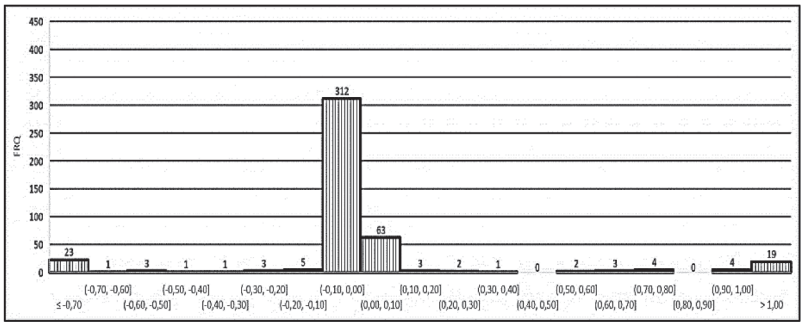
Panel A: Frequency distribution of the estimated values of the coefficient of asset intensity



Panel B: Frequency distribution of the estimated values of the coefficient of employee intensity



Panel C: Frequency distribution of the estimated values of the coefficient of GDP growth



Panel D: Frequency distribution of the estimated values of the coefficient of successive sales revenue decreases (managerial expectations for future operating activity)

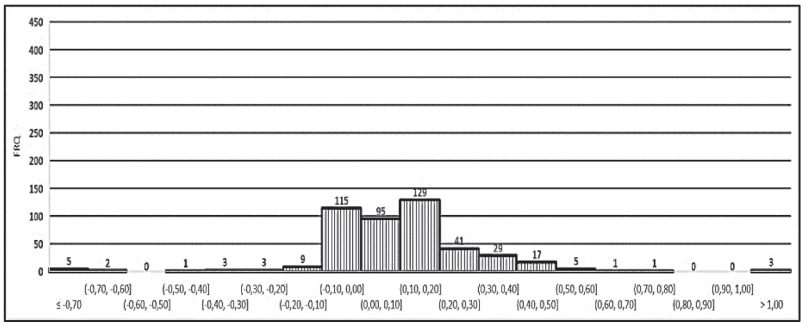


Fig. 2. Frequency distributions of the estimated values of the coefficients for the primary determinants of cost asymmetry.

asymmetry. Panel C of Fig. 2 shows the frequency distribution of the estimated values of the coefficient of GDP growth (a proxy for the level of macroeconomic activity). The corresponding distribution is right-skewed, which indicates that empirical research diagnoses more frequently that the level of macroeconomic activity increases (decreases) cost stickiness (anti-stickiness). This finding is consistent with the theoretical expectations of the effects of macroeconomic activity on cost asymmetry. Panel D of Fig. 2 graphically shows the frequency distribution of the estimated values of the coefficient of successive sales revenue decreases (a proxy for managerial expectations of future operating activity). It seems that in a considerable number of cases, empirical research suggests that pessimistic managerial expectations increase (decrease) cost stickiness, which contradicts the theoretical expectations of the effects of optimistic (pessimistic) managerial expectations on cost asymmetry. One possible reason is that successive sales revenue decreases may capture the effects of other (besides managerial

expectations) factors of cost asymmetry.

The log-linear econometric specification of mainstream cost asymmetry empirical research has attracted criticism. Balakrishnan et al. (2014) argued that the standard log-linear econometric specification does not explicitly control for a firm's cost structure due to the curvature of the log function.[6] The presence of fixed costs leads to a non-constant elasticity, and it induces bias in favor of documenting the presence of cost asymmetry. To address this claim, Balakrishnan et al. (2014) proposed a linear percentage specification, attempting to consider a firm's cost structure:

$\left(EX_{i,t}-EX_{i,t-1}\right)/EX_{i,t-1} = b_0 + b_1\left(RV_{i,t}-RV_{i,t-1}\right)/RV_{i,t-1} + b_2 DS_{i,t}\left(RV_{i,t}-RV_{i,t-1}\right)/RV_{i,t-1} + \varepsilon_{i,t}$ Linear specification (Balakrishnan et al., 2014)

3.2. Specialized econometric approaches for specific determinants of asymmetric cost behavior

Specialized econometric approaches have been proposed to verify the association between the specific determinants of cost asymmetry. For instance, Banker et al. (2014b) investigated the relationship between managerial expectations for future operating activities and cost asymmetry using a two-period model. Based on the assumption that a prior period sales revenue increase (decrease) indicates the presence of optimistic (pessimistic) managerial expectations for future operating activities, Banker et al. (2014b) estimated the following model:

$\log\left(EX_{i,t}/EX_{i,t-1}\right) = b_0 + IN_{i,t-1}[b_1^{Incr}\log\left(RV_{i,t}/RV_{i,t-1}\right) + b_2^{Incr}DS_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right)] + DS_{i,t-1}[b_1^{Decr}\log\left(RV_{i,t}/RV_{i,t-1}\right) + b_2^{Decr}DS_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right)] + \varepsilon_{i,t}$ Managerial expectations for future operating activity and cost asymmetry (Banker et al., 2014)where $IN_{i,t-1}(DS_{i,t-1})$ is a dummy variable coded one when prior period sales increase (decrease) and zero otherwise. b_1^{Incr} and b_2^{Incr} (b_1^{Decr} and b_2^{Decr}) refer to the cost elasticity coefficient (b_1) and the cost asymmetry coefficient (b_2) of the simple log-linear model (Anderson et al., 2003) in the case of a prior period sales increase (decrease). Optimistic managerial expectations for future operating activity imply that the estimated value of coefficient b_1^{Incr} is higher than that of coefficient b_1^{Decr} (i.e., managers with optimistic expectations are less hesitant about expanding resource levels), the estimated value of coefficient b_2^{Incr} is negative (i.e., optimistic managerial expectations lead to cost stickiness), and the estimated value of coefficient b_2^{Decr} is positive (i.e., pessimistic managerial expectations lead to cost anti-stickiness).

Another example is the attempt of Ciftci and Zoubi (2019) to capture the effect of the magnitude of the current-period sales revenue change on asymmetric cost behavior. Ciftci and Zoubi (2019) predicted that in the case of a prior period with sales revenue increases (decreases), there is a greater magnitude of cost stickiness (anti-stickiness) for small current sales revenue changes than for large current sales revenue changes. Therefore, they divided current sales changes into three categories (i.e., small, medium, and large current sales changes) and estimated the following econometric specification:

$\log\left(EX_{i,t}/EX_{i,t-1}\right) = \beta_0 + \beta_{01}DS_{i,t} + \alpha_0 SMI\_SMD_{i,t} + \alpha_{01}SMI\_SMD_{i,t}DS_{i,t} + \delta_0 MED\_MMD_{i,t} + \delta_{01}MED\_MMD_{i,t}DS_{i,t} + \alpha_1 SMI\_SMD_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right) + \alpha_2 SMI\_SMD_{i,t}DS_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right) + \delta_1 MED\_MMD_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right) + \delta_2 MED\_MMD_{i,t}DS_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right) + \beta_1\log\left(RV_{i,t}/RV_{i,t-1}\right) + \beta_2 DS_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right) + \varepsilon_{i,t}$ Asymmetric cost behavior and magnitude of current period's sales change (Ciftci & Zoubi, 2019) where $SMI\_SMD_{i,t}$ ($MED\_MMD_{i,t}$) is an indicator variable coded one when there is a small (medium) decrease or increase in current sales changes, and zero otherwise; coefficients a_0 and δ_0 denote the difference between small (medium) and large current period sales revenues increases, β_{01} describes the large current period sales revenue decreases, a_{01} and δ_{01} denote the difference in the intercepts between small (medium) current sales revenue increases and small (medium) current period sales revenue decreases, β_2 describes the magnitude of cost stickiness for large current sales changes, and $a_2(\delta_2)$ is the difference in the magnitude of cost stickiness between small (medium) and large current period sales revenue changes.

3.3. Exploring the effects of asymmetric cost behavior on earnings behavior and other economic phenomena

As research initiatives have explored how the asymmetric cost behavior phenomenon is associated with other economic phenomena, a proliferation of research designs has emerged. Some of them integrate the presence of cost asymmetry with the pre-existing econometric specifications of accounting research. For instance, Banker and Chen (2006) examine the effects of cost asymmetry on earnings behavior by formulating a new econometric specification, the cost-driven earnings behavior model:

$NI_{i,t}/MV_{i,t-1} = a_0 + b_1 DS_{i,t} + b_2\Delta RV_{i,t}/MV_{i,t-1} + b_3 DS_{i,t}\left(\Delta RV_{i,t}/MV_{i,t-1}\right) + \varepsilon_{i,t}$ The cost driven earnings behavior model (Banker & Chen, 2006)where $NI_{i,t}/MV_{i,t-1}$ is the level of earnings ($NI_{i,t}$) scaled with the market value of equity at the beginning of the fiscal year ($MV_{i,t-1}$), $\Delta RV_{i,t}$ is the annual change in the level of sales revenue, and $DS_{i,t}$ is a dummy variable coded one if $RV_{i,t} < RV_{i,t-1}$, and zero otherwise. It aims to separate the effects of sales revenue increases on earnings from the corresponding effects of sales revenue decreases.

The cost driven earnings behavior model was integrated by Banker et al. (2016) with the Basu (1997) asymmetric timeliness model to explore the confounding effect of cost stickiness on conditional conservatism:

$NI_{i,t}/MV_{i,t-1} = a_0 + a_1 DR_{i,t} + a_2 RET_{i,t} + a_3 DR_{i,t}RET_{i,t} + b_1 DS_{i,t} + b_2\Delta RV_{i,t}/MV_{i,t-1} + b_3 DS_{i,t}\left(\Delta RV_{i,t}/MV_{i,t-1}\right) + \upsilon_{i,t}$ The cost stickiness and asymmetric timeliness integrated model (Banker et al., 2016)where $RET_{i,t}$ is the market-adjusted stock return, and $DR_{i,t}$ is a dummy variable coded one if the market-adjusted stock return is negative, and zero otherwise.

3.4. Research instruments for measuring the intensity of cost asymmetry

Research instruments for measuring the intensity of cost stickiness have enabled empirical research to explore the relationship between cost asymmetry and other economic phenomena more systematically. For instance, Weiss (2010) proposed a direct measure of cost stickiness at the firm-year level. This model is based on quarterly data, using the difference between the change in cost scaled by revenues measured in the recent quarter with decreasing sales and the corresponding change in cost scaled by revenues measured in the recent quarter with increasing sales:

$STICKY^j_{i,t} = \log\left(\Delta EX^j_{i,t}/\Delta RV^j_{i,t}\right)_{i,T(-)} - \log\left(\Delta EX^j_{i,t}/\Delta RV^j_{i,t}\right)_{i,T(+)}$, $T(-),\ T(+) \in \{T,\cdots,T-3\}$ Cost asymmetry measuring approach proposed by Weiss (2010)where $T(-)$ is the most recent change in the last four quarters associated with a decrease in revenue, and $T(+)$ is the most recent change in the last four quarters associated with an increase in revenue. $\Delta EX^j_{i,t}$ represent the difference between costs in year t and those in previous year. A negative (positive) value of $STICKY^j_{i,t}$ associated with a higher (lower) intensity of asymmetric cost behavior.

[6] . Banker and Byzalov (2014) responded to Balakrishnan et al. (2014) that their reported conclusions are subject to the following issues: (i) they rely on the assumption that all resources have not prohibitive adjustment costs, and for this reason, cost items can be separated to fixed versus variable regardless the direction of activity change, (ii) the presence of systematic variation in the degree of cost asymmetry is ignored, and (iii) there is a deviation from the standard sample selection criteria of empirical cost asymmetry research.

The firm-level measure of Weiss (2010), which is based on a rolling window of four observations, may reduce the sample size because its implementation requires quarterly data, and even if all necessary accounting data are available, observations might be precluded. Therefore, Kaspereit and Lopatta (2019) proposed another methodology for measuring the intensity of cost stickiness at the firm-year level. More specifically, they estimated the following log-linear specification to derive UPW_SCORE and ASY_SCORE:

$$\log\left(EX_{i,t}/EX_{i,t-1}\right) = b_0 + b_0^1 DS_{i,t} + (b_1 + b_1^x F_{i,t})\log\left(RV_{i,t}/RV_{i,t-1}\right) + \left(b_2 + b_2^x F_{i,t}\right)DS_{i,t}\log\left(RV_{i,t}/RV_{i,t-1}\right) + \varepsilon_{i,t}, \quad T \in \{T, \cdots, T-4\}$$

Cost asymmetry measuring approach proposed by Kaspereit and Lopatta (2019)

$$UPW_{SCORE} = b_1 + b_1^x F_{i,t},\ ASY\_SCORE = b_2 + b_2^x F_{i,t}$$

where UPW_SCORE (upward adjustment costs) captures how firms adjust costs in the case of a 1% increase in sales revenue, ASY_SCORE (downward adjustment costs) captures the percentage decrease in costs following a 1% decrease in sales revenue, b_1^x and b_2^x denote the coefficients of various observable determinants of cost asymmetry (vector $F_{i,t}$).

3.5. Summary and suggestions for the future

The asymmetric cost behavior phenomenon has been theorized under the assumptions that (i) managers play a dominant role in potential resource commitment decisions and other stakeholders (i.e., entrepreneurs, creditors, shareholders, etc.) play a passive role, and (ii) there is sufficient resource availability to justify the economic significance of a potential resource commitment problem if concurrent sales decrease (i.e., retaining versus disposing idle resources) (Banker & Bylazov, 2014). Cost stickiness emerges if the level of adjustment costs is considerable, regardless of maintenance costs. Cost anti-stickiness is associated with the inflow of economic benefits from the disposal of idle resources.

Most empirical research has shaped testable hypotheses based on these assumptions. However, these assumptions are restrictive for formulating theoretical propositions in empirical settings where managers are not dominant in the resource adjustment process and resource commitment decisions (e.g., family owned firms, non-listed firms, and public-sector organizations) or there is insufficient resource availability. Thus, the economic rationalization of cost asymmetry should be reshaped under less-restrictive assumptions.[7]

In this section, we review econometric methods and instruments used in empirical cost-asymmetric research. The standard econometric approach for exploring the presence of cost asymmetry empowered the research community with an analytical framework for formulating and implementing various research designs that document the effects of various (environmental-, firm-, or managerial-specific) factors on the direction and intensity of cost asymmetry. Therefore, the research stream that explores new determinants of cost asymmetry seems to be dominant in asymmetric cost behavior research.

Viewing asymmetric cost behavior as a manifestation of managerial resource adjustment decisions provides a research gateway for a considerable number of research initiatives to capture specific instances of managerial behavior and study their consequences on other economic phenomena. In this research stream, where the economic consequences of cost asymmetry are explored, it is difficult to diagnose a standard econometric approach. Different economic phenomena require different research approaches; however, a critical reliability factor is the research instrument employed for measuring the firm-specific intensity of cost asymmetry, such as those proposed by Weiss (2010) and Kaspereit and Lopatta (2019). Additional sensitive research instruments for measuring firm-specific intensity of cost asymmetry will enable this research stream to elevate its research output and spectrum.

4. Determinants of the asymmetric cost behavior phenomenon

Most empirical cost asymmetry research has explored how various factors shape the intensity and direction of cost asymmetry. Table 3 shows the broad categorization of the studies in our analysis: (i) studies exploring the determinants of cost asymmetry (Panel A, Table 3) and (ii) studies exploring the effects of cost asymmetry on earnings behavior, prediction, and other economic phenomena (Panel B, Table 3). In this section, we review studies exploring the determinants of cost asymmetry. We attempt to untangle the complex nexus of empirically verified determinants of cost asymmetry by classifying them as environmental, firm, or managerial-specific. Within each broad category of determinants, we recognized additional subcategories, as shown in Tables 4, 5, and 6.

4.1. Environmental specific determinants of cost asymmetry

To highlight the manifestation of cost asymmetry, a plethora of studies have examined the environmental effects on the adjustment costs associated with the corresponding deliberate managerial decisions to maintain idle resources after a sales revenue decline. For methodological reasons, we classify environment-specific determinants of cost asymmetry into four categories: (i) macroeconomic conditions, (ii) social, political, and cultural environment, (iii) legal environment and regulations, and (iv) regional, industrial, and market characteristics.

4.1.1. Macroeconomic conditions

Initially, the effects of the economic environment on cost asymmetry were rationalized through the effects of economic growth on managerial optimism for future sales revenue (i.e., operating activity). Consequently, GDP growth rate is adopted as one of the primary variables to capture the effects of macroeconomic conditions on the asymmetric cost behavior phenomenon. An increase in the level of economic growth increases managerial optimism for future sales and intensity of cost stickiness. Similarly, the effects of an economic crisis, as a special case of negative economic shock, on cost asymmetry is examined in several studies (e.g., Namitha & Shijin, 2016; Prabowo et al., 2018; Banker et al., 2020; Li & Zheng, 2020; Stimolo & Porporato, 2020). An economic crisis seems to mitigate the manifestation of cost asymmetry (Namitha & Shijin, 2016; Banker et al., 2020; Stimolo & Porporato, 2020). Habib and Hasan (2019) adopted a more integrated perspective on the effects of economic growth on cost asymmetry and expanded their analysis across different stages of the economic cycle. The main conclusion is that during a recession, cost behavior is symmetric, but by the end of the recession, cost stickiness emerges.

The research community has explored the effects of different characteristics, conditions, and aspects of the economic environment on cost asymmetry. Labor market characteristics, such as the level of human capital, as reflected by the labor skill index (Golden et al., 2020a) and the unemployment rate (Golden et al., 2020a; Hartlieb et al., 2020a), have been associated with employee-related adjustment costs at the firm level. Human capital seems to elevate cost stickiness, whereas periods with low unemployment rates are associated with cost stickiness (Golden et al., 2020a). However, the unemployment rate has no statistically significant effect on the intensity of cost stickiness (Hartlieb et al.,

[7] . Some studies have verified the existence of cost asymmetry in research settings where managers do not have the dominant role in the resource commitment decisions, such as public sector organizations (Cohen et al., 2017; Bradbury & Scott 2018; Nagasawa, 2018; Wu et al., 2020), governmental and state-owned organizations (Holzhacker et al., 2015b; Prabowo et al., 2018; Xue & Hong, 2016; Li et al., 2020b), and organizations with varying degrees of access to capital (Cheng et al., 2018; Li & Zheng, 2020). Empirical research that focuses on similar research lines can substantially expanded if they are empowered with appropriate generalized theoretical frameworks for cost asymmetry with less restrictive assumptions.

Table 3
Selection process and classification of asymmetric cost behavior studies.

Panel A: Determinants of the asymmetric cost behavior phenomenon

No.	Study	Research site	Sample years	Cost category
1.	Anderson et al. (2003)	U.S.	1979–1998	SG&A expenses
2.	Balakrishnan et al. (2004)	U.S.	1992–1997	Operating costs[1]
3.	Calleja et al. (2006)	U.S., UK, France, and Germany	1988–2004	Operating costs[2]
4.	Balakrishnan and Gruca (2008)	Canada	1986–1989	Operating costs
5.	Chen et al. (2012)	U.S.	1996–2005	SG&A expenses
6.	Dierynck et al. (2012)	Belgium private firms	1993–2006	Total labor costs (Number of employees, Total number of hours)
7.	Anderson et al. (2013)	U.S.	1980–2009	SG&A expenses
8.	Banker et al. (2013)	19 OECD[3]	1988–2008	Operating costs
9.	Kama and Weiss (2013)	U.S.	1979–2006	Operating costs
10.	Balakrishnan et al. (2014)	U.S.	1980–2004	SG&A expenses
11.	Banker and Byzalov (2014)	Globally[4]	1988–2008	SG&A expenses
12.	Banker et al. (2014b)	U.S.	1979–2009	SG&A expenses, Advertising costs, R&D expenses, Other SG&A expenses, COGS, Number of employees
13.	Brüggen and Zehnder (2014)	U.S.	1992–2006	SG&A expenses
14.	Cannon (2014)	U.S. Airlines	1992–2007	Total capacity cost
15.	Dalla Via and Perego (2014)	Italian SMEs Firms	1999–2008	SG&A expenses, COGS, Total labor costs, Operating costs
16.	Liang et al. (2014)	China	2002–2010	Operating costs,
17.	Shust and Weiss (2014)	U.S.	1988–2011	Operating costs paid in cash, Operating expenses before depreciation
18.	de Villiers et al. (2014)	U.S.	2000–2008	Audit fee
19.	Bu et al. (2015)	China	2001–2012	SG&A expenses
20.	Bugeja et al. (2015)	Australia[5]	1990–2010	Operating costs
21.	Holzhacker et al. (2015b)	German Hospitals	1993–2008	Operating costs
22.	Venieris et al. (2015)	U.S.	1979–2009	SG&A expenses (Adjusted SG&A expenses, Advertising expenses)
23.	Yang (2015)	Korea	1995–2011	Merger hubris theory
24.	Zanella et al. (2015)	United Arab Emirates	2002–2011	SG&A expenses
25.	Banker et al. (2016)	U.S.	1987–2007	Earnings (Operating accruals)
26.	Ben-Nasr and Alshwer (2016)	U.S.	1994–2010	Total labor costs
27.	Dogan et al. (2016)	U.S.	1975–2012	Operating lease expense, Interest expense, Pension & Retirement expense,
28.	Hall (2016)	U.S. Banks	1997–2006	Total labor costs
29.	Kitching et al. (2016)	39 countries[6]	1990–2013	Operating costs
30.	Namitha and Shijin (2016)	India	1997–2012	SG&A expenses
31.	Subramaniam and Watson (2016)	U.S.[7]	1979–2000	SG&A expenses, COGS, R&D expenses, Advertising expenses, Interest expenses, Provision for loan losses
32.	Xue and Hong (2016)	China	2003–2010	SG&A expenses
33.	Cohen et al. (2017)	Greek Municipalities	2002–2008	SG&A expenses, COGS
34.	Ibrahim and Ezat (2017)	Egypt	2004–2011	SG&A expenses, COGS
35.	Li and Zheng (2017)	U.S.	1996–2009	Operating costs
36.	Mohammadi and Taherkhani (2017)	Iran	2004–2014	Operating costs
37.	Xu and Sim (2017)	China Manufacturing	2010–2014	Operating costs
38.	Bradbury and Scott (2018)	New Zealand Municipalities	2008–2012	Operating costs
39.	Cheng et al. (2018)	China SMEs Firms	1998–2007	SG&A expenses
40.	Cheung et al. (2018)	38 Countries[8]	1988–2012	SG&A expenses
41.	Ibrahim (2018)	Egypt	2008–2013	COGS
42.	Loy and Hartlieb (2018)	U.S.	1970–2014	SG&A expenses, COGS, Operating costs
43.	Nagasawa (2018)	Japan	1974–2013	Operating costs
44.	Prabowo et al. (2018)	22 European Countries[9]	1993–2012	Total labor costs
45.	Belina et al. (2019)	Health Insurance Companies	2002–2016	SG&A expenses
46.	Cai et al. (2019)	China	2009–2017	SG&A expenses
47.	Chen et al. (2019b)	U.S.	1994–2014	SG&A expenses
48.	Chang et al. (2019)	China	2001–2016	Audit fees
49.	Chung et al. (2019)	U.S.	1981–2012	Operating costs
50.	Ciftci and Zoubi (2019)	U.S.	1979–2015	SG&A expenses
51.	Cook et al. (2019)	U.S.	1980–2014	SG&A expenses, COGS, Operating costs, Advertising expenses, R&D expenses, Total labor costs
52.	Ding et al. (2019)	43 developed and developing countries[10]	2000–2014	SG&A expenses, COGS, Operating costs, Number of employees
53.	Habib and Hasan (2019)	U.S.	1991–2013	Operating costs
54.	Haga et al. (2019)	33 OECD[11]	2011–2016	SG&A expenses
55.	Höglund and Sundvik (2019)	Finland	2012–2014	SG&A expenses
56.	Khedmati et al. (2019)	U.S.	1999–2016	Total labor costs
57.	Kim et al. (2019)	U.S.	2004–2016	SG&A expenses
58.	Kuiate and Noland (2019)	U.S. long haul tracking firms	1989–1997	Total labor costs
59.	Liu et al. (2019)	U.S.	1990–2013	SG&A expenses
60.	Ma et al. (2019)	U.S.	1971–2010	SG&A expenses
61.	Shi et al. (2019)	China Manufacturing SMEs	2000–2013	Inventories, Property, plant, and equipment (PP&E), Number of employees
62.	Silge and Wöhrmann (2019)	U.S.	1990–2014	SG&A expenses
63.	Yang (2019)	Australia	1990–2016	Operating costs
64.	Zhang et al. (2019a)	U.S. tourism and hospitality	2009–2017	SG&A expenses
65.	Zhang et al. (2019b)	China Manufacturing	2009–2013	SG&A expenses
66.	Ballas et al. (2020)	U.S.	1991–2014	SG&A expenses, SG&A expenses minus advertising expenses, Advertising expenses
67.	Balios et al. (2020)	G7 countries	1995–2015	SG&A expenses

(*continued on next page*)

Table 3 (*continued*)

Panel A: Determinants of the asymmetric cost behavior phenomenon

No.	Study	Research site	Sample years	Cost category
68.	Cannon et al. (2020)	38 countries[12]	1984–2011	SG&A expenses
69.	Golden et al. (2020a)	U.S.	1999–2016	Operating costs
70.	Golden et al. (2020b)	U.S.	2003–2015	SG&A expenses, Operating costs
71.	Gray (2020)	U.S. specialty retail firms	1997–2016	Lease expense, Operating lease commitments
72.	Hartlieb et al. (2020a)	U.S.	1990–2014	Operating costs
73.	Hartlieb et al. (2020b)	44 countries[13]	1999–2009	Operating costs
74.	Huang and Kim (2020)	41 countries[14]	2002–2014	Operating costs
75.	Ko et al. (2020)	Korea	2011–2018	SG&A expenses, R&D expenses
76.	Krisnadewi and Soewarno (2020)	Indonesia, Malaysia, and Singapore	2010–2017	SG&A expenses
77.	Lee et al. (2020a)	55 countries[15]	1995–2012	Operating costs
78.	Lee et al. (2020b)	U.S.	1990–2006	SG&A expenses
79.	Li and Zheng (2020)	U.S.	1979–2015	Operating costs
80.	Li et al. (2020a)	U.S.	1991–2017	SG&A expenses
81.	Li et al. (2020b)	China	2008–2018	SG&A expenses
82.	Lopatta et al. (2020)	U.S.	1990–2015	SG&A expenses
83.	Loy and Hartlieb (2020)	U.S.[16]	1977–2011	Operating costs
84.	Özkaya (2020)	Turkey	2013–2017	SG&A expenses, COGS
85.	Stimolo and Porporato (2020)	Argentina	2004–2012	SG&A expenses
86.	Wu et al. (2020)	Taiwan public schools	2011–2013	Operating costs
87.	Xu and Zheng (2020)	U.S.	1990–2013	SG&A expenses
88.	Yang et al. (2020)	China	2003–2016	Operating costs
89.	Zhu et al. (2020)	China	2009–2017	SG&A expenses

Panel B: Cost asymmetry as determinant of earnings behavior, earnings prediction, and other economic phenomena

No.	Study	Research site	Sample years	Economic phenomenon
1.	Banker and Chen (2006)	U.S.	1988–2002	Earnings prediction
2.	Anderson et al. (2007)	U.S.	1980–2003	Operating efficiency
3.	Baumgarten et al. (2010)	U.S.	1980–2006	Operating efficiency
4.	Weiss (2010)	U.S.	1986–2005	Analysts' earnings forecasts; Analysts' coverage; Market response to earnings surprises
5.	Ciftci et al. (2016)	U.S.	1998–2011	Analysts' sales and earnings forecast
6.	Banker et al. (2016)	U.S.	1987–2007	Asymmetric timeliness
7.	Ciftci and Salama (2018)	U.S.	1994–2015	Management forecasts issuance and forecast errors; Analysts' surprises by management earnings forecasts
8.	Rouxelin et al. (2018)	U.S.	1985–2013	Prediction of future macro-level unemployment rate
9.	Salehi et al. (2018)	Iran	2010–2016	Financial reporting quality (FRQ)
10.	Chen et al. (2019a)	U.S.	1963–2016	Operating Leverage
11.	Kaspereit and Lopatta (2019)	U.S.	1986–2014	Earnings prediction model; Analysts' forecast accuracy and earnings surprises on market reactions
12.	Han et al. (2020)	U.S.	2005–2016	Management earnings forecasts (MEF) releases
13.	He et al. (2020)	U.S.	1978–2016	Dividend policy
14.	Jang and Yehuda (2020)	U.S.	1990–2014	Value creation in mergers and acquisitions (M&A) deals.
15.	Lu et al. (2020)	Australia	1993–2013	CFO asymmetric timeliness
16.	Tang et al. (2020)	China	2009–2017	Stock price crash risk
17.	Riegler and Weiskirchner-Merten (2020)	Theoretical Analysis		Market decisions

Notes: This table clusters the studies into two categories: (i) determinants of the asymmetric cost behavior phenomenon, and (ii) cost asymmetry as determinant of earnings behavior, earnings prediction, and other economic phenomena. We exclude studies that examine the relation of demand uncertainty and cost structure and rigidity (the proportion of fixed versus variable costs) (e.g., Banker et al. 2014a; Holzhacker et al. 2015a; Aboody et al. 2018; Cohen and Li 2020). Additional information is provided by the following notes:

1. This study focuses on a particular industry (i.e., therapy clinics) in which major costs are: staffed hours and salary paid to therapists.
2. Operating costs are proxied by the relevant literature with the following methods: a) as an aggregation of COGS and SG&A, b) as the difference between annual sales revenues and income from operations and c) as a standalone variable obtained from Compustat.
3. Includes the following OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, U.S., and UK.
4. Includes the following countries: Australia, Brazil, Canada, China, France, Germany, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Singapore, South Africa, Sweden, Switzerland, Taiwan, Thailand, UK, and U.S.
5. Authors examine the variation of cost asymmetry and within the context of six industries: resources, manufacturing, construction, retail, services, and unclassified industries.
6. Includes the following countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Colombia, Denmark, Finland, France, Germany, UK, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, Turkey, U.S., Venezuela.
7. Authors examine cost asymmetry across different industries such as: manufacturing, merchandising, service, and financial.
8. Includes the following countries: Australia, Austria, Belgium, Bermuda, Brazil, Canada, China, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Lithuania, Malaysia, Marshall Islands, Mexico, Netherlands, Nigeria, Norway, Pakistan, Philippines, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, UK, and U.S.
9. Includes the following countries: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Luxembourg, Latvia, Netherlands, Poland, Portugal, Slovenia, Slovakia, Spain, Sweden, and UK.
10. Includes the following countries: Australia, Austria, Belgium, Bulgaria, Brazil, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, Norway, Poland,

Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Sweden, Turkey, Taiwan, UK, and U.S.
11. Includes the following countries: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, UK, and U.S.
12. Includes the following countries: Argentina, Austria, Belgium, Brazil, Chile, China, Colombia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, South Africa, Sweden, Switzerland, Taiwan, Thailand, Turkey, Venezuela, and Zimbabwe.
13. Includes the following countries: Australia, Austria, Belgium, Brazil, Canada, Chile, China, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Italy, Japan, Jordan, Latvia, Lithuania, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Russia, Singapore, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, UK, and U.S.
14. Includes the following countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Portugal, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK, and U.S.
15. Includes the following countries: Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, South Korea, Latvia, Lithuania, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Russia, Singapore, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK, and U.S.
16. Authors place emphasis in 762 regions in U.S. which is geographically classified, according to U.S. Census Bureau, with the following distribution: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific.

2020a). Managerial decisions to fire workers are delayed when a firm operates within an economic environment with low hiring credits, which increases the adjustment cost of replacing old workers (Golden et al., 2020a). Thus, when investigating the effects of the labor market on the level of adjustment costs, researchers should emphasize not only the imbalance between supply and demand but also the qualitative characteristics of the labor market.

Economic uncertainty seems to affect a firm's cost structure and thus the manifestation of cost stickiness. Prior literature has documented that firms operating in an economic environment of trade openness (Ding et al., 2019) and demand uncertainty exhibit a more rigid short-run cost structure with higher fixed costs and lower variable costs (Banker et al., 2014a; Cohen & Li, 2020). Trade openness increases the cost stickiness of the COGS (Ding et al., 2019), whereas demand uncertainty might have no significant effects or increase cost stickiness (e.g., Ma et al., 2019; Cai et al., 2019; Ballas et al., 2020).

Country-budget conditions are another factor that determines the intensity of cost stickiness in public entities (Cohen et al., 2017; Nagasawa, 2018; Prabowo et al., 2018; Wu et al., 2020). Politicians (or managers) in local governments are anchored with less power to retain idle resources when budget pressure is high (Cohen et al., 2017; Nagasawa, 2018; Prabowo et al., 2018), signifying a lower intensity of cost stickiness. In contrast, Wu et al. (2020) provided evidence that managers of public schools tend to retain resources that appear in the school budget, which represents a substantial portion of the country's budget, due to the existence of high enrolment pressure.

An economy's rate of inflation and business risk affects the level of adjustment costs and shapes managerial expectations. Firms operating in countries with lower inflation rates and more favorable investing environments tend to exhibit increased cost stickiness (Lee et al., 2020a). Within the same context, Hartlieb et al. (2020a) examined a country's income per capita and overall population as observable determinants of cost asymmetry. However, neither determinant appears to have a significant effect on the intensity of cost stickiness.

Finally, regional characteristics have been documented as significant determinants of cost asymmetry. More specifically, Xu and Sim (2017) examined the economic development of Chinese regions and indicated that cost stickiness is more prevalent in eastern and western provinces than in central provinces.

4.1.2. Social and cultural environment

The literature has investigated the effects of social and cultural environments on asymmetric cost behavior. Community social capital seems to restrain managers from making opportunistic resource adjustment decisions that induce cost stickiness (Hartlieb et al., 2020a; Loy & Hartlieb, 2020). In contrast, the level of education and religious adherence does not seem to have significant effects, or it decreases the intensity of asymmetric cost behavior (Ma et al., 2019; Hartlieb et al., 2020a; Hartlieb et al., 2020b; Loy & Hartlieb, 2020). Hartlieb et al. (2020b), in a cross-country analysis, found that sticky cost behavior is positively related to informal social attributes, such as generalized trust. Cost stickiness varies among national cultural attributes such as uncertainty avoidance, masculinity, and long-term orientation (Kitching et al., 2016; Huang & Kim, 2020). Finally, Huang and Kim (2020) found that firms located in countries with weak time-reference languages exhibit greater cost stickiness, on average, than firms located in countries with strong time-reference languages.

4.1.3. Political environment

The political environment affects the decision-making processes of various economic agents, including those associated with decisions that shape the manifestation of cost asymmetry. Cohen et al. (2017) examined asymmetric cost behavior in the presence of strong political incentives, which affect rational economic decision making in the public sector. Empirical evidence suggests that local government managers adjust administrative services costs (costs of service provision) faster (slower) when revenues decrease than when they rise. Lee et al. (2020a) documented that election years increase the stickiness of labor costs and R&D expenses, since managers might elect to delay employment decisions under political uncertainty, and R&D investment decisions are irreversible in the short term. However, the effects of election year on cost asymmetry are more profound for state-owned firms than for private firms (Prabowo et al., 2018), with the former exhibiting increased levels of cost stickiness if a left-wing political party wins the country's elections. In contrast, politically connected private firms reduce their labor costs more than other firms when sales decline, as they may rely on their political connections to address or overcome resistance from labor unions and other stakeholders (Prabowo et al., 2018). Finally, political stability enables managers to make sensible resource adjustment decisions, increasing the intensity of cost stickiness (Lee et al., 2020a).

4.1.4. Legal environment and regulations

The legal environment and regulations might shape direct managerial behavior and a firm's activities. Therefore, prior empirical research considered legal origin (i.e., code law versus common law countries) to be a significant determinant of cost asymmetry (e.g., Calleja et al., 2006; Banker et al., 2013; Kitching et al., 2016; Prabowo et al., 2018; Ding et al., 2019; Haga et al., 2019; Balios et al., 2020; Cannon et al., 2020; Hartlieb et al., 2020b; Huang & Kim, 2020; Lee et al., 2020a). Different legal origins are responsible for differences in the systems of corporate governance and managerial oversight. Another major determinant of cost asymmetry is the level of labor market protection. Firms operating in countries with stricter employment protection legislation seem to exhibit higher cost stickiness (Dierynck et al., 2012; Banker et al., 2013;

Table 4
Environmental specific determinants of cost asymmetry.

Macroeconomic conditions				
No.	Determinant	Direction	Selected studies	Cost category
1.	Level of macroeconomic activity	↑	Cost asymmetry determinant employed by the standard econometric specifications employed by the mainstream asymmetric cost behavior empirical research. The level of macroeconomic activity is measured with the GDP growth rate.	Multiple cost categories
2.	Economic crisis (or economic slowdowns)	↓	Namitha and Shijin (2016), Prabowo et al. (2018), Banker et al. (2020), Li and Zheng (2020), Stimolo and Porporato (2020)	Labor costs, Operating costs, SG&A expenses
3.	Stages of economic cycle	↓/↑	Habib and Hasan (2019)	Operating costs
4.	Hiring subsidy programs	↓/↑	Golden et al. (2020a)	Operating costs
5.	Country budget condition	↓/↑	Cohen et al. (2017), Nagasawa (2018), Prabowo et al. (2018), Wu et al. (2020)	SG&A expenses, Labor costs, COGS
6.	Labor skill index	↑	Golden et al. (2020a)	Operating costs
7.	Unemployment rate	0	Golden et al. (2020a), Hartlieb et al. (2020a)	Operating costs
8.	Income per capita	0	Hartlieb et al. (2020a)	Operating costs
9.	Overall and density population	0	Hartlieb et al. (2020a)	Operating costs
10.	Investment profile index	↑	Lee et al. (2020a)	Operating costs
11.	Inflation	↓	Lee et al. (2020a)	Operating costs
12.	Trade openness	↑	Ding et al. (2019)	SG&A expenses, Operating costs, COGS
13.	Demand uncertainty	0/↑	Banker et al. (2014a), Holzhacker et al. (2015a), Cai et al. (2019), Ma et al. (2019), Ballas et al. (2020), Cohen and Li (2020)	Operating costs, SG&A expenses, Advertising expenses, COGS
14.	Different regions of a country	↓/↑	Xu and Sim (2017)	Operating costs
Social and cultural environment				
No.	Determinant	Direction	Selected studies	Cost category
1.	Level of social capital	↓	Hartlieb et al. (2020a), Loy and Hartlieb (2020)	Operating costs
2.	National culture (long-term orientation, masculinity, uncertainty avoidance)	↓/↑	Kitching et al. (2016); Huang and Kim (2020)	Operating costs
3.	Education level	0	Hartlieb et al. (2020a), Hartlieb et al. (2020b), Loy and Hartlieb (2020)	Operating costs
4.	Religious adherence	0/↓	Ma et al. (2019), Hartlieb et al. (2020a), Hartlieb et al. (2020b), Loy and Hartlieb (2020)	SG&A expenses, Operating costs
5.	Time reference in languages	↓/↑	Huang and Kim (2020)	Operating costs
6.	Generalized Trust	↑	Hartlieb et al. (2020b)	Operating costs
Political environment				
No.	Determinant	Direction	Selected studies	Cost category
1.	Election year, left wing government	0/↑	Prabowo et al. (2018), Lee et al. (2020a)	Labor costs, Operating costs, R&D expenses
2	Political connections	↓	Prabowo et al. (2018)	Labor costs
3.	Political stability	↑	Lee et al. (2020a)	Operating costs
Legal environment and regulations				
No.	Determinant	Direction	Selected studies	Cost category
1.	Legal origin (code law versus common law countries)	↓/↑	Calleja et al. (2006), Banker et al. (2013), Kitching et al. (2016), Prabowo et al. (2018), Ding et al. (2019), Haga et al. (2019), Balios et al. (2020), Cannon et al. (2020), Hartlieb et al. (2020b), Huang and Kim (2020), Lee et al. (2020a)	Operating costs, SG&A expenses, COGS
2.	Labor market protection	↑	Dierynck et al. (2012), Banker et al. (2013), Zanella et al. (2015), Prabowo et al. (2018), Kaspereit and Lopatta (2019), Golden et al. (2020a), Hartlieb et al. (2020b), Huang and Kim (2020), Lee et al. (2020a)	Labor costs, Operating costs, SG&A expenses
3.	M&A law enactments	↓	Cannon et al. (2020)	SG&A expenses
Table 4: Continued				
3.	First time adoption of IFRS	↑	Bugeja et al. (2015), Yang (2019)	Operating costs
4.	Regulatory pressure for capital adequacy	↓	Hall (2016)	Labor costs
5.	Regulatory intervention	↓	Holzhacker et al. (2015b), Belina et al. (2019)	Operating costs, SG&A expenses
Regional, industrial, and market characteristics				
No.	Determinant	Direction	Selected studies	Cost category
1.	Industry-specific effects	↓/↑	Calleja et al. (2006), Dalla Via and Perego (2014), Liang et al. (2014), Bugeja et al. (2015), Ben-Nasr and Alshwer (2016), Subramaniam and Watson (2016), Cohen et al. (2017), Ibrahim and Ezat (2017), Xu and Sim (2017), Bradbury and Scott (2018), Nagasawa (2018), Prabowo et al. (2018), Rouxelin et al. (2018), Habib and Hassan (2019), Shi et al. (2019), Zhang et al. (2019a), Zhang et al. (2019b), Gray (2020), Krisnadewi and Soewarno (2020), Li et al. (2020b), Loy and Hartlieb (2020), Lu et al. (2020), Özkaya (2020), Stimolo and Porporato (2020)	SG&A expenses, COGS, Operating costs, Labor costs, Interest expenses, Advertising expenses, Lease Expense, Operating lease commitments
2.	Federal funds rate (i.e., economic growth rate in banking industry)	↓/↑	Hall (2016), Rouxelin et al. (2018)	Labor costs
3.	Market concentration and competition measures	↓/↑	Liang et al. (2014), Subramaniam and Watson (2016), Li and Zheng (2017), Cheung et al. (2018), Ballas et al. (2020), Krisnadewi and Soewarno (2020), Li et al. (2020b), Lee et al. (2020b), Tang et al. (2020)	SG&A expenses, COGS, Operating costs, R&D expenses, Interest expenses, Advertising expenses

Notes: This table presents the environmental specific determinants of cost asymmetry. Environmental specific determinants of cost asymmetry are classified into four categories: (i) macroeconomic conditions, (ii) social, political, and cultural environment, (iii) legal environment and regulations, and (iv) regional, industrial and

market characteristics. ↑ denotes the empirical research that documents a positive (negative) association of cost stickiness (anti-stickiness) with the corresponding determinant, ↓ denotes the empirical research that documents a negative (positive) association of cost stickiness (anti-stickiness) with the corresponding determinant, 0 denotes the empirical research that documents no statistic significant association of cost asymmetry with the corresponding determinant, / stands for "or".

Zanella et al., 2015; Prabowo et al., 2018; Kaspereit & Lopatta, 2019; Golden et al., 2020a; Hartlieb et al., 2020b; Huang & Kim, 2020; Lee et al., 2020a).

Changes in accounting regimes may affect cost behavior (Bugeja et al., 2015; Yang, 2019). Cost stickiness is more pronounced in the post-IFRS period, probably due to the more efficient employment of intangible resources (Yang, 2019). Regulatory intervention is an additional determinant associated with cost asymmetry. For instance, a regulatory change in the context of the health insurance industry reduces the intensity of cost stickiness (Holzhacker et al., 2015b; Belina et al., 2019). In the banking sector, regulatory pressure for capital adequacy is positively associated with fewer upward labor adjustments and greater downward labor adjustments (Hall, 2016).

The effect of international takeover laws has also been observed to be a determinant of cost asymmetry. Cannon et al. (2020) provided evidence that takeover threats, following an mergers and acquisitions (M&A) law enactment, induce managers to dispose of unutilized resources after sales volume declines. This effect is more pronounced in countries with weak investor protection and short-term-oriented performance, revealing that takeover laws induce market discipline and myopic resource adjustment decisions.

4.1.5. Regional, industrial, and market characteristics

Industrial characteristics have been considered as significant determinants of cost asymmetry. Therefore, prior literature has either explicitly examined notable industry characteristics on cost asymmetry or executed research designs with appropriate industry controls (e.g., Calleja et al., 2006; Dalla Via & Perego, 2014; Liang et al., 2014; Bugeja et al., 2015; Ben-Nasr & Alshwer, 2016; Subramaniam & Watson, 2016; Cohen et al., 2017; Ibrahim & Ezat, 2017; Xu & Sim, 2017; Bradbury & Scott, 2018; Nagasawa, 2018; Prabowo et al., 2018; Rouxelin et al., 2018; Habib & Hassan, 2019; Shi et al., 2019; Zhang et al., 2019a; Zhang et al., 2019b; Gray, 2020; Krisnadewi & Soewarno, 2020; Li et al., 2020b; Loy & Hartlieb, 2020; Lu et al., 2020; Özkaya, 2020; Stimolo & Porporato, 2020). For instance, to capture the effect of macroeconomic activity on the banking sector, Hall (2016) employed the federal funds rate as a determinant of economic growth.

A special characteristic of an industry is the intensity of its market concentration and competition. Cost stickiness increases as competition intensity increases (Li & Zheng, 2017; Cheung et al., 2018). The latter pattern is more pronounced if management is optimistic about future demand for single-segment firms relative to multi-segment firms and firms in an industry with a larger market size. This has also been verified for the retail industry (Krisnadewi & Soewarno, 2020) and the banking sector (Lee et al., 2020b). However, other studies have documented that increased competition decreases cost stickiness (Subramaniam & Watson, 2016; Ballas et al., 2020).

4.2. Organizational specific determinants of cost asymmetry

In this section, we review the determinants of the cost asymmetry associated with accounting entities' organizational characteristics and profiles. For methodological reasons, the determinants of cost asymmetry associated with managerial characteristics and behavior are classified in a separate category. Most of the literature is anchored with the view that managers play a dominant role in resource retention or disposal decisions. Therefore, managerial-specific determinants of cost asymmetry have attracted considerable research interest. We classify the organizational-specific determinants of cost asymmetry into six categories: (i) level of adjustment costs, (ii) financial and operating efficiency, (iii) corporate governance and control, (iv) organizational complexity and transformation, (v) operating risk, and (vi) strategy and marketing.

4.2.1. Level of adjustment costs

Higher levels of adjustment costs are associated with a higher degree of cost stickiness. Mainstream empirical cost asymmetry research employs asset intensity (i.e., the log ratio of total assets to sales) and employee intensity (i.e., the log ratio of the number of employees to sales) as firm-specific proxies of the level of adjustment costs. Capacity utilization is another possible reason for the emergence of cost asymmetry. More specifically, it seems that if firms experience strained capacity (high-capacity utilization) and, therefore, increased adjustment costs, they tend to retain resources as demand falls and add resources as demand grows (Balakrishnan et al., 2004; Cannon, 2014; Holzhacker et al., 2015b). Similarly, several determinants of the intensity of cost asymmetry reflect the level of adjustment costs managers should consider in a resource disposal scenario. Firm size is positively associated with adjusting costs and cost stickiness (Kama & Weiss, 2013; Dalla Via & Perego, 2014; Cheng et al., 2018; Prabowo et al., 2018; Chung et al., 2019; Ding et al., 2019; Kim et al., 2019; Shi et al., 2019; Han et al., 2020; Özkaya, 2020). A specialized instance of a firm's size is the level of the (gross/net) plant, property, and equipment. A decline in (gross/net) properties, plants, and equipment has been associated with a reduction in adjustment costs (Kaspereit & Lopatta, 2019; Yang, 2019; Lopatta et al., 2020). Further, the degree of employee and customer orientation is positively related to cost stickiness (Liu et al., 2019). Adjustment costs include either explicit expenditure (i.e., customer orientation) or implicit organizational, psychological, personal, and opportunity costs (i.e., employee orientation).

Investments in working capital are used as another proxy for the level of adjustment cost, although the empirical results on the effects of investments in working capital on cost asymmetry are mixed for different countries and legal origins (e.g., Calleja et al., 2006). Another way to capture the level of adjustment costs is to focus on the magnitude of current sales changes. A plausible assumption is that there is a positive correlation between changes in sales revenue and adjustment costs. However, this positive relationship might be interrupted in the case of large changes in sales revenue when the economic benefits of disposing idle capacity exceed the level of adjustment costs. Existing empirical studies have provided mixed results (Dalla Via & Perego, 2014; Subramaniam & Watson, 2016; Ciftci & Zoubi, 2019; Özkaya, 2020).

4.2.2. Financial and operating efficiency

The level of financial efficiency affects the intensity and direction of cost asymmetry. The magnitude of financial leverage mitigates the intensity of cost stickiness (Calleja et al., 2006; Dalla Via & Perego, 2014; Chung et al.; 2019; Huang & Kim, 2020; Ko et al., 2020; Krisnadewi & Soewarno, 2020; Özkaya 2020, Tang et al., 2020), and the level of financial strength (e.g., access to capital, level of rollover risk, etc.) is positively associated with the intensity of cost stickiness (Cheng et al., 2018; Li & Zheng, 2020; Lee et al., 2020b). Firms with fewer financing resources/capital (higher financial constraints) tend to dispose of unutilized resources to reduce financial risk. It can be argued that managers, to preserve higher leverage ratios, reduce the intensity of cost stickiness to reduce earnings volatility.

An emerging stream of the literature encapsulates the effect of operating efficiency on cost asymmetry. A lower magnitude of cost stickiness is associated with better future performance (Chung et al., 2019; Liu et al., 2019). Within the same context, Zhang et al. (2019b) indicated that there is a positive association between cost asymmetry and Initial Public Offering (IPO) overfunding, where liquidity stemming from IPO overfunding increases the level of managerial empire building

behavior and reduces the company's operating efficiency. However, if costs create higher (lower) future values, managers are likely to retain (dispose) idle resources, leading to cost stickiness (cost anti-stickiness and/or cost symmetry) (Chen et al., 2012; Namitha & Shijin, 2016; Loy & Hartlieb, 2018; Liu et al., 2019; Ma et al., 2019; Yang et al., 2020). In addition, high growth potential (proxied by either the market-to-book ratio, book-to-market ratio, historical sales growth, and signs of operating, investing, and financing cash flows) increases the level of cost stickiness (Anderson et al., 2013; Banker et al., 2016; Liu et al., 2019, Silge & Wöhrmann, 2019; Jang & Yehuda, 2020). However, market participants react negatively to the presence of cost stickiness as evidence of poor control, especially when firms exhibit low long-term growth expectations (Silge & Wöhrmann, 2019).

4.2.3. Corporate governance, control, and ownership structure

Cost asymmetry emerges from decisions to retain or dispose of resources when operating activity declines. This section reviews the determinants associated with mechanisms (such as corporate governance, control, and ownership structure) that affect the dynamic balance of the conflicting interests of different economic agents/stakeholders regarding cost asymmetry. Corporate governance mechanisms enable organizations to control managerial empire-building behavior and reduce the intensity of cost stickiness (e.g., Chen et al., 2012; Liang et al., 2014; Bugeja et al., 2015; Namitha & Shijin, 2016; Xue & Hong, 2016; Ibrahim, 2018; Chung et al., 2019; Liu et al., 2019; Zhang et al. 2019b; Hartlieb et al., 2020a; Jang & Yehuda, 2020). However, firms anchored with a high intensity of social responsibility activities are engaged in ongoing investments in value-creating activities; hence, it is difficult to scale down committed resources instantly even when the activity declines and they exhibit increased intensity of cost stickiness (Habib & Hasan, 2019; Golden et al., 2020b).

The ownership structure might affect the response of costs to activity changes. The presence of high institutional ownership better protects the shareholder interests while simultaneously reducing agency issues and the intensity of cost stickiness (Liu et al., 2019; Zhang et al. 2019b; Huang & Kim, 2020). Economic activities performed or controlled by the government and the public sector tend to exhibit increased cost stickiness. Cost asymmetry has been observed in public sector organizations (Cohen et al., 2017; Bradbury & Scott, 2018; Nagasawa, 2018; Wu et al., 2020) and is more pronounced in governmental or non-profit firms than in for-profit firms (Holzhacker et al., 2015b). The presence of state ownership increases the degree of cost stickiness because managers face political or social pressure to avoid adjustment costs, such as layoffs and modified employee wages (Bu et al., 2015; Xue & Hong, 2016; Prabowo et al., 2018; Li et al., 2020b, Tang et al., 2020). Finally, the literature examines differences in cost stickiness between private and public firms. Hall (2016) and Haga et al. (2019) find that cost stickiness is more prevalent in private firms than in public firms. In contrast, Dalla Via and Perego (2014) and Cheng et al. (2018) observed that SMEs tend to dispose idle resources when sales volume declines, leading to a lower degree of cost stickiness or anti-stickiness.

Auditing quality is negatively associated with cost stickiness (Liang et al., 2014; Cai et al., 2019; Höglund & Sundvik, 2019). For instance, auditors might restrict sticky behavior that might be associated with illegal actions (Höglund & Sundvik, 2019) or restrict managerial empire-building behavior (Liang et al., 2014). A special case occurs when a supplier and customer share the same auditor. The presence of shared auditors in the supply chain seems to reduce suppliers' cost stickiness significantly when suppliers' managers hold optimistic expectations and increases suppliers' cost stickiness in cases of pessimistic expectations (Cai et al., 2019). In addition, de Villiers et al. (2014) and Chang et al. (2019) examined the cost behavior of audit fees using US and Chinese samples, respectively. Their empirical findings indicate that audit fees' behavior is sticky, as audit fees react more quickly to upward adjustments than downward adjustments. Chang et al. (2019) found that upward (downward) audit fee stickiness is positively (negatively) related to audit quality.

Internal controls may have consequences on asymmetric cost behavior. Based on real options theory, Kim et al. (2019) observed that managers in firms with internal control weaknesses face information uncertainty and are more likely to postpone downward adjustments of slack resources by exercising an option to wait until more information about future business prospects becomes available. However, Zhu et al. (2020) argued that the reason for the negative effects of corporate finalization on cost stickiness is the presence of strong internal control mechanisms.

4.2.4. Organizational complexity

Organizational complexity affects the way an organization produces and delivers its services. Costs become stickier in the more central activities of the organization (Balakrishnan & Gruca, 2008; Cohen et al., 2017). In addition, cost stickiness is more pronounced (although not statistically significant) for single-segment firms than for multi-segment firms (Li et al., 2017).

4.2.5. Operating risk

Operating risk is an essential parameter in managerial resource-allocation decisions. Anderson et al. (2013) documented that managers operating in firms with high sales volatility must adjust resources to reduce the risk of operating income. Similarly, Xu and Zheng (2020) indicated that the level of cash flow volatility enhances the negative association of cost stickiness with tax avoidance because cash savings from tax avoidance for firms with high cash flow volatility induce higher benefits for managers to achieve resource adjustment goals. Kuiate and Noland (2019) attempted to capture the effect of operating risk on cost asymmetry within the context of pension benefits. Pension benefits are associated with high adjustment costs because they serve as an effective employee retention tool, which results in a high degree of cost stickiness.

4.2.6. Strategy and marketing

Strategic decisions and marketing policies are important parameters in managerial decision-making. Intangible resources, such as organizational capital, human capital, and R&D activities, seem to be correlated with cost asymmetry (Venieris et al., 2015; Mohammadi & Taherkhani, 2017; Loy & Hartlieb, 2018; Yang, 2019; Golden et al., 2020a; Ko et al., 2020). A high level of intangible investment increases adjustment costs and drives managers to shape more optimistic expectations regarding whether future sales growth will absorb the slack of unutilized resources (Venieris et al., 2015). A firm's strategic orientation determines the direction and intensity of its cost asymmetry. Firms classified as prospectors exhibit cost stickiness, whereas firms classified as defenders exhibit SG&A cost anti-stickiness (Ballas et al., 2020; Xu & Zheng, 2020).

4.3. Managerial specific determinants of cost asymmetry

Understanding managerial behavior is essential for analyzing and exploring the asymmetric cost behavior phenomenon. In this section, we review the determinants of cost asymmetry associated with managerial behavior and characteristics such as (i) (optimistic/pessimistic) managerial expectations for future sales, (ii) empire building behavior and compensation, (iii) Chief Executive Officer (CEO) characteristics, and (iv) earnings management behavior.

4.3.1. Managerial expectations for future sales

Managerial expectations for future sales are considered one of the major determinants of the direction and intensity of cost asymmetry. The empirical research on mainstream asymmetric cost behavior proxies pessimistic managerial expectations based on whether a firm experiences a sales revenue decrease for two consecutive fiscal years (successive sales decrease). However, the literature has attempted to capture the effects of managerial expectations of future sales on cost asymmetry

Table 5
Organizational specific determinants of cost asymmetry.

Level of adjustment costs				
No.	Determinant	Direction	Selected studies	Cost category
1.	Asset intensity	↑	Cost asymmetry determinant employed by the standard econometric specifications employed by the mainstream asymmetric cost behavior empirical research. The level of asset intensity is measured as the log of the ratio of total assets to sales revenue.	Multiple cost categories
2.	Employee intensity	↑	Cost asymmetry determinant employed by the standard econometric specifications employed by the mainstream asymmetric cost behavior empirical research. The level of employee intensity is measured with as the log of the ratio of the total number of employees to sales revenue.	Multiple cost categories
3.	Firm size	↑	Kama and Weiss (2013), Dalla Via and Perego (2014), Cheng et al. (2018), Prabowo et al. (2018), Chung et al. (2019), Ding et al. (2019), Kim et al. (2019), Shi et al. (2019), Han et al. (2020), Özkaya (2020)	SG&A expenses, COGS, Operating costs, Labor costs,
4.	Decline of (gross/net) property, plant, and equipment	↓	Kaspereit and Lopatta (2019), Yang (2019), Lopatta et al. (2020)	SG&A expenses, Operating costs
5.	Working capital intensity	↓/↑	Calleja et al. (2006)	Operating costs
6.	Magnitude of current sales changes	↓/↑	Calleja et al. (2006), Dalla Via and Perego (2014), Subramaniam and Watson (2016), Ciftci and Zoubi (2019), Özkaya (2020)	SG&A expenses, COGS, Labor costs, Operating costs
7.	Capacity utilization	↑	Balakrishnan et al. (2004), Cannon (2014), Holzhacker et al. (2015b), Chen et al. (2019b)	Operating costs, SG&A expenses
8.	Employee related adjustment costs	↑	Liu et al. (2019)	SG&A expenses
Financial and operating efficiency				
No.	Determinant	Direction	Selected studies	Cost category
1.	Financial leverage and debt intensity	↓	Calleja et al. (2006), Dalla Via and Perego (2014), Chung et al. (2019), Huang and Kim (2020), Ko et al. (2020) Krisnadewi and Soewarno (2020), Özkaya (2020), Tang et al. (2020)	Operating costs, SG&A expenses, COGS
2.	Operating efficiency (ROE/ROA)	↓/↑	Banker and Chen (2006), Calleja et al. (2006), Chung et al. (2019), Kaspereit and Lopatta (2019), Liu et al. (2019), Zhang et al. (2019b), Tang et al. (2020)	Operating costs, SG&A expenses, Labor costs
3.	Financial strength of firms	↑	Li and Zheng (2017), Cheng et al. (2018), Shi et al. (2019), Golden et al. (2020a), Li and Zheng (2020), Zhu et al. (2020), Lee et al. (2020b)	Operating costs, SG&A expenses
4.	Firms Life cycle & creation of high (or low) future value	↓/↑	Chen et al. (2012), Namitha and Shijin (2016), Loy and Hartlieb (2018), Ma et al. (2019), Kaspereit and Lopatta (2019), Liu et al. (2019), Silge and Wöhrmann (2019), Yang et al. (2020)	SG&A expenses, Operating costs
5.	Demand growth (historical sales growth, book to market and market to book ratio)	↑	Anderson et al. (2013), Banker et al. (2016), Liu et al. (2019), Jang and Yehuda (2020)	SG&A expenses, Earnings, Operating costs
Corporate governance, control, and ownership structure				
No.	Determinant	Direction	Selected studies	Cost category
1.	Corporate governance	↓	Chen et al. (2012), Liang et al. (2014), Bugeja et al. (2015), Namitha and Shijin (2016), Xue and Hong (2016), Ibrahim (2018), Chung et al. (2019), Liu et al. (2019), Zhang et al. (2019b), Hartlieb et al. (2020a), Jang and Yehuda (2020)	SG&A expenses, Operating costs, Labor costs
2.	Corporate social responsibility	↑	Habib and Hasan (2019), Golden et al. (2020b)	Operating costs
3.	Ownership structure	↓/↑	Dalla Via and Perego (2014), Liang et al. (2014), Bu et al. (2015), Holzhacker et al. (2015b), Hall (2016), Xue and Hong (2016), Cohen et al. (2017), Bradbury and Scott (2018), Cheng et al. (2018), Nagasawa (2018), Prabowo et al. (2018), Haga et al. (2019), Khedmati et al. (2019), Liu et al. (2019), Zhang et al. (2019b), Huang and Kim (2020), Li et al. (2020b), Wu et al. (2020), Tang et al. (2020)	Operating costs, COGS, SG&A expenses, R&D expenses
4.	Auditing quality	↓/↑	de Villiers et al. (2014), Liang et al. (2014), Xue and Hong (2016), Cai et al. (2019), Chang et al. (2019), Höglund and Sundvik (2019), Xu and Zheng (2020)	SG&A expenses, Operating costs
5.	Internal control	↓	Kim et al. (2019), Zhu et al. (2020)	SG&A expenses
Organizational complexity and transformation				
No.	Determinant	Direction	Selected studies	Cost category
1.	Intra-firm (support) services	↑	Balakrishnan and Gruca (2008), Cohen et al. (2017)	Operating costs, SG&A expenses, COGS
2.	Multi (single) segment firms	↑	Li and Zheng (2017)	Operating costs
Operating risk				
No.	Determinant	Direction	Selected studies	Cost category
1.	Demand volatility uncertainty	↓	Anderson et al. (2013)	SG&A expenses
2.	Business risk (cash flow volatility)	↓	Xu and Zheng (2020)	SG&A expenses
3.	Offering pension benefits	↑	Kuiate and Noland (2019)	Labor costs
Strategy and marketing				
No.	Determinant	Direction	Selected studies	Cost category
1.	Intensity of intangible investments	↑	Venieris et al. (2015), Mohammadi and Taherkhani (2017), Loy and Hartlieb (2018), Liu et al. (2019), Yang (2019), Golden et al. (2020a), Ko et al. (2020), Jang and Yehuda (2020)	SG&A expenses, Operating costs
2.	Business strategy	↓/↑	Ballas et al. (2020), Xu and Zheng (2020)	SG&A expenses

Notes: This table presents the organizational specific determinants of cost asymmetry. Organizational specific determinants of cost asymmetry are classified into six categories: (i) level of adjustment costs, (ii) financial and operating efficiency, (iii) corporate governance and control, (iv) organizational complexity and transformation, (v) operating risk, and (vi) strategy and marketing. ↑ denotes the empirical research that documents a positive (negative) association of cost stickiness (anti-stickiness) with the corresponding determinant, ↓ denotes the empirical research that documents a negative (positive) association of cost stickiness (anti-stickiness)

with the corresponding determinant, 0 denotes the empirical research that documents no statistic significant association of cost asymmetry with the corresponding determinant, / stands for "or".

Table 6
Managerial specific determinants of cost asymmetry.

Managerial optimism/pessimism				
No.	Determinant	Direction	Selected studies	Cost category
1.	Pessimistic managerial expectations for future sales	↓	Cost asymmetry determinant employed by the standard econometric specifications employed by the mainstream asymmetric cost behavior empirical research. The presence of (pessimistic) managerial expectations is signified whether a firm experiences a sales revenue decrease for two consecutive fiscal years (successive sales decrease).	Multiple cost categories
2.	Stock performance	0/↓/↑	Banker et al. (2006), Chen et al. (2012), Namitha and Shijin (2016), Habib and Hasan (2019), Ma et al. (2019), Xu and Zheng (2020), Golden et al. (2020b), Li et al. (2020a), Lopatta et al. (2020)	SG&A expenses, Operating costs
3.	Forward looking statements	↑	Chen et al. (2019b)	SG&A expenses
4.	Loss in prior year	↓	Dierynck et al. (2012), Hall (2016), Ben-Nasr and Alshwer (2016), Khedmati et al. (2019), Kaspereit and Lopatta (2019), Han et al. (2020), Lopatta et al. (2020)	Labor costs, SG&A expenses
Empire building behavior and compensation				
No.	Determinant	Direction	Selected studies	Cost category
1.	Empire building behavior	↑	Chen et al. (2012), Banker and Byzalov (2014), Venieris et al. (2015), Namitha and Shijin (2016), Liu et al. (2019), Habib and Hasan (2019), Zhang et al. (2019b), He et al. (2020), Hartlieb et al. (2020a), Ballas et al. (2020), Ko et al. (2020), Li and Zheng (2020), Li et al. (2020b), Lopatta et al. (2020)	SG&A expenses, Advertising expenses, Operating costs
2.	CEO's fixed and equity based compensation	↓	Chen et al. (2012), Brüggen and Zehnder (2014), Namitha and Shijin (2016), Habib and Hasan (2019), Hartlieb et al. (2020a), Li and Zheng (2020), Li et al. (2020b), Zhu et al. (2020)	SG&A expenses, Operating costs
3.	CEO's-Stock based incentives	↓	Hall (2016)	Labor costs
4.	Risk taking incentives	↓	Aboody et al. (2018), Li et al. (2020a)	Operating costs, SG&A expenses
5.	Managerial stock ownership	↓	Banker et al. (2016)	Earnings
6.	Market Monitoring	↓	Ben-Nasr and Alshwer (2016)	Labor costs
CEO characteristics				
No.	Determinant	Direction	Selected studies	Cost category
1.	CEO tenure	↑	Chen et al. (2012), Namitha and Shijin (2016), Hartlieb et al. (2020a)	SG&A expenses, Operating costs
2.	CEO horizon	↑	Chen et al. (2012), Bugeja et al. (2015), Namitha and Shijin (2016), Hartlieb et al. (2020a), Lopatta et al. (2020)	SG&A expenses, Operating costs
3.	CEO-director ties	↑	Khedmati et al. (2019)	Labor costs
4.	CEO duality	↓/↑	Liang et al. (2014)	Operating costs
5.	Merger hubris theory	↑	Yang (2015)	COGS, SG&A expenses
6.	Leadership style of CEOs	↑	Lopatta et al. (2020)	SG&A expenses
7.	Managerial risk appetite	↑	Li et al. (2020b)	SG&A expenses
Earnings management				
No.	Determinant	Direction	Selected studies	Cost category
1.	Incentives to meet earnings benchmarks [Incentives to avoid losses or earnings decreases/Small (large) profit & loss]	↓	Dierynck et al. (2012), Kama and Weiss (2013), Banker and Byzalov (2014), Bu et al. (2015), Bugeja et al. (2015), Hall (2016), Xue and Hong (2016), Xu and Sim (2017), Kaspereit and Lopatta (2019), Liu et al. (2019), Yang (2019), Xu and Zheng (2020), Li et al. (2020a), Lopatta et al. (2020)	Labor costs, Operating costs, SG&A expenses
2.	Incentives to meet financial analysts' earnings forecasts	↓	Kama and Weiss (2013)	Operating costs
3.	Level of abnormal accruals	↓	Dierynck et al. (2012), Liang et al. (2014), Hall (2016), Ma et al. (2019), Yang (2019), Balios et al. (2020), Huang and Kim (2020)	Labor costs, SG&A expenses, Operating costs
4.	Incentives to reduce taxation	↓/↑	Haga et al. (2019), Xu and Zheng (2020)	SG&A expenses
5.	Tax rate and compliance	↓	Höglund and Sundvik (2019)	SG&A expenses

Notes: This table presents the managerial specific determinants of cost asymmetry. Managerial specific determinants of cost asymmetry are classified into four categories: (i) (optimistic/pessimistic) managerial expectations for future sales, (ii) empire building behavior and compensation, (iii) CEO characteristics, and (iv) earnings management behavior. ↑ denotes the empirical research that documents a positive (negative) association of cost stickiness (anti-stickiness) with the corresponding determinant, ↓ denotes the empirical research that documents a negative (positive) association of cost stickiness (anti-stickiness) with the corresponding determinant, 0 denotes the empirical research that documents no statistic significant association of cost asymmetry with the corresponding determinant, / stands for "or".

using a variety of approaches. Chen et al. (2019b) use the tone of forward-looking statements (US Securities Exchange Commission 10-K reports) as a proxy for managerial expectations, providing evidence that managerial expectations affect the intensity of cost asymmetry in light of high adjustment costs and a high degree of unused resources. Similarly, prior literature has provided evidence that the reported loss in the prior fiscal year (Dierynck et al., 2012; Hall, 2016; Ben-Nasr & Alshwer, 2016; Kaspereit & Lopatta, 2019; Khedmati et al., 2019; Han et al., 2020; Lopatta et al., 2020) is associated with pessimist managerial expectations for future sales, which in turn reduces the intensity of cost stickiness.

Stock price performance may transfer positive expectations regarding future earnings, which may motivate managers to retain idle resources associated with different costs and increase their degree of cost stickiness (Chen et al., 2012, Ma et al., 2019). However, favorable stock price performance may motivate managers to avoid retaining unutilized resources, signaling a negative association between stock performance and cost stickiness (Li et al., 2020a; Lopatta et al., 2020).

Finally, several studies (Namitha & Shijin, 2016; Habib & Hasan, 2019; Xu & Zheng, 2020) provide no statistically significant empirical evidence on how stock price performance affects the intensity of cost stickiness.

4.3.2. Empire building behavior and compensation

Empire building behavior is considered a significant driver of cost stickiness (e.g., Chen et al., 2012; Banker & Byzalov, 2014; Venieris et al., 2015; Namitha & Shijin, 2016; Habib & Hasan, 2019; Liu et al., 2019; Zhang et al., 2019b; Ballas et al., 2020; Hartlieb et al., 2020a; He et al., 2020; Ko et al., 2020; Li & Zheng, 2020; Li et al., 2020b; Lopatta et al., 2020). Empire building behavior occurs when managers engage in activities for their own benefits, rather than the benefits of the firm's shareholders, by growing the firm beyond its optimal size or by maintaining unutilized resources to increase personal utility from status, power, compensation, and prestige (Chen et al., 2012). As a result, empire building managers are likely to increase costs too rapidly when sales increase, or decrease costs too slowly when sales decrease.

The increasing effects of empire-building behavior on the intensity of cost stickiness might be mitigated by the presence of strong corporate governance mechanisms (see Section 4.2.3). Regardless of the quality of corporate governance mechanisms, CEO's fixed pay compensation (Chen et al., 2012; Namitha & Shijin, 2016; Habib & Hasan, 2019; Hartlieb et al., 2020a; Li & Zheng, 2020; Li et al., 2020b; Zhu et al., 2020), equity-based compensation (Brüggen & Zehnder, 2014) and stock-based compensation (Hall, 2016) appear to effectively restrict CEOs' intentions to serve their own benefits rather than the benefits of the firm's shareholders. Stock price informativeness results in a better monitoring of managers reducing, at the same time, empire-building incentives (Ben-Nasr & Alshwer, 2016). As managerial ownership attempts to combine managers' incentives and shareholders' interests, Banker et al. (2016) provided evidence that managerial stock ownership reduces the extent of empire building incentives. Finally, management mechanisms through risk taking incentives mitigate the existence of cost asymmetry (Aboody et al., 2018; Li et al., 2020a).

4.3.3. CEO characteristics

Several studies have focused on a variety of CEO characteristics and explored their effects on cost asymmetry, such as (i) CEO tenure (Chen et al., 2012; Namitha & Shijin, 2016; Hartlieb et al., 2020a), (ii) CEO horizon (Chen et al., 2012; Bugeja et al., 2015; Namitha & Shijin, 2016; Hartlieb et al., 2020a; Lopatta et al., 2020), (iii) CEO-director ties (Khedmati et al., 2019), (iv) leadership style of CEOs (Lopatta et al., 2020), and (v) managers' risk appetite (Li et al., 2020b). CEOs with longer tenures might have greater empire-building incentives (Chen et al., 2012), such as building influences within firms and deciding compensation packages according to their preferences (Namitha & Shijin, 2016; Hartlieb et al., 2020a); thus, CEO tenure is positively associated with cost stickiness. Similarly, a longer CEO horizon is associated with more intense empire-building behavior and increased cost stickiness (Chen et al., 2012; Bugeja et al., 2015; Namitha & Shijin, 2016; Hartlieb et al., 2020a; Lopatta et al., 2020). Furthermore, according to Lopatta et al. (2020), top managers can impose their idiosyncratic leadership style on a firm, leading to empire-building issues (or suboptimal cost management). Finally, risk-taking managers prefer volatile revenues and seem to underestimate external risks, leading them to maintain idle resources (Li et al., 2020b).

Another CEO characteristic that affects the intensity of cost asymmetry is CEO overconfidence, which has been analyzed in the context of hubris theory. The effects of optimistic managerial expectations of future sales on the intensity of cost asymmetry are more profound in the case of bidder CEOs' hubris. Bidder CEOs who overestimate the merged firm's growth retain more underutilized capacity when sales decrease than do CEOs of standalone firms. Optimistic bidder CEOs induce greater cost stickiness through strong and irrational self-beliefs than do optimistic non-bidder CEOs (Yang, 2015).

4.3.4. Earnings management

Earnings management is a significant determinant of asymmetric cost behavior. The level of accrual earnings management (i.e., the level of abnormal accruals) is negatively correlated with the intensity of cost stickiness (Dierynck et al., 2012; Liang et al., 2014; Hall, 2016; Ma et al., 2019; Yang, 2019; Balios et al., 2020; Huang & Kim, 2020). In addition, the literature has documented that the presence of managerial incentives to meet earnings targets is negatively related to cost stickiness. Managers seem to choose to narrow the intensity of cost stickiness to avoid losses or earnings decreases (Kama & Weiss, 2013; Banker & Byzalov, 2014; Bu et al., 2015; Bugeja et al., 2015; Xu & Zheng, 2020; Xue & Hong, 2016; Yang, 2019; Li et al., 2020a; Lopatta et al., 2020). Similarly, the literature provides evidence that the intensity of cost stickiness decreases when an entity reports small earnings or large losses in the current fiscal year (Dierynck et al., 2012; Kama & Weiss, 2013; Hall, 2016; Xue & Hong, 2016; Xu & Sim, 2017; Kaspereit & Lopatta, 2019; Liu et al., 2019).

Managerial incentives to meet financial analysts' earnings forecasts and avoid taxes are associated with earnings management initiatives through cost asymmetry (Kama & Weiss, 2013; Haga et al., 2019; Xu & Zheng, 2020). For instance, managerial incentives to meet financial analysts' earnings forecasts decrease the intensity of cost stickiness (Kama & Weiss, 2013). Xu and Zheng (2020) provided evidence of a significantly negative relationship between tax avoidance proxied by the cash effective tax rate and asymmetric cost behavior. Tax avoidance reduces a firm's tax liability and improves its cash flows. Increased cash tax savings may alleviate managers' concerns about adjustment costs; consequently, managers may be more willing to bear current and future adjustment costs due to the reduction in cutting excess resources when activity falls, exhibiting a lower degree of cost stickiness. In addition, cost stickiness seems to be more pervasive in the year before a tax rate reduction than in other years because managers have a strong incentive to decrease tax expenses by engaging in tax-induced earnings management (Haga et al., 2019). Finally, compliance and tax avoidance may affect cost stickiness. For instance, auditors might restrict sticky behavior associated with illegal actions (Höglund & Sundvik, 2019).

4.4. Suggestions for the future

A major body of research has investigated the effects of various determinants on the intensity and direction of cost asymmetry. Despite the proliferation of empirical evidence verifying a plethora of cost-asymmetry determinants, a critical analysis of this domain may reveal interesting areas and directions for future research.

Within the context of environment-specific determinants of cost asymmetry, the determinants associated with macroeconomic conditions have attracted considerable research interest. The literature has identified a variety of macroeconomic characteristics that affect cost asymmetry, such as GDP growth, the economic cycle, the unemployment rate, economic uncertainty, inflation, and business risk (Namitha & Shijin, 2016; Ding et al., 2019; Banker et al., 2020; Cohen & Li, 2020; Golden et al., 2020a; Hartlieb et al., 2020a; Stimolo & Porporato, 2020). Indeed, macroeconomic conditions affect firms' cost structure and behavior, and this effect should be integrated into empirical cost asymmetry research in a more profound way. However, standard econometric specifications for cost asymmetry primarily consider the GDP growth rate to control for macroeconomic conditions on cost behavior. This econometric approach may raise omitted-variable issues. A compound variable that synthesizes various macroeconomic dimensions with proper weights may be a more appropriate approach than using the GDP growth rate alone to control for macroeconomic conditions.

The literature seems to ignore two important dimensions of the economic environment: price nonlinearity and market imperfectness. Cannon (2014), focusing on the air transportation discipline, provided evidence that cost stickiness occurs because managers adjust selling

prices when demand decreases. However, managers are inclined to raise prices when demand increases due to extreme slippery price conditions. The price linearity assumption simplifies the formulation and implementation of research designs on cost asymmetry, but Cannon (2014) provided an alternative explanation for the observed cost behavior that emphasizes managerial decisions for prices rather than managerial decisions for maintaining idle resources when operating activity declines. Our intuition is that considering the idiosyncratic characteristics of different industries, both explanations hold. However, it remains unclear how the dynamic interaction between price nonlinearity and resource adjustment is manifested. Therefore, the research community should devote more effort to examining how changes in operating activities affect not only cost behavior but also selling prices.

A deeper analysis of the effects of price nonlinearity on cost asymmetry revealed that price nonlinearity is a feature of an imperfect market. Riegler and Weiskirchner-Merten (2020) provided an analytical parsimonious economic model of a firm operating in differing imperfect markets (e.g., monopoly, duopoly, and oligopoly), identifying a firm's market decisions concerning the output quantity and price level as an additional source of asymmetric cost behavior. Thus, imperfect markets and their characteristics are expected to be significant environmental (i.e., regional, industrial, and market characteristics) determinants of cost asymmetry, and a research area for the interdisciplinary synthesis of economics and accounting. The literature on cost asymmetry should be enriched with empirical evidence of the effects of imperfect markets on firms' cost behavior.

The legal environment and regulation continually evolve, and as such, new issues concerning cost asymmetry are expected to emerge. Policymaking is associated with regulations. However, there is limited empirical evidence on the association between policymaking and cost asymmetry. Do policymakers evaluate the effectiveness of various policies and regulations based on cost asymmetry? As cost asymmetry has behavioral grounds, what conclusions about managerial behavior towards various policies and regulations can policymakers draw across industries with varying degrees of cost asymmetry?

Although social, political, and cultural environments are determinants of cost asymmetry, we found seven studies that captured it as an environmental determinant of cost asymmetry (Kitching et al., 2016; Prabowo et al., 2018; Ma et al., 2019; Hartlieb et al., 2020a; Huang & Kim, 2020; Lee et al., 2020a; Loy & Hartlieb, 2020). Social, political, and cultural environments have a plethora of dimensions that, individually or in combination, may affect cost asymmetry. Managerial actions and decisions are shaped within organizational boundaries, but managers are social players affected by social phenomena and political situations. To this end, cost asymmetry provides unique opportunities to directly examine the economic implications (in terms of cost behavior) of various social and political phenomena, events, and theories.

The economic (cost) implications of various management accounting research streams that focus on topics such as management control systems, budgeting, performance measurement, organizational change, and transformations can be further explored through the veins of the asymmetric cost behavior phenomenon. Are managers aware of the cost asymmetry when preparing and implementing budgets? Are organizational changes and transformation determinants of cost asymmetry? How can management control systems diagnose managerial empire-building behavior via the signals of cost asymmetry? Does business risk cause fluctuations in the level of adjustment costs and managerial expectations for future sales? Cost asymmetry has been rationalized in terms of how managers make a trade-off between the costs of maintaining or disposing idle capacity in the case of sales revenue decline. In this regard, there is limited analysis and empirical evidence on how this trade-off is affected by the presence of operating and business risks.

Another potential contribution is the effects of qualitative organizational characteristics on the intensity and direction of cost asymmetry. In addition to strategy (Ballas et al., 2020) and intangible assets (Venieris et al., 2015), organizational structure, innovation and knowledge management, human resource management culture, management philosophy, and total quality management are examples of qualitative organizational characteristics that the asymmetric cost behavior research community may examine.

Initiatives for managerial expectations regarding future sales and empire-building behavior dominate the research interest on managerial-specific determinants of cost asymmetry. The theory of cost asymmetry relies on managerial behavior and decision-making. Most of the existing empirical evidence relies on the econometric handling of scaling financial data, within which researchers employ various proxies to model managerial expectations for future sales and empire building behavior. Different types of research designs may provide direct evidence and a better understanding of managerial behavior underlining the manifestation of cost asymmetry. Case studies, interviews, and qualitative research designs that explore managerial motives and behavior reveal significant aspects of cost asymmetry and enhance the research community's understanding.

Another stream of empirical research on managerial-specific determinants of cost asymmetry emphasizes CEO characteristics and earnings management. In addition to the fact that more research on the relationship between cost asymmetry and earnings behavior is needed, the literature should also explore whether the association of cost behavior with earnings management is value enhancing. More emphatically, cost-asymmetry-related decisions may enhance a firm's economic value either directly (i.e., affecting the relationship between revenues and expenses) or indirectly (i.e., affecting the likelihood of continuing financing value-enhancing activities).

The effects of CEO characteristics on cost asymmetry were examined in the isolation of organizational characteristics and values. Organizational values, characteristics, structures, and/or missions may have a moderating or mediating effect on the relationship between CEO characteristics and cost asymmetry.

5. Meta-analysis of the determinants of the asymmetric cost behavior phenomenon

5.1. *Meta-analysis of the determinants of the asymmetric cost behavior phenomenon*

Our analysis of empirical research on the determinants of cost asymmetry is not limited to suggesting future research possibilities. We also emphasize a *meta*-analysis of several issues that can be identified within the existing body of empirical research and knowledge of cost asymmetry. Meta-analysis is widely documented in the social and medical disciplines, with limited application in the accounting literature. More specifically, *meta*-analyses have been published on accounting topics such as financial reporting (Ahmed & Courtis, 1999; Khlif & Souissi, 2010; Souissi & Khlif, 2012; Singh et al., 2017), corporate governance (Pomeroy & Thornton, 2008; García-Meca & Sánchez-Ballesta, 2009; Siddiqui, 2014), auditing (Hay et al., 2006; Habib, 2012; Habib, 2013), and management accounting (Derfuss, 2009; Liu et al., 2014). However, no *meta*-analysis provides a summary of prior empirical findings on the factors affecting the manifestation of the asymmetric cost behavior phenomenon. In other words, *meta*-analysis enables researchers to shape future research designs.

First, most empirical evidence documents the presence of cost stickiness. A relatively small number of empirical studies have diagnosed cost anti-stickiness (Kitching et al., 2016; Cheng et al., 2018; Kuiate & Noland, 2019). This may be the reason for the literature to perceive cost stickiness as a synonym for cost asymmetry. However, the latter includes both cost stickiness and anti-stickiness. We performed a *meta*-analysis of previously reported empirical evidence to draw inferences about the direction of cost asymmetry.

Second, the proliferation of empirical studies on different determinants of cost asymmetry poses an interesting question of the extent to which the estimated values of the intensity of cost asymmetry

represent an unbiased and reliable estimation of the corresponding common mean value of the population. Alternatively, there may be additional variability in the mainstream empirical evidence, which was not captured by prior empirical research. The latter variability may occur due to (intentional or unintentional) omitted variable bias of mainstream econometric specifications or commonly established research perceptions. This case should be considered in future research to enhance the validity and reliability of the empirical findings.

The variability in the estimation of the (population) mean of the intensity of cost asymmetry may be a result of a generalized research focus on a specific cost category, in which the manifestation of cost stickiness (rather than cost anti-stickiness) is more likely to occur due to the idiosyncratic nature of the cost item. In addition, there is a long-standing research tradition on mainstream cost asymmetry econometric specification that employs specific proxies for modelling the major determinants of cost asymmetry (i.e., employee or asset intensity, macroeconomic conditions, managerial optimism, or pessimism) without a critical evaluation of whether these proxies are exhaustive of the corresponding major determinants of cost asymmetry. Additional sources of variability may include various country characteristics such as different national settings, legal systems, or corporate governance systems. We further applied *meta*-regression analysis to explore the possibility of publication bias in the studies in our analysis (Hay & Knechel, 2017; Hay, 2019). Possible sources of publication bias are the relative ranking of the journal in which the study was published, the use of alternative econometric specifications for contacting empirical cost asymmetry research, alternative thresholds for the data elimination process, and the status of universities affiliated with the authors of these articles.

5.2. Meta-analysis procedure

Most *meta*-analytic studies in the field of accounting and finance (Ahmed & Courtis, 1999; Hay et al., 2006; García-Meca & Sánchez-Ballesta, 2009; Khlif & Souissi, 2010; Habib, 2012; Souissi & Khlif, 2012; Siddiqui, 2014; Khlif & Chalmers, 2015; Singh et al., 2017), calculate the effect size (r) for each pair of variables that comes from different empirical studies and determine potential moderating effects. The effect size (r) estimates the magnitude of variations between a dependent variable (e.g., response of a cost item to a sales revenue change) and an independent variable (e.g., a specific determinant of cost asymmetry[8]). According to Khlif and Chalmers (2015), there are three different proxies to capture effect size: (i) standardized mean difference; (ii) correlation metrics, which are commonly used in *meta*-analytic accounting studies; and (iii) odds ratio.

If a study does not report the (correlation) r statistic, but only *t*-test or p-values coefficients are reported, we adopt the methodology proposed by Lipsey and Wilson (2001) to convert the t-statistic results into r statistics implementing the formula, as follows:

$$r = t/\sqrt{t^2 + df} \tag{1a}$$

where df (=n-3) denotes the degrees of freedom (i.e., n represents the number of firm-year observations), and t corresponds to the reported t-statistic. P-value coefficients are initially converted to t-statistics and then to r-statistics. Once the r statistic is calculated for each study, the methodology proposed by Lipsey and Wilson (2001) is applied to estimate the mean correlation (or effect size) coefficient ($\bar{r}_{Zr}$) and standard error (S_{Zr}). The mean effect size was calculated using the inverse weight variance method, which allowed us to standardize the effect size for each study.

$$r_{Zr} = 0.5\log_e[(1 + r)/(1 - r)] \tag{1b}$$

To capture the effect of the number of observations in the sample of each study on its effect size, we estimate the variance weight, $w_{Zr} = n - 3$, where n represents the number of firm-year observations, and multiply it with the standardized effect size (r_{Zr}). The mean effect size for all research studies in the *meta*-analysis was calculated using the following formula:

$$\bar{r}_{Zr} = \Sigma(w_{Zr} * r_{Zr})/\Sigma(w_{Zr}) \tag{1c}$$

The significance of the association between two variables was tested by estimating the standard error (S_{Zr}) and Z-values (Z) at the 5 percent significance level (Lipsey & Wilson, 2001):

$$Z = |\bar{r}_{Zr}|/S_{Zr},\ S_{Zr} = 1/\sqrt{\Sigma(w_{Zr})} \tag{1d}$$

Assuming a normal distribution, the lower bound of the effect size was calculated as $\bar{r}_{Zr} - (1.96 * S_{Zr})$, whereas the upper bound was estimated as $\bar{r}_{Zr} + (1.96 * S_{Zr})$. The inclusion of zero within the confidence interval leads to the assumption that the relationship of interest is not significant.

Table 7 (Panel A) shows the results of the selected studies, examining the association of the annual log change in the level of a cost item with the annual log change in the level of sales revenue when sales revenue declines (i.e., cost asymmetry coefficient). Panel A reports the effect size (r) and mean effect size (r_{Zr}) measures of the 84 selected studies[9] following the procedures described in Eqs. (1a) and (1b). Further, Panel B of Table 7 describes the overall mean effect size ($\bar{r}_{Zr}$), which equals −0.0117, Z-statistic of 85.93, and 95% confidence interval between −0.0119 and −0.0114, providing strong support for the existence of cost stickiness. This empirical evidence is in line with the general rule of thumb statistic proposed by Lipsey and Wilson (2001), which indicates that an absolute value of effect size below 0.02 leads to a small confidence interval range.

5.3. Test for heterogeneity

The presence of either heterogeneity or homogeneity constitutes an important component in *meta*-analytic-related literature (e.g., Pomeroy & Thornton, 2008; Habib, 2012; Khlif & Chalmers, 2015) and which aims to specify whether the individual effect size around a mean value estimates a common population mean (Habib, 2012). In a homogeneous distribution, variability across studies is explained only by sampling error variance. However, the individual effect size might differ from the population mean, not only by sampling error but also by other moderating factors, suggesting the presence of heterogeneity (Lipsey & Wilson, 2001; Habib, 2012; Khlif & Chalmers, 2015).

To examine whether the observed variance stems from other moderating effects or the sampling error variance, we rely on the Q-test suggested by Lipsey and Wilson (2001), as follows:

$$Q = \Sigma\left(w_{Zr} * r_{Zr}^2\right) - \Sigma(w_{Zr} * r_{Zr})^2/\Sigma(w_{Zr}) \tag{1e}$$

The computed value of the Q statistic was compared against the chi-square critical value, where the degrees of freedom equals the number of studies minus one. If the Q-value is not significant, the association between the two variables is considered unmoderated and homogeneous, and the variation stems only from statistical error. On the other hand, if

[8] . We consider as main determinants of the intensity of cost asymmetry: (i) sales decline in the current period signifying the occurrence of cost asymmetry (i.e., cost stickiness or cost anti-stickiness), (ii) managerial expectations for future sales, (iii) economic growth, (iv) employee intensity, and (v) asset intensity.

[9] . In our *meta*-analysis, we included studies with research designs with regression analysis that is related with cost asymmetry mainly operationalized by mainstream standard empirical econometric modelling (i.e., simple log-linear model, extended log-linear model with three-way interactions, and extended log-linear model with two-way and three-way interactions).

the Q-value is significant, it leads to the rejection of the null hypothesis of homogeneity, and further moderating effects should be undertaken to reduce heterogeneity across the *meta*-analytic sample (Habib, 2012; Khlif & Chalmers, 2015). In panel B of Table 7, the Q-statistic is 44,924.49, which strongly supports that there is no homogeneity in the relationship of the response of the cost item with the change in sales revenues when sales decline. This empirical evidence is verified by the proliferation of studies that add new factors that influence the intensity of cost asymmetry.

Panel C of Table 7 shows the mean effect size statistics and the corresponding homogeneity tests separately for studies focusing on the cost behavior of different cost items. More specifically, the overall mean effect size of studies investigating cost asymmetry in the case of SG&A expenses is −0.0097 with a Z-statistic of 53.42 and a 95% confidence interval between −0.0100 and −0.0093, signifying that the overall mean effect size is significantly negative at 1%. Furthermore, the overall mean effect size of studies that examine cost asymmetry in the case of operating expenses is −0.0125 with a Z-statistic of 56.47 and a 95% confidence interval between −0.0129 and −0.0121. A similar pattern to previous results is confirmed for other expenses, such as advertising expenses, COGS, R&D expenses, and total labor costs. More specifically, the overall mean effect size ranges from −0.0469 (studies that emphasize total labor costs) to −0.0003 (studies that emphasize R&D expenses). The z-statistic is significant across different cost categories (ranging from 2.06 to 49.53) and there is no inclusion of zero within the 95% confidence interval. Panel C shows the Q-statistics for each study cluster. The homogeneity test for each cost category indicates that the residual variability within each cost category is heterogeneous (reported values for the Q statistic are: (i) 19,434 for SG&A expenses, (ii) 20,151 for operating expenses, (iii) 939 for advertising expenses, (iv) 922 for COGS, (v) 52 for R&D expenses, and (vi) 990 for total labor costs). Within-group Q, which represents the sum of the above-reported Q statistics, is significantly lower than the between-group Q statistic (reported in Panel B of Table 7). Thus, focusing on the behavior of different cost items reduces the heterogeneity of empirical findings concerning the relationship between the response of a single cost item to a sales revenue decline.

To investigate possible sources of heterogeneity for the empirical findings concerning the relationship of the response of cost items with the change in sales revenues when sales decline, we test for moderating variables proposed by the *meta*-analytic accounting literature (Hay et al., 2006; García-Meca & Sánchez-Ballesta, 2009; Habib, 2012; Khlif & Chalmers, 2015). Initially, we conduct a cross-country analysis between cost asymmetry studies that use data from the U.S. and studies that use non-U.S. data (i.e., European countries, Australia, Brazil, Canada, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Singapore, and South Africa). Panel A of Table 8 reveals that the overall mean effect size is negative and significant both in the U.S. and outside the U.S., signifying that the cost asymmetry coefficient b_2 is negative for the whole sample [Z-statistic equals to: (i) 104.52-US market; (ii) 35.31-non-US markets]. Furthermore, we include fundamental determinants of cost asymmetry in the *meta*-analysis, such as managerial expectations for future sales, macroeconomic activity, asset intensity, and employee intensity. The overall mean effect size of cost behavior with various determinants of cost asymmetry seems to be significant in both groups. More specifically, the overall mean effect sizes for managerial expectations and economic growth are significant and have positive and negative signs, respectively. Regarding employee and asset intensity, the mean correlations are negative and significant at the 95% confidence interval.

We expand the cross-country analysis by focusing on institutional factors such as (i) the legal system (common versus code law) and (ii) the system of corporate governance (Anglo-American, Communitarian, and Emerging). In Panels B and C of Table 8, we present the *meta*-analysis results of studies that implement data from countries with different legal origins and corporate governance systems. Overall, the empirical results provide strong support for sticky cost behavior across all groups of countries, where managers tend to accept major commitments of resources with respect to the level of adjustment costs. In accordance with previous literature (Calleja et al., 2006; Balios et al., 2020; Lee et al., 2020a), it seems that studies with data from common law countries and the Anglo-American system of corporate governance exhibit higher cost stickiness than studies with data from code law countries and the Communitarian or Emerging system of corporate governance [Z-statistic for cost asymmetry coefficient equals: (i) 106.12-common law countries; (ii) 19.75-code law countries; (iii) 106.11-Anglo-American system of corporate governance; (iv) 17.27-Communitarian system of corporate governance; and (iv) 12.99-Emerging system of corporate governance].

Another moderating effect incorporates publication quality. Hay et al. (2006) argued that articles in high-quality journals include more robust findings; however, there is also a greater possibility of bias, as editors may reject interesting studies because their results are not statistically significant. In other words, in top (low) ranked accounting journals, there is a more (less) demanding review process that probably introduces publication bias (Khlif & Chalmers, 2015). Therefore, to examine the intensity of cost asymmetry, we provide an additional analysis comparing studies published in the top six (according to ABS journal list) accounting journals[10] against studies published in other accounting journals.

Of the 84 studies used in our *meta*-analysis, 13 are published in the top five accounting journals (none were published in *Accounting, Organizations, and Society*). We also construct a subgroup that includes nine studies published in management accounting journals (*Journal of Management Accounting Research* and *Management Accounting Research*).

Table 9 documents the presence of cost asymmetry for all the previously mentioned sub-groups. More specifically, the overall mean effect size of cost asymmetry coefficient is negative and significant for a 95% confidence interval. Furthermore, the coefficients on other determinants of cost asymmetry are mainly consistent with previous literature. However, the overall mean effect size of the employee intensity is negative and not significant (Z-statistic equals 0.43) within top (according to ABS journal list) accounting journals and a 95% confidence interval, including zero. Finally, the overall mean effect size of the macroeconomic growth is positive but not significant (Z-statistic equals 0.49) for specialized management accounting journals.

5.4. Robustness tests of meta-analysis

5.4.1. File drawer problem

A common issue that is mainly discussed in *meta*-analytic-related literature is the file-drawer problem, which emerges if the non-significant results of unpublished or unreported studies can reverse the conclusions of a significant relationship between the dependent variables (different cost categories in our case) and independent variables (Rosenthal, 1979; Rosenthal, 1991). We focused on studies that directly examine the presence of cost asymmetry within various research questions,[11] examining the file-drawer problem for the cost asymmetry coefficient (i.e., which documents the presence of the asymmetric cost behavior phenomenon) and the coefficients that examine the effects of GDP growth, successive sales decrease, assets, and employee intensity on the manifestation of cost asymmetry.

Statistical testing for the file-drawer problem relies on the calcula-

[10] . The top six accounting journals, as presented by ABS list (ABS=4), are (i) *The Accounting Review* (TAR), (ii) *Journal of Accounting and Economics* (JAE), (iii) *Journal of Accounting Research* (JAR), (iv) *Contemporary Accounting Research* (CAR), (v) *Review of Accounting Studies* (RAS), and (vi) *Accounting, Organizations and Society* (AOS).

[11] . This approach reduces the number of studies included in the analysis for assessing the file-drawer problem. However, it increases the power of our statistical testing.

Table 7
Descriptive statistics and estimation of effect size.

Panel A: Effect size and mean effect size of different studies included in the meta-analysis

Study (by chronological order)	Number of Estimates	Reported Statistical Value			Effect Size (r)			Mean Effect Size (r_{Zr})		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Anderson et al. (2003)	2	−26.14	−2.63	−14.39	−0.1028	−0.0103	−0.0566	−0.1032	−0.0103	−0.0568
Calleja et al. (2006)	4	−6.88	−1.98	−4.36	−0.1253	−0.0213	−0.0740	−0.1260	−0.0213	−0.0743
Balakrishnan and Gruca (2008)	5	−4.44	−0.47	−2.16	−0.2239	−0.0240	−0.1097	−0.2278	−0.0240	−0.1108
Chen et al. (2012)	12	−2.92	1.58	−1.02	−0.0512	0.0313	−0.0143	−0.0513	0.0313	−0.0143
Dierynck et al. (2012)	10	−5.48	0.89	−3.02	−0.0829	0.0125	−0.0283	−0.0830	0.0125	−0.0283
Anderson et al. (2013)	10	−16.5	−3.42	−10.09	−0.0585	−0.0121	−0.0358	−0.0586	−0.0122	−0.0358
Banker et al. (2013)	8	−11.46	0.36	−4.64	−0.0396	0.0014	−0.0150	−0.0396	0.0014	−0.0150
Kama and Weiss (2013)	14	−10.83	0.79	−6.27	−0.0395	0.0095	−0.0253	−0.0395	0.0095	−0.0253
Balakrishnan et al. (2014)	1	−16.34	−16.34	−16.34	−0.0452	−0.0452	−0.0452	−0.0452	−0.0452	−0.0452
Banker and Byzalov (2014)	2	−22.99	−15.84	−19.42	−0.0626	−0.0435	−0.0531	−0.0627	−0.0435	−0.0531
Brüggen and Zehnder (2014)	3	−12.44	−2.60	−6.84	−0.0914	−0.0191	−0.0503	−0.0917	−0.0191	−0.0504
Cannon (2014)	1	−2.24	−2.24	−2.24	−0.0996	−0.0996	−0.0996	−0.0999	−0.0999	−0.0999
Dalla Via and Perego (2014)	20	−14.54	15.14	1.12	−0.1560	0.0527	−0.0057	−0.1572	0.0528	−0.0058
Liang et al. (2014)	26	−3.21	0.48	−1.85	−0.1662	0.0198	−0.0363	−0.1678	0.0198	−0.0364
Shust and Weiss (2014)	3	−10.46	−8.47	−9.63	−0.0372	−0.0302	−0.0343	−0.0373	−0.0302	−0.0343
de Villiers et al. (2014)	14	−12.36	−2.24	−6.78	−0.0830	−0.0220	−0.0535	−0.0832	−0.0220	−0.0535
Bu et al. (2015)	8	−5.88	−2.23	−3.43	−0.0538	−0.0204	−0.0314	−0.0538	−0.0204	−0.0314
Bugeja et al. (2015)	26	−15.25	−0.26	−3.49	−0.0860	−0.0013	−0.0431	−0.0862	−0.0013	−0.0432
Holzhacker et al. (2015b)	4	−3.90	−3.89	−3.89	−0.0801	−0.0317	−0.0523	−0.0802	−0.0317	−0.0524
Venieris et al. (2015)	18	−10.94	8.87	−0.77	−0.1242	0.1050	−0.0081	−0.1249	0.1054	−0.0082
Yang (2015)	10	−4.97	−2.36	−3.79	−0.2536	−0.0515	−0.1122	−0.2592	−0.0515	−0.1134
Zanella et al. (2015)	3	0.69	0.76	0.71	0.0383	0.0432	0.0411	0.0383	0.0432	0.0412
Ben-Nasr and Alshwer (2016)	1	−1.33	−1.33	−1.33	−0.0149	−0.0149	−0.0149	−0.0149	−0.0149	−0.0149
Dogan (2016)	3	−16.87	−4.86	−10.34	−0.0395	−0.0114	−0.0242	−0.0395	−0.0114	−0.0242
Hall (2016)	12	−5.76	−0.76	−2.40	−0.1426	−0.0370	−0.0671	−0.1436	−0.037	−0.0673
Kitching et al. (2016)	15	−1.18	3.33	1.27	−0.0039	0.0085	0.0030	−0.0039	0.0085	0.0030
Namitha and Shijin (2016)	12	−8.90	2.50	−0.65	−0.1796	0.0666	−0.0162	−0.1816	0.0667	−0.0164
Subramaniam and Watson (2016)	28	−8.77	2.66	−3.77	−0.1177	0.0256	−0.0327	−0.1183	0.0256	−0.0327
Xue and Hong (2016)	13	−12.01	1.39	−5.19	−0.1670	0.0269	−0.0661	−0.1686	0.0269	−0.0665
Cohen et al. (2017)	8	−9.54	4.64	−0.89	−0.2183	0.1076	−0.0203	−0.2219	0.1080	−0.0208
Ibrahim and Ezat (2017)	30	−7.21	4.22	−1.07	−0.6817	0.4559	−0.0883	−0.8324	0.4921	−0.1052
Li and Zheng (2017)	10	−9.34	−2.82	−5.961	−0.0416	−0.0178	−0.0300	−0.0416	−0.0178	−0.03
Xu and Sim (2017)	23	−4.91	2.83	0.02	−0.2294	0.1572	0.0039	−0.2336	0.1585	0.0037
Bradbury and Scott (2018)	4	−2.77	−2.28	−2.50	−0.1517	−0.1257	−0.1376	−0.1528	−0.1264	−0.1384
Cheng et al. (2018)	27	−13.49	16.59	0.12	−0.0605	0.0308	−0.0071	−0.0605	0.0308	−0.0071
Cheung et al. (2018)	21	−6.12	2.39	−1.08	−0.0147	0.0058	−0.0261	−0.0147	0.0058	−0.0261
Ibrahim (2018)	5	−9.85	−2.86	−5.81	−0.4336	−0.1377	−0.2668	−0.4643	−0.1386	−0.2779
Loy and Hartlieb (2018)	50	−18.92	4.51	−4.32	−0.1228	0.0198	−0.0305	−0.1235	0.0199	−0.0306
Nagasawa (2018)	102	−28.85	24.29	−3.19	−0.3247	0.1364	−0.0445	−0.3369	0.1372	−0.0451
Prabowo et al. (2018)	27	−16.90	−0.54	−9.14	−0.0838	−0.0156	−0.0575	−0.0840	−0.0156	−0.0576
Belina et al. (2019)	2	−2.12	−2.09	−2.10	−0.1595	−0.1573	−0.1584	−0.1609	−0.1586	−0.1597
Cai et al. (2019)	36	−1.93	3.78	0.95	−0.1257	0.2570	0.0576	−0.1264	0.2629	0.0582
Chang et al. (2019)	12	−9.54	−0.07	−4.26	−0.1000	−0.0021	−0.0467	−0.1003	−0.0021	−0.0468
Chen et al. (2019a)	2	−11.47	−6.20	−8.84	−0.0308	−0.0167	−0.0237	−0.0308	−0.0167	−0.0237
Chen et al. (2019b)	11	−6.37	8.17	−0.04	−0.0366	0.0391	0.0042	−0.0367	0.0391	0.0042
Ciftci and Zoubi (2019)	3	−30.30	−10.49	−19.13	−0.0702	−0.0243	−0.0443	−0.0703	−0.0244	−0.0444
Cook et al. (2019)	7	−2.58	0.94	−0.69	−0.1076	0.0051	−0.0032	−0.1076	0.0051	−0.0032
Ding et al. (2019)	3	−1.68	4.98	0.66	−0.0036	0.0106	0.0014	−0.0036	0.0106	0.0014
Habib and Hasan (2019)	16	−4.82	1.75	−1.17	−0.0325	0.0279	−0.0075	−0.0325	0.0279	−0.0075
Haga et al. (2019)	14	−5.26	0.35	−2.29	−0.0214	0.0013	−0.0095	−0.0214	0.0013	−0.0095
Höglund and Sundvik (2019)	14	−5.35	1.67	−0.77	−0.0233	0.0059	−0.0058	−0.0233	0.0059	−0.0058
Kaspereit and Lopatta (2019)	2	−4.62	−3.25	−3.93	−0.0058	−0.0035	−0.0046	−0.0058	−0.0035	−0.0046
Khedmati et al. (2019)	1	−2.09	−2.09	−2.09	−0.0539	−0.0539	−0.0539	−0.0539	−0.0539	−0.0539

(continued on next page)

Table 7 (*continued*)

Panel A: Effect size and mean effect size of different studies included in the meta-analysis

Study (by chronological order)	Number of Estimates	Reported Statistical Value			Effect Size (r)			Mean Effect Size (r_{Zr})		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Kim et al. (2019)	12	−22.82	−1.47	−7.46	−0.1443	−0.0094	−0.0623	−0.1453	−0.0094	−0.0625
Kuiate and Noland (2019)	15	−1.82	3.94	1.42	−0.0982	0.2103	0.0654	−0.0986	0.2135	0.0661
Liu et al. (2019)	13	−9.92	−3.53	−6.59	−0.0995	−0.0409	−0.0670	−0.0998	−0.0409	−0.0672
Ma et al. (2019)	35	−11.78	1.44	−4.53	−0.0368	0.0112	−0.0178	−0.0368	0.0112	−0.0178
Yang (2019)	13	−4.42	−2.03	−3.69	−0.4410	−0.0203	−0.0368	−0.4410	−0.0203	−0.0369
Zhang et al. (2019a)	4	−1.85	−1.15	−1.39	−0.1178	−0.0733	−0.0886	−0.1183	−0.0734	−0.0888
Zhang et al. (2019b)	25	−2.69	2.57	0.60	−0.0776	0.1135	0.0220	−0.0777	0.1140	0.0220
Ballas et al. (2020)	46	−36.39	8.57	−3.81	−0.6069	0.2553	−0.0610	−0.7040	0.2611	−0.0675
Balios et al. (2020)	12	−13.64	−2.02	−6.26	−0.1180	−0.0224	−0.0565	−0.1186	−0.0224	−0.0565
Cannon et al. (2020)	32	−4.91	0.98	−3.31	−0.1170	0.0269	−0.0298	−0.1176	0.0269	−0.0298
Cohen and Li (2020)	2	−7.20	−4.75	−5.98	−0.0297	−0.0196	−0.0247	−0.0297	−0.0196	−0.0247
Golden et al. (2020a)	10	−3.79	−1.90	−2.30	−0.0176	−0.0087	−0.0123	−0.0176	−0.0087	−0.0123
Golden et al. (2020b)	9	−11.55	−4.08	−7.67	−0.0807	−0.0286	−0.0537	−0.0809	−0.0286	−0.0537
Gray (2020)	15	−8.04	0.52	−2.97	−0.2306	0.0153	−0.0866	−0.2348	0.0153	−0.0876
Hartlieb et al. (2020a)	16	−4.94	−0.77	−2.51	−0.0859	−0.0058	−0.0244	−0.0861	−0.0058	−0.0245
Hartlieb et al. (2020b)	9	−1.08	4.28	0.71	−0.0046	0.0160	0.0021	−0.0046	0.0160	0.0021
Huang and Kim (2020)	11	−3.46	−1.25	−2.28	−0.0088	−0.0031	−0.0056	−0.0088	−0.0031	−0.0056
Ko et al. (2020)	5	−5.44	0.47	−4.07	−0.0175	0.0048	−0.0126	−0.0175	0.0048	−0.0126
Lee et al. (2020a)	24	−4.96	6.34	−0.54	−0.0112	0.0178	−0.0008	−0.0112	0.0178	−0.0008
Lee et al. (2020b)	2	−12.49	−9.48	−11.14	−0.0511	−0.0379	−0.0445	−0.0511	−0.0379	−0.0445
Li and Zheng (2020)	26	−34.91	−1.76	−11.07	−0.0997	−0.0115	−0.0419	−0.1000	−0.0115	−0.0420
Li et al. (2020a)	5	−3.95	−0.79	−2.12	−0.0191	−0.0060	−0.0139	−0.0191	−0.006	−0.0139
Li et al. (2020b)	52	−12.39	−2.41	−8.11	−0.1309	−0.0215	−0.0923	−0.1316	−0.0215	−0.0926
Lopatta et al. (2020)	10	−4.76	0.99	−2.44	−0.0445	0.0063	−0.0181	−0.0445	0.0063	−0.0181
Loy and Hartlieb (2020)	4	−8.85	1.76	−3.27	−0.0300	0.0060	−0.0112	−0.0300	0.0060	−0.0112
Tang et al.(2020)	2	−25.03	−22.44	−23.74	−0.2208	−0.1989	−0.2099	−0.2245	−0.2016	−0.2131
Özkaya (2020)	9	−3.29	−3.29	−3.29	−0.0519	−0.0373	−0.0470	−0.0519	−0.0373	−0.047
Stimolo and Porporato (2020)	5	−1.68	0.24	−0.80	−0.0682	0.0100	−0.0322	−0.0683	0.0100	−0.0323
Wu et al. (2020)	4	−2.18	−0.03	−1.11	−0.1342	−0.0019	−0.0680	−0.1350	−0.0019	−0.0684
Xu and Zheng (2020)	9	−4.09	1.65	−0.93	−0.1124	0.0670	−0.0130	−0.1128	0.0670	−0.0013
Zhu et al. (2020)	15	−9.76	−4.09	−7.42	−0.0964	−0.0312	−0.0657	−0.0967	−0.0312	−0.0658

Panel B: Mean effect size statistics and homogeneity test (across different cost items)

Overall mean effect size ($\bar{r}_{Zr}$):	−0.0117
Standard error (S_{Zr}):	0.0001
z-statistic:	85.9313[c]
Lower bound:	−0.0119
Upper bound:	−0.0114
Homogeneity test (Q-values):	44,924.49[c]

Panel C: Mean effect size statistics and homogeneity tests (clustered by cost item)

	SG&A expenses	Operating expenses	Advertising expenses	Cost of goods sold	R&D expenses	Total labor costs
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0097	−0.0125	−0.0249	−0.0023	−0.0063	−0.0451
Standard error (S_{Zr}):	0.0002	0.0002	0.0034	0.0009	0.0030	0.0009
z-statistic:	53.4147[c]	56.4742[c]	7.4095[c]	2.7016[c]	2.0605[b]	49.5343[c]
Lower bound:	−0.0100	−0.0129	−0.0315	−0.0040	−0.0122	−0.0469
Upper bound:	−0.0093	−0.0121	−0.0183	−0.0006	−0.0003	−0.0433
Homogeneity test (Q-values):	19,434.45[c]	20,151.18[c]	939.36[c]	922.12[c]	52.28[c]	990.33[c]
Within group Q:	42,489.72[c]					
Between group Q (Panel B)	44,924.49[c]					

Notes: **Panel A** presents the effect size (r) and mean effect size (r_{Zr}) of 84 studies that examine, for different types of cost items, the association of the annual log change in the level of a cost item with the annual log change in the level of sale revenues, in case of a sale revenues decline (i.e., cost asymmetry coefficient). The effect size (r) is calculated as $r = t/\sqrt{t^2 + df}$. The mean effect size (r_{Zr}) is calculated using the inverse weight variance method for standardizing the effect size of each study (Lipsey and Wilson, 2001): $r_{Zr} = 0.5\log_e[(1 + r)/(1 - r)]$. **Panel B** illustrates the mean effect size statistics (i.e., overall mean effect size, the z-statistic, the lower and the upper bound of a 95% confidence interval assuming normal distribution) and homogeneity test across different cost items. Overall mean effect size ($\bar{r}_{Zr}$) is calculated using as weight for the standardized effect size (r_{Zr}) of each study the variance weight $w_{Zr} = n - 3$, where n depicts the number of firms-year observations: $\bar{r}_{Zr} = \sum(w_{Zr} * r_{Zr}) / \sum(w_{Zr})$. The z-statistic (Z) is calculated as $Z = |\bar{r}_{Zr}|/S_{Zr}$. We capture the effect of heterogeneity using the Chi-square within the Q-test. **Panel C** reports the mean effect size statistics (i.e., overall mean effect size, the z-statistic, the lower and the upper bound of a 95% confidence interval assuming normal distribution) and homogeneity tests clustered by cost item. In addition, Panel C reports within and among group Q statistics. Following the Chi-square statistic, the within group Q is distributed with 1,164 degrees of freedom (1,170 individual effect size minus 6 different cost categories). Thus, we reject the hypothesis that the residual variability

within each cost category is homogeneous. The difference within group Q and between group Q is statistically significant at the critical level which exhibit the presence of any intra-group effect. In all panels, a, b, and c indicates 10%, 5%, and 1% levels of significance, respectively.

tion of the fail-safe number N (N_{fail}) of unreported studies, with non-significant results required to combat the publication bias of verifying the presence of asymmetric cost behavior (Rosenthal, 1979; Rosenthal, 1991). Initially, all reported t-statistics of the studies in our analysis were converted to p-values and then converted to Z-scores, similar to the calculation of the effect size. To calculate the unweighted Z_c, the individual Z-scores were then combined and scaled by the square root of the number of tests:

$$Z_c = \Sigma Z/\sqrt{N} \tag{2a}$$

where N is the number of studies in the *meta*-analysis and Z is the converted Z-score. The fail-safe number (N_{fail}) of unreported studies with non-significant results required to combat the publication bias of verifying the presence of asymmetric cost behavior was calculated from the following equation (Rosenthal, 1979):

$$N_{fail} = \left[k\left(k^{*}Z_c^2 - 2.706\right)\right]/2.706 \tag{2c}$$

where, k is the number of studies in the *meta*-analysis. The file drawer issue becomes apparent when the fail-safe number (N_{fail}) exceeds a critical value:

$$\text{Critical value} = (5^{*}k) + 10 \tag{2c}$$

Table 10 reports the summary statistics for file drawer problem. The fail-safe number (N_{fail}) of cost asymmetry coefficient equals 1,232,696, which exceeds the critical value of 430 estimated by the Eq. (2c). In this context, the fail-safe number (N_{fail}) of GDP growth, successive sales decrease, asset intensity, and employ intensity systematically exceeds the corresponding critical value. The above empirical findings indicate that the *meta*-analytic evidence on asymmetric cost behavior research reported by our study is robust to the file drawer problem.

5.4.2. Meta-regression analysis

We applied *meta*-regression analysis to explore the possibility of publication bias in the studies in our literature review (Hay, 2019). According to Hay and Knechel (2017), *meta*-regression analysis provides insights into both publication bias and differences in contextual factors that may influence the key findings across multiple studies. Initially, we followed a simple regression model that estimated the magnitude of both publication bias and the remaining significant effect after excluding publication bias (Stanley & Jarrell, 1989; Stanley et al., 2008; Hay & Knechel, 2017):

$$b_{2j} = \beta + \beta_0 Se_j + e_j \tag{3a}$$

where b_{2j} is the estimated value of the cost asymmetry coefficient reported by Study j, and Se_j is the corresponding standard error. Publication bias can be excluded by testing whether the standard errors in each study are associated with the reported estimated value of the cost asymmetry coefficient. In the case of publication bias, the estimated value of the coefficient of standard error (β_0) significantly affects the results (Stanley & Jarrell, 1989; Stanley et al., 2008; Stanley & Doucouliagos, 2012; Hay & Knechel, 2017). As the previous equation suffers from heteroscedasticity regarding Se_j, the parameters of our model were estimated using weighted least squares (WLS) techniques by adjusting standard errors with $1/Se_j^2$.

Following the methodology of Hay and Knechel (2017), we introduced in the regression model of Eq. (3a) several factors are likely to be associated with a greater (less) publication bias. Specifically, two vectors correlate with the publication process and some contextual effects were included in Eq. (3a). Our generic *meta*-regression model is as follows.

$$b_{2j} = \beta + \beta_0 Se_j + \sum_{j=1}^{J} \gamma_j K_j Se_j + \sum_{k=1}^{K} \delta_k X_k + e_j \tag{3b}$$

where K is the vector of indicator variables that affect publication selection (journal quality, prestigious research universities, and econometric specifications), X is the vector of indicator variables for differences in the research settings of the study (country-level institutional factors; different cost categories), and γ_j and δ_k denote the corresponding coefficients of the K and X vectors, respectively.

Following previous studies (e.g., Stanley & Doucouliagos, 2012; Wang & Shailer, 2015; Hay & Knechel, 2017), we included the following factors in the vector K: (a) journal quality with the dummy variable $TOP\_JOURNAL_j$, coded one for each study in our analysis that was published in one of six top (according to ABS journal list) accounting journals,[12] and zero otherwise; (b) econometric specification with dummy variables, coded one for each study of our analysis employed the extended log-linear model with three-way interactions ($THREE\text{-}WAY\_MODEL_j$), and the extended log-linear with two and three-way interactions ($TWO\ \&\ THREE\text{-}WAY\_MODEL_j$), and zero otherwise; (c) data sample characteristics with the dummy variable $WINSORIZATION_j$ coded one if a study in our analysis eliminates outliers by applying either 1% or 5% winsorization, and zero otherwise[13]; and (d) prestigious of university ($UNIVERSITY_j$), coded one if at least one author of a study in our analysis is affiliated with higher-status universities, and zero otherwise. There are many alternative measures to proxy the status of universities (Hay & Knechel,2017), but we divide the top universities worldwide according to the following ranking lists: (i) the list of top universities adopted by the QS Quacquarelli Symonds[14] (QS_j), and (ii) the list of top universities published by the Round University Ranking (RUR) Agency[15] (RUR_j). All variables on the K vector are multiplied by the standard error, and negative (positive) values of the γ coefficient indicate a higher (lower) level of publication bias in favor of verifying the presence of cost stickiness. The sum of coefficients $\beta_0 + \gamma$ measures the overall test for publication bias.

The X vector emphasizes two fundamental characteristics of each study: (a) a dummy variable (D_US_j) coded one if a study in our analysis focuses on the U.S. and zero otherwise; and (b) dummy variables for each cost category coded one if the study examines the existence of cost asymmetry in relation to a specific cost category and zero otherwise. We included dummy variables for SG&A expenses ($D\_SG\&A_j$), operating expenses (D_OPEX_j), advertising expenses (D_ADVERT_j), COGS (D_COGS_j), R&D expenses ($D\_R\&D_j$), and total labor costs ($D\_Labor\ Costs_j$). The sum of the estimated values of coefficients β_0 and δ_0 measures the freedom of publication selection bias.

Table 11 reports the estimated results of regression models of Eq. (3a) and Eq. (3b). In the case of the simple regression model of Eq. (3a), the estimated value of the coefficient β_0 is −3.087, which signals the presence of publication bias. To rule out the effect of publication bias,

[12] . The top six accounting journals, as presented by ABS list (ABS=4), are as follows: (i) The Accounting Review (TAR), (ii) Journal of Accounting and Economics (JAE), (iii) Journal of Accounting Research (JAR), (iv) Contemporary Accounting Research (CAR), (v) Review of Accounting Studies (RAS), and (vi) Accounting, Organizations and Society (AOS).

[13] . We focus on winsorization because the other elimination process steps are standard in cost asymmetry literature and thus have rather limited variability.

[14] . https://www.topuniversities.com/university-rankings/world-university-rankings/2020 (January 2022).

[15] . https://roundranking.com/ranking/world-university-rankings.html#world-2020 (January 2022).

Table 8
Cross sectional analysis.

Panel A: Mean effect size statistics and homogeneity tests (US market versus non-US market)

Panel A1: US market

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0264	−0.0008	0.0204	−0.0182	−0.0042
Standard error (S_{Zr}):	0.0003	0.0003	0.0003	0.0003	0.0003
z-statistic:	104.5228[c]	3.0006[c]	80.6812[c]	71.8377[c]	16.5857[c]
Lower bound:	−0.0269	−0.0013	0.0199	−0.0187	−0.0047
Upper bound:	−0.0259	−0.0003	0.0209	−0.0177	−0.0037
Homogeneity test (Q-values):	12,841.41[c]	1,212.35[c]	25,068.54[c]	13,026.42[c]	2,465.13[c]

Panel A2: non-US market

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0057	−0.0015	0.0096	−0.0056	−0.0008
Standard error (S_{Zr}):	0.0002	0.0002	0.0002	0.0002	0.0002
z-statistic:	35.3079[c]	9.6058[c]	59.8429[c]	34.7664[c]	4.7308[c]
Lower bound:	−0.0060	−0.0019	0.0093	−0.0059	−0.0011
Upper bound:	−0.0054	−0.0012	0.0100	−0.0053	−0.0005
Homogeneity test (Q-values):	27,295.60[c]	3,234.89[c]	19,173.15[c]	7,223.65[c]	4,250.02[c]

Panel B: Mean effect size statistics and homogeneity tests (common versus code law countries)

Panel B1: Common law countries

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0266	−0.0008	0.0203	−0.0180	−0.0044
Standard error (S_{Zr}):	0.0003	0.0003	0.0003	0.0003	0.0003
z-statistic:	106.1173[c]	3.2277[c]	80.8082[c]	71.8561[c]	17.5556[c]
Lower bound:	−0.0271	−0.0013	0.0198	−0.0185	−0.0049
Upper bound:	−0.0261	−0.0003	0.0207	−0.0175	−0.0039
Homogeneity test (Q-values):	13,130.09[c]	1,266.64[c]	25,327.84[c]	13,380.17[c]	2,776.32[c]

Panel B2: Code law countries

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0043	0.0001	0.0051	−0.0006	−0.0005
Standard error (S_{Zr}):	0.0002	0.0002	0.0002	0.0002	0.0002
z-statistic:	19.7515[c]	0.4202	23.8035[c]	2.8277[c]	2.1871[c]
Lower bound:	−0.0047	−0.0003	0.0047	−0.0010	−0.0009
Upper bound:	−0.0038	0.0005	0.0055	−0.0002	−0.00005
Homogeneity test (Q-values):	22,230.69[c]	816.13[c]	3,755.43[c]	2,708.33[c]	3,430.21[c]

Panel C: Mean effect size statistics and homogeneity tests (Anglo-American versus communitarian versus emerging system of corporate governance)

Panel C1: Anglo-American system of corporate governance

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0266	−0.0008	0.0203	−0.0181	−0.0044
Standard error (S_{Zr}):	0.0003	0.0003	0.0003	0.0003	0.0003
z-statistic:	106.1084[c]	3.2298[c]	80.9822[c]	72.2512[c]	17.4490[c]
Lower bound:	−0.0271	−0.0013	0.0198	−0.0186	−0.0049
Upper bound:	−0.0261	−0.0003	0.0208	−0.0176	−0.0039
Homogeneity test (Q-values):	13,024.51[c]	1,266.62[c]	25,138.31[c]	13,096.96[c]	2,631.78[c]

Panel C2: Communitarian system of corporate governance

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0076	0.0001	0.0023	−0.0030	0.0028
Standard error (S_{Zr}):	0.0004	0.0004	0.0004	0.0004	0.0004
z-statistic:	17.2711[c]	0.1325	5.2362[c]	6.8514[c]	6.3072[c]
Lower bound:	−0.0084	−0.0008	0.0014	−0.0039	0.0019
Upper bound:	−0.0067	0.0009	0.0031	−0.0021	0.0036
Homogeneity test (Q-values):	13,962.26[c]	44.99[c]	847.52[c]	798.50[c]	689.94[c]

Panel C3: Emerging system of corporate governance

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0032	0.0001	0.0060	0.0002	−0.0015
Standard error (S_{Zr}):	0.0002	0.0002	0.0002	0.0002	0.0002
z-statistic:	12.9900[c]	0.4075	24.2535[c]	0.9710	6.1956[c]
Lower bound:	−0.0037	−0.0004	0.0055	−0.0003	−0.0020
Upper bound:	−0.0027	0.0006	0.0065	0.0007	−0.0010
Homogeneity test (Q-values):	8,298.99[c]	771.14[c]	3,020.25[c]	2,096.22[c]	2,815.16[c]

Notes: This table exhibits cross sectional analysis of the mean effect size statistics (i.e., overall mean effect size, the z-statistic, the lower and the upper bound of a 95% confidence interval assuming normal distribution) and homogeneity tests for cost asymmetry coefficient and main determinants of cost asymmetry. The overall mean

effect size ($\bar{r}_{Zr}$) is calculated using as weight for the standardized effect size (r_{Zr}) of each study the variance weight $w_{Zr} = n - 3$, where n depicts the number of firms-year observations: $\bar{r}_{Zr} = \sum(w_{Zr} * r_{Zr}) / \sum(w_{Zr})$. The z-statistic (Z) is calculated as $Z = |\bar{r}_{Zr}| / S_{Zr}$. We capture the effect of heterogeneity using the Chi-square within the Q-test. Studies are grouped by different characteristics of their corresponding research site: (i) region (US market versus non-US market (**Panels A1 and A2**), (ii) legal origin (common versus code law countries) (**Panels B1** and **B2**), and (iii) corporate governance system (Anglo-American versus communitarian versus emerging system of corporate governance) (**Panels C1, C2** and **C3**). In all panels, a, b, and c indicates 10%, 5%, and 1% levels of significance, respectively.

we emphasize determinants related to publication process and variations in the research settings that are included in the regression model of Eq. (3b). We reported two different versions of the regression model of Eq. (3b) (i.e., Models 2 and 3) corresponding to the two different measures of a prestigious university (QS_j, RUR_j).

The variables of the vector K are associated with the publication process. The reported coefficients of the variable TOP_JOURNALj are negative but not significant, revealing that there is no publication bias related to relative journal ranking.[16] Regarding the econometric specification for testing cost asymmetry, t he estimated values of the coefficients of the variables THREE – WAY $MODEL_j$ and TWO & THREE – WAY_MODELj are not significant in both models ($\gamma_4 = 0.187$, $\gamma_4 = 0.275$, γ_5 = -0.191, γ_5 = -0.0366), which is consistent with the view that the three-way and the two- and three-way interaction models showed no significant evidence of increased publication bias. We also examined whether data winsorization affected the publication bias. In this context, the estimated value of the coefficient of the variable $WINSORIZATION_j$ is negative and not significant, thereby not inducing publication bias in favor of verifying the existence of cost stickiness. Finally, we incorporated university status, as researchers from highly reputed universities may either anchor with greater pressure to publish, or it is more convenient for them to publish in accounting journals (Hay & Knechel, 2017). The top 100 universities from the QS list (QS_j) seem to be associated with less publication bias, and the top 100 universities from the RUR agency (RUR_j) show no significant evidence[17] of increased publication bias.

The estimated coefficient of the dummy variable D_Usj, which proxies studies focusing on U.S. listed firms, is negative and not significant, indicating that cost stickiness is not observed only in U.S. listed firms. Finally, the estimated values of the dummy variables for each cost category are all significant and positive. These empirical findings suggest that cost categories do not induce estimation bias and that asymmetric cost behavior is documented across different cost classifications (Anderson et al., 2003; Calleja et al., 2006; Dierynck et al, 2012; Shust & Weiss, 2014; Venieris et al., 2015; Subramaniam & Watson, 2016; Cohen et al., 2017; Loy & Hartlieb, 2018).

6. Cost asymmetry as determinant of earnings behavior, earnings prediction, and other economic phenomena

This section reviews empirical research focusing on the effects of cost asymmetry on earnings behavior, earnings prediction, and other economic phenomena. The motivation for the relevant empirical studies relies on the fact that because earnings are calculated as the difference between revenues and expenses, cost asymmetry may trigger an asymmetric earnings response to a decline in sales revenue. In addition, the behavioral nature of the asymmetric cost behavior phenomenon allows researchers to associate earnings behavior (and/or quality) with a wide range of managerial attitudes, motives, and behaviors. For systematic reasons, we recognize within this research stream the following areas: (i) future earnings behavior and implications on dividend policy, (ii) analysts' behavior and capital market responses, (iii) conditional conservatism, (iv) management forecasts, and (v) other economic phenomena.

6.1. Future earnings behavior and implications on dividend policy

Initially, Banker and Chen (2006) provided evidence that cost asymmetry might trigger an asymmetric earnings response to sales declines, which, if incorporated in the econometric specification of return on equity forecast models, improves their prediction accuracy. The return on equity forecast model that decomposes earnings into components that reflect the variability of costs with sales revenue and cost asymmetry in a sales decline (cost variability/cost stickiness - CVCS - model) is more accurate than (i) a model that disaggregates earnings into operating and non-operating income components and (ii) another model that disaggregates earnings into cash flows and accruals components (Banker & Chen, 2006). The prediction accuracy of the cost variability/cost stickiness (CVCS) model is improved if it is extended by incorporating firm-year-specific proxy measures for upward cost adjustment and cost asymmetry (Kaspereit & Lopatta, 2019). A more accurate measurement of cost asymmetry leads to improved earnings prediction.

The presence of SG&A cost asymmetry has motivated researchers to explore the relationship between future earnings and the SG&A ratio. Anderson et al. (2007) provided empirical evidence that future earnings are positively related to changes in the SG&A cost ratio in periods in which revenue declines, which is inconsistent with the traditional interpretation of SG&A cost changes. Baumgarten et al. (2010) expanded our understanding of the link between SG&A expenses to sales ratio and future profitability. Intended (unintended) increases in SG&A expenses to sales ratio are expected to be positively (negatively) associated with increases in future profitability. A firm's past SG&A expenses to sales ratio increase is defined as intendent (i.e., efficient SG&A cost management) if it is below the industry average. Intended increases significantly enhance future earnings because they either contribute to the creation of intangible resources or are attributed to cost asymmetry.[18]

The relationship between cost asymmetry and future earnings also seems to affect dividend policies. Responding to investors' aversion to dividend reductions, firms with higher resource adjustment and stickier costs pay lower dividends than their peers because they are less able to sustain a higher level of dividend payouts in the future (He et al., 2020).

6.2. Analysts' behavior and capital markets response

Analysts do not seem to fully incorporate the effects of cost asymmetry on future earnings in their forecasts. Weiss (2010) documented that firms with stickier cost behavior have less accurate analysts' earnings forecasts than firms with less sticky cost behavior. Analysts seem to "converge to the average" in recognizing both cost variability and stickiness, resulting in substantial and systematic earnings forecast errors (Ciftci et al., 2016; Kaspereit & Lopatta, 2019). Further, analysts' forecast errors for sticky cost firms are greater than those of managers (Ciftci & Salama, 2018). Finally, cost asymmetry seems to have a wider behavioral effect on analysts and investors. Analysts' coverage priorities

[16] . We also test whether publications in two management accounting journals (*The Journal of Management Accounting Research* and *Management Accounting Research*) are anchored with publication bias. Untabulated results indicate no publication bias.

[17] . We also divide top 100 universities in the US, within the QS and RUR agency lists, providing similar empirical findings.

[18] . In addition, an orientation towards the creation of intangible resources is associated with the presence of cost stickiness (Venieris et al., 2015).

Table 9
Cross sectional analysis (journal's characteristics).

Panel A: Mean effect size statistics and homogeneity test (ABS = 4 versus ABS < 4 journals)

Panel A1: ABS = 4

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0117	−0.0092	0.0336	−0.0190	−0.0002
Standard error (S_{Zr}):	0.0004	0.0004	0.0004	0.0004	0.0004
z-statistic:	28.6209[c]	22.4593[c]	82.3728[c]	46.6606[c]	0.4315
Lower bound:	−0.0125	−0.0100	0.0328	−0.0198	−0.0010
Upper bound:	−0.0109	−0.0084	0.0344	−0.0182	0.0006
Homogeneity test (Q-values):	2,464.94[c]	1,005.17[c]	9,663.13[c]	4,466.26[c]	484.35[c]

Panel A2: ABS < 4

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0117	−0.0003	0.0101	−0.0080	−0.0020
Standard error (S_{Zr}):	0.0001	0.0001	0.0002	0.0002	0.0002
z-statistic:	81.0249[c]	2.3778[b]	70.4252[c]	55.5574[c]	13.5271[c]
Lower bound:	−0.0120	−0.0006	0.0099	−0.0083	−0.0022
Upper bound:	−0.0114	−0.0001	0.0104	−0.0077	−0.0017
Homogeneity test (Q-values):	42,459.55[c]	3,033.27[c]	32,924.19[c]	16,889.33[c]	6,345.10[c]

Panel B: Mean effect size statistics and homogeneity test (management accounting specialized versus non-management accounting specialized journals)

Panel B1: Management accounting specialized journals

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0193	0.0003	0.0024	−0.0051	−0.0030
Standard error (S_{Zr}):	0.0005	0.0005	0.0005	0.0005	0.0005
z-statistic:	37.5027[c]	0.4847	4.6764[c]	9.7989[c]	5.7480[c]
Lower bound:	−0.0204	−0.0008	0.0014	−0.0061	−0.0040
Upper bound:	−0.0183	0.0013	0.0034	−0.0040	−0.0020
Homogeneity test (Q-values):	2,485.93[c]	61.19[c]	479.35[c]	221.22[c]	256.95[c]

Panel B2: Non-management accounting specialized journals

	Cost asymmetry coefficient	GDP growth	Successive decrease	Asset intensity	Employee intensity
Overall mean effect size ($\bar{r}_{Zr}$):	−0.0111	−0.0014	0.0135	−0.0095	−0.0017
Standard error (S_{Zr}):	0.0001	0.0001	0.0001	0.0001	0.0001
z-statistic:	78.8395[c]	10.2014[c]	95.9713[c]	67.7250[c]	11.8034[c]
Lower bound:	−0.0114	−0.0017	0.0132	−0.0098	−0.0019
Upper bound:	−0.0108	−0.0012	0.0138	−0.0093	−0.0014
Homogeneity test (Q-values):	42,200.62[c]	4,383.02[c]	44,620.60[c]	21,715.52[c]	6,583.31[c]

Notes: This table exhibits cross a sectional analysis of the mean effect size statistics (i.e., overall mean effect size, the z-statistic, the lower and the upper bound of a 95% confidence interval assuming normal distribution) and homogeneity tests for cost asymmetry coefficient and main determinants of cost asymmetry. The overall mean effect size ($\bar{r}_{Zr}$) is calculated using as weight for the standardized effect size (r_{Zr}) of each study the variance weight $w_{Zr} = n - 3$, where n depicts the number of firms-year observations: $\bar{r}_{Zr} = \sum(w_{Zr} * r_{Zr}) / \sum(w_{Zr})$. The z-statistic (Z) is calculated as $Z = |\bar{r}_{Zr}| / S_{Zr}$. We capture the effect of heterogeneity using the Chi-square within the Q-test. Studies are grouped by different characteristics of the publication outlet: (i) ABS = 4 versus ABS < 4 journals (**Panels A1** and **A2**), and (ii) management accounting versus non-management accounting journals (**Panels B1** and **B2**). In our analysis, we classify "The Journal of Management Accounting Research" and "Management Accounting Research" as management accounting specialized journal. In all panels, a, b, and c indicates 10%, 5%, and 1% levels of significance, respectively.

Table 10
File Drawer Issues.

Determinants	Number of studies	Unweighted Stouffer test	Fail safe number of studies	Critical number for drawers
Cost asymmetry coefficient	84	472.78	1,232,696	430
GDP growth	36	12.12	5,769	190
Successive decrease	49	451.00	400,121	255
Asset intensity	57	235.85	283,124	295
Employee intensity	43	100.06	68,326	225

Notes: This table presents the strength of *meta*-analytic results conditional on the file drawer problem. The file drawer issue is documented when the fail-safe number of studies is not greater than the critical number of studies.

are negatively associated with cost stickiness and investors, who understand that cost stickiness relies less on earnings (Weiss, 2010).

As a result of a partial understanding of cost behavior in capital markets, cost stickiness is positively associated with a weaker effect of earnings surprises on market reactions (Kaspereit & Lopatta, 2019). Moreover, a negative association exists between the intensity of cost stickiness and stock price crash risk. This negative relationship becomes more apparent in (i) state-owned firms, (ii) firms with high market competition, (iii) firms with lower financial risk, (iv) centralized ownership firms, and (v) firms with poor performance (Tang et al., 2020). Finally, focusing on the traditional interpretation of SG&A cost changes, abnormal positive returns may be earned on portfolios formed by going long on firms with high increases in the SG&A cost ratio (and short on firms with low increases in the SG&A cost ratio) in revenue-declining periods (Anderson, 2007).

6.3. Conditional conservatism

Conditional conservatism is the timelier recognition of

contemporaneous economic losses versus economic gains in accounting earnings (Basu, 1997). Motivated by the asymmetric earnings response to sales declines, Banker et al. (2016) investigated the effects of cost asymmetry on the standard econometric modelling of empirical conditional conservatism. Banker et al. (2016) integrated the cost-driven earnings behavior model with Basu's (1997) asymmetric timeliness model to explore the confounding effect of cost stickiness on conditional conservatism. It seems that the estimates of the asymmetric timeliness models present an upward bias due to the absence of cost stickiness (i.e., omitted variable). Empirical research on conditional conservatism should recognize the potential confounding effect of cost asymmetry.

Lu et al. (2020) investigated the asymmetric timeliness of CFOs. Cost asymmetry and product pricing are important explanations for CFO asymmetric timeliness. Lu et al. (2020) provided evidence that if firms face bad economic news, they are likely to diminish product prices to enhance sales and/or retain idle resources to avoid redundancy payments, which gives rise to CFO asymmetric timeliness.

6.4. Management forecasts

Cost stickiness is positively associated with the issuance of management earnings forecasts (Cifti & Salama, 2018; Han et al., 2020). Perhaps managers are aware of the asymmetric earnings response to sales decline due to the presence of cost asymmetry. However, managers fail to encapsulate the exact impact of cost asymmetry in their forecast models (Cifti & Salama, 2018). Cost stickiness is positively correlated with the frequency of firms' propensity to issue management earnings forecasts, from the perspectives of information asymmetry and managerial optimism (Han et al., 2020). In addition, firms with a high intensity of cost stickiness have an incentive to release more favorable news within their forecasts.

6.5. Other economic phenomena

As the research community becomes familiar with cost asymmetry, new research ideas have emerged to explore the effects of cost asymmetry on various microeconomic and macroeconomic phenomena. For instance, Rouxelin et al. (2018) associated cost asymmetry with the prediction of the future unemployment rate. Aggregate cost stickiness positively affects the prediction of future macroeconomic outcomes. A stronger predictive power of cost stickiness is observed towards the end of recessionary periods (Rouxelin et al., 2018). Jang and Yehuda (2020) examined the effects of cost asymmetry on value creation in M&As. Acquirers in mergers and acquisitions (M&A) deal with high adjustment costs tend to present low acquisition gains and deal synergies. However, acquirers with high adjustment costs are prone to divesting assets after a deal.

Conversely, Chen et al. (2019a) examined the impact of operating leverage on firms' profitability and financial leverage. To capture the effect of operating leverage, Chen et al. (2019a) emphasized SG&A expenses because SG&A expenses are much stickier than the COGS. Following Anderson's (2003) model, they provide evidence that in the case of sales decline, SG&A expenses exhibit more intense cost asymmetry than the COGS.

6.6. Critical analysis and suggestions for the future

An unexplored area is the relationship between cost asymmetry and management accounting–related concepts, techniques, and methodologies. The vast amount of empirical evidence in favor of the existence of cost asymmetry provides a solid background for challenging the dominance of the symmetric cost behavior assumption adopted by management and cost accounting techniques and methodologies. Activity-based costing, budgeting, target costing, and cost-volume analysis will improve their accuracy if they consider the concept of cost asymmetry. They benefit from the improved rationalization of (probable)

Table 11
Meta-Regression Analysis.

	Model (1)	Model (2)	Model (3)
β: underling effect	−0.00949[a]	−0.297[c]	−0.256[c]
	(−1.86)	(−6.10)	(−5.57)
X Vector:			
δ_2: D_US_j		0.00405	0.00401
		(0.42)	(0.41)
δ_3: $D\_SG\&A_j$		0.279[c]	0.238[c]
		(5.87)	(5.18)
δ_4: D_OPEX_j		0.283[c]	0.241[c]
		(5.95)	(5.39)
δ_5: D_ADVERT_j		0.317[c]	0.275[c]
		(6.65)	(6.08)
δ_6: D_COGS_j		0.310[c]	0.268[c]
		(6.50)	(5.98)
δ_7: $D\_R\&D_j$		0.334[c]	0.290[b]
		(4.14)	(3.64)
δ_8: D_Labor $Cost_j$		0.192[c]	0.149[c]
		(3.52)	(2.89)
β_0: Se_j	**−3.087[c]**	**−2.658[c]**	**−2.655[c]**
	(−15.96)	**(−6.23)**	**(−6.22)**
K Vector:			
γ_1: QS_j		0.841[b]	
		(2.47)	
γ_2: RUR_j			0.288
			(0.83)
γ_3: $TOP\_JOURNAL_j$		−0.362	−0.221
		(−0.86)	(0.51)
γ_4: THREE – WAY_MODELj		0.187	0.275
		(0.40)	(0.59)
γ_5: TWO & THREE – WAY_MODEL_j		−0.191	−0.0366
		(−0.37)	(−0.07)
γ_6: $WINSORIZATION_j$		−0.497	−0.442
		(−1.51)	(−1.32)
Number of Observations:	1,168	1,168	1,168
R-Squared:	0.181	0.218	0.216

Notes: This table exhibits the results of the regression analysis of the following models:

Model 1:. $b_{2j} = \beta + \beta_0 Se_j + e_j$

Model 2 and 3:. $b_{2j} = \beta + \beta_0 Se_j + \sum_{j=1}^{J} \gamma_j K_j Se_j + \sum_{k=1}^{K} \delta_\kappa X_k + e_j$

Where Se_j is the Standard error of cost asymmetry coefficient (b_{2j}). **Vector K**: includes the following variables: (a) the dummy variable $TOP\_JOURNAL_j$ coded 1 for each study in our analysis was published in one of six top (according to ABS journal list) accounting journals, and 0 otherwise; (b) dummy variables corresponding to extended log-linear model with three-way interactions (THREE - WAY_MODEL_j), and extended log-linear with two and three-way interactions (TWO & THREE - WAY_MODEL_j) (c) the dummy variable $WINSORIZATION_j$ coded 1 if a study in our analysis eliminated outliers by applying either 1% or 5% winsorization, and 0 otherwise and; (d) prestigious of university ($UNIVERSITY_j$) coded 1 if at least one author of a study in our analysis is affiliated with higher-status universities, and 0 otherwise. We divide top universities worldwide according to the following ranking lists: the listing of top universities adopted by the QS Quacquarelli Symonds (QS_j), and the listing of top universities published by the Round University Ranking (RUR) Agency (RUR_j). The sum of the coefficients $\beta_0 + \gamma$ measures the overall test for publication bias. **Vector X**: includes the following variables: (a) D_US_j is a dummy variable coded 1 if a study in our analysis focusses on U.S., and 0 otherwise; (b) a number of dummy variables for each cost category coded 1 if a study examines the existence of cost asymmetry in relation to a specific cost category and 0 otherwise. These dummy variables are: (i) $D\_SG\&A_j$ which examines the existence of cost asymmetry in the case of selling, general and administrative expenses; (ii) D_OPEX_j which examines the existence of cost asymmetry in the case of operating expenses; (iii) D_ADVERT_j which examines the existence of cost asymmetry in the case of advertising expenses; (iv) D_COGS_j which examines the existence of cost asymmetry in the case of COGS; (iv) $D\_R\&D_j$ which examines the existence of cost asymmetry in the case of R&D expenses; and (v) $D\_Labor\ Costs_j$ which examines the existence of cost asymmetry in the case of total labor costs. a, b, and c indicates 10%, 5%, and 1% levels of significance, respectively.

Table 12
Cost asymmetry as determinant of earnings behavior, earnings prediction, and other economic phenomena.

Future earnings behavior and implications on dividend policy		
Economic phenomenon	Study	Rationale
Return on equity forecast models	Banker and Chen (2006)	A return on equity forecast model that decomposes earnings into components that reflect variability of costs with sales revenue and cost asymmetry in a sales decline (cost variability/cost stickiness - CVCS - model) is more accurate than (i) a model that disaggregates earnings into operating and non-operating income components, and (ii) another model that disaggregates earnings into cash flows and accruals components. However, all above models are less accurate than analysts' consensus forecasts that rely on a larger information set.
Future earnings and SG&A ratio	Anderson et al. (2007)	Future earnings are positively related to changes in the SG&A cost ratio in periods in which revenue declines, inconsistent with traditional interpretation of SG&A cost changes.
Future earnings and SG&A ratio	Baumgarten et al. (2010)	Intended (unintended) increases in the SG&A expenses to sales ratio are expected to be positively (negatively) associated with increases of future profitability. A firm's past SG&A expenses to sales ratio increase is defined as intendent (i.e., efficient SG&A cost management) if it was below its industry average. Intended increases significantly enhance future earnings because either they contribute on the creation of intangible resources, or they are attributed on cost asymmetry.
Return on equity forecast models	Kaspereit and Lopatta (2019)	The cost variability/cost stickiness (CVCS) model is extended by incorporating firm-year-specific proxy measures for upward cost adjustment and cost asymmetry. This adjustment significantly enhances earnings forecasts.
Implications on dividend policy	He et al. (2020)	Responding to investors' aversion to dividend reductions, firms with higher resource adjustment costs and stickier costs pay lower dividends than their peers because they are less able to sustain any higher level of dividend payouts in the future.
Financial reporting quality	Salehi et al. (2018)	In case of a decrease on the current period's activity, managers are likely to maintain idle resources to increase firms' profits in long run. This indicates that cost stickiness has a positive impact on financial reporting quality.
Analysts' behavior and capital markets response		
Economic phenomenon	Study	Rationale
Analysts' earnings forecast accuracy	Weiss (2010)	Firms with stickier cost behavior have less accurate analysts' earnings forecasts than firms with less sticky cost behavior
Analysts' coverage priorities	Weiss (2010)	Analysts' coverage priorities are negatively associated with the cost stickiness.
Market response to SG&A to sales ratio	Anderson (2007)	Abnormal positive returns may be earned on portfolios formed by going long on firms with high increases in the SG&A cost ratio (and short on firms with low increases in the SG&A cost ratio) in revenue-declining periods.
Market response to earnings surprises	Weiss (2010)	Investors which recognize cost stickiness rely less on earnings.
Analysts' earnings forecast errors	Ciftci et al. (2016)	Analysts tend to ignore cost stickiness leading them in systematic errors in forecasting earnings. They ''converge to the average'' in recognizing both cost variability and cost stickiness, resulting in substantial and systematic earnings forecast errors
Analysts surprised by management earnings forecasts	Ciftci and Salama (2018)	Analysts' forecast errors for sticky cost firms are greater than managers' forecast errors.
Analysts' earnings forecast accuracy and earnings surprises on market reactions	Kaspereit and Lopatta (2019)	Partial understanding of cost behavior by capital markets. Cost stickiness is positively associated with lower analysts' forecast accuracy and a weaker effect of earnings surprises on market reactions.
Stock price crash risk	Tang et al. (2020)	There is a negative relationship between stock price crash risk and the intensity of cost stickiness.
Conditional conservatism		
Economic phenomenon	Study	Rationale
Asymmetric timeliness	Banker et al. (2016)	The estimates of the asymmetric timeliness models present an upward bias due to the absence of cost stickiness (i.e., omitted variable). Conditional conservatism empirical research should recognize the potential confounding effect of cost asymmetry.
CFO asymmetric timeliness	Lu et al. (2020)	Cost asymmetry and product pricing are important explanations of CFO asymmetric timeliness. When firms face bad economic news, they are likely to reduce product prices to encourage sales and/or retain slack resources to avoid redundancy payments, which leads to CFO asymmetric timeliness.

Management forecasts		
Economic phenomenon	Study	Rationale
Management forecasts issuance & forecast errors	Ciftci and Salama (2018)	Cost stickiness is positively associated with the issuance of a management earnings forecast. However, managers fail to encapsulate the exact impact of cost asymmetry in their forecast models
Management earnings forecasts releases	Han et al. (2020)	Cost stickiness is positively correlated with the firms' propensity to issue management earnings forecasts (MEF) and the frequency of MEF from the perspectives of information asymmetry and managerial optimism. In addition, firms with high intensity of cost stickiness have incentives to release more favorable news within their forecasts.
Other economic phenomena		
Economic phenomenon	Study	Rationale
Value creation in mergers and acquisitions (M&A) deals.	Jang and Yehuda (2020)	Acquirers in mergers and acquisitions (M&A) deals with high adjustment costs tend to present low acquisition gains and deal synergies. However, acquirers with high adjustment costs are prone to divest assets after the deal.
Prediction of future unemployment rate	Rouxelin et al. (2018)	Aggregate cost stickiness presents a positive effect on the prediction of future macroeconomic outcomes. A stronger predictive power of cost stickiness is observed toward the end of recessionary periods.
Operating leverage	Chen et al. (2019a)	Authors confirm, through the cost asymmetry, their decision to exclude cost of goods sold from the definition of operating leverage. More specifically, it seems that SG&A expenses are much stickier than COGS.

unfavorable cost variances in the case of sales decline due to the emergence of cost stickiness. For instance, addressing the behavioral dimension of cost asymmetry will improve responsibility accounting and management control systems in several ways, such as restricting managerial empire building behavior.

Most asymmetric cost behavior research is quantitative and utilizes (usually) large panel datasets to explore the existence of cost asymmetry, its determinants, and its economic consequences. Research on qualitative cost asymmetry is extremely rare, although it may provide valuable insights. Case studies, interviews, field studies, and questionnaires might enable the research community to better understand deliberate managerial decisions to maintain idle resources after a sales revenue decline, to evaluate the relative importance of major cost asymmetry determinants, and to explore the causal associations of cost

asymmetry with earnings behavior. Qualitative cost asymmetry research might expand the research agenda in new avenues with an interdisciplinary character. For instance, theories from marketing, management, and innovation could provide a wide range of potential theoretical propositions for exploring the relationship between cost asymmetry and cost behavior through a variety of phenomena.

Numerous studies (Dierynck et al., 2012; Kama & Weiss, 2013; Banker & Byzalov, 2014; Bugeja et al., 2015; Hall, 2016; Xue & Hong, 2016; Xu & Sim, 2017; Kaspereit & Lopatta, 2019; Liu et al., 2019; Yang, 2019; Li et al., 2020a; Lopatta et al., 2020; Xu & Zheng, 2020) have examined various instances of earnings management as determinants of the direction and intensity of cost asymmetry. For instance, incentives to meet earnings targets or analysts' earnings forecasts and the level of (abnormal) accruals decrease the intensity of cost stickiness (e.g., Dierynck et al., 2012; Kama & Weiss, 2013; Liang et al., 2014; Hall, 2016; Yang, 2019; Balios et al., 2020). The reverse direction of causality offers interesting avenues for potential research contributions: is cost asymmetry a determinant of earnings quality? Thus far, the literature provides evidence that econometric methods for studying a significant quality of earnings, such as asymmetric timeless earnings, should consider the presence of cost asymmetry (Banker et al., 2016; Lu et al., 2020). Investigating whether and how standard research approaches for studying earnings quality (level of abnormal accruals, earnings persistence, etc.) should be adjusted properly to incorporate the effects of cost asymmetry will enrich our understanding of earnings quality.

The literature has investigated the effects of cost asymmetry on return on equity forecast models (i.e., Banker & Chen, 2006) analysts' behavior, and the capital market response (i.e., Kaspereit & Lopatta, 2019). Cost asymmetry seems to have considerable implications for firm valuations. Ohlson (1995) and Feltham and Ohlson (1995) developed an elegant and simple model that associates accounting data with firm value in light of accounting conservatism. To the best of our knowledge, no study has examined the effect of cost asymmetry, which triggers an asymmetric earnings response to sales decline, on the previously mentioned model. In other words, the equity valuation literature should be enriched considering the valuation implications of cost asymmetry.

Another interesting avenue for future research is the effect of cost asymmetry on financial reporting quality. Cost asymmetry has been associated with managerial empire-building behavior, incentives to meet earnings targets, or to avoid losses. To the extent that these factors prevail in the manifestation of cost asymmetry, high-intensity cost asymmetry may be a signal of poor future reporting quality or an increased likelihood of fraud occurrence. However, several studies have associated cost asymmetry with value-enhancing firm characteristics such as the intensity of the level of organizational capital and coherent strategic orientation. In such a case, the high intensity of cost asymmetry might have a positive impact on the quality of financial reporting.

In relation to financial reporting quality, the research community may direct future initiatives on the relationship between auditing and cost asymmetry. This relationship may be bilateral in nature. Cost asymmetry may critically affect the quality of auditing services or effort. Conversely, high-quality auditing services might restrict managerial building behavior, and thus, the intensity of cost asymmetry.

In the finance literature, several studies (Harrison et al., 2011; Simintzi et al. 2015; Kumar & Yerramilli 2016; Kahl et al., 2019) have explored the interaction between financial and operating leverage. These studies relied on the microeconomic distinction between fixed and variable costs. Thus, the finance literature will be beneficial considering the existence of cost asymmetry when exploring the interaction between financial and operating leverage.

7. Concluding remarks

This study provides a literature review of asymmetric cost behavior research, which is accompanied by a *meta*-analysis that addresses several issues. Initially, we review econometric methods and instruments employed in empirical asymmetric cost behavior studies. Two primary suggestions for the existing economic rationalization of the asymmetric cost behavior phenomenon are as follows: First, it should be reshaped under less restrictive assumptions, which, in turn, would enable the research community to expand the potential avenues of hypothesis development. Second, the price linearity assumption and the presence of imperfect market competition (Cannon, 2014; Riegler & Weiskirchner-Merten, 2020) should be critically assessed by the research community.

We recognized several research streams within the two major streams of cost asymmetry literature: (i) determinants of the asymmetric cost behavior phenomenon, and (ii) cost asymmetry as a determinant of earnings behavior and other economic phenomena. Each of the major topics in our review is accompanied by a critical analysis and suggestions for the future.

Most empirical research is focused on exploring the effects of various factors on the manifestation of cost asymmetry, which are categorized by the current review study as (i) environmental, (ii) organizational, and (iii) managerial-specific determinants of cost asymmetry. Various avenues for future research were identified.

Within the context of environment-specific determinants of cost asymmetry, determinants associated with macroeconomic conditions beyond the use of the GDP growth rate should attract research interest. Macroeconomic conditions affect firms' cost structure and behavior, which should be integrated into cost asymmetry research in more sophisticated ways. For instance, a compound variable that synthesizes various macroeconomic dimensions with proper weights may be a more appropriate approach: that is, the single use of the GDP growth rate to control for macroeconomic conditions. More importantly, research should highlight two other important dimensions of the economic environment: price nonlinearity and market imperfections.

The legal environment and regulations continually evolve, and thus, new issues concerning cost asymmetry are expected to emerge. Policymaking is associated with regulations. However, there is limited empirical evidence on the association between policymaking and cost asymmetry. A wide range of policies may affect managerial decisions and cost behavior. The documented phenomenon of cost asymmetry may provide insights to policymakers, putting forward cost implications when formulating and evaluating various policies.

Although social, political, and cultural environments are determinants of cost asymmetry, only seven studies have investigated this relationship. (Kitching et al., 2016; Prabowo et al., 2018; Ma et al., 2019; Hartlieb et al., 2020a; Huang & Kim, 2020; Lee et al., 2020a; Loy & Hartlieb, 2020). Social, political, and cultural environments have a plethora of dimensions that, individually or in combination, may affect cost asymmetry. Cost asymmetry provides unique opportunities to directly examine the economic implications (in terms of cost behavior) of various social and political phenomena, events, and theories.

The economic (cost) implications of various management accounting research streams emphasizing topics such as management control systems, budgeting, performance measurement, organizational change, and transformations can be further explored through the vein of the asymmetric cost behavior phenomenon. Another area for potential contribution lies in the effects of qualitative organizational characteristics on the intensity and direction of cost asymmetry. Organizational structure, innovation, knowledge management, human resource management culture, management philosophy, and total quality management are examples of qualitative organizational characteristics that the asymmetric cost behavior research community may examine.

The theory of cost asymmetry relies on managerial behavior and decision-making. In addition to econometrics, alternative research designs may provide direct evidence and a better understanding of managerial behavior underlining the manifestation of cost asymmetry. Case studies, interviews, and qualitative research designs that explore managerial motives and behavior will reveal significant aspects of cost asymmetry and enhance the research community's understanding.

Another stream of empirical research on the managerial determinants of cost asymmetry emphasizes CEO characteristics and earnings management. There is limited evidence on whether the association between cost behavior and earnings management is value-enhancing. Finally, the effects of CEO characteristics on cost asymmetry are examined in the isolation of organizational characteristics and values. Organizational values, characteristics, structures, and/or missions may have a moderating or mediating effect on the relationship between CEO characteristics and cost asymmetry.

We also performed a *meta*-analysis of prior empirical evidence on the main determinants of the direction and intensity of the asymmetric cost behavior phenomenon. To the best of our knowledge, this is the first *meta*-analysis in the field of cost asymmetry and, beyond our critical review of the literature, provides significant conclusions on several issues identified within the field of cost asymmetry. Cost stickiness seems to be the prevailing manifestation of cost asymmetry across different categories of operating expenses and across different regions, legal systems, and corporate governance systems. In addition, studies with firms from the common law system and Anglo-American system of corporate governance exhibit higher cost stickiness than studies with firms from the code law system and the Communitarian or Emerging system of corporate governance. Furthermore, the coefficients of other determinants of cost asymmetry are consistent with the previous literature. The overall mean effect size of employee intensity is negative and not significant within (according to the ABS journal list) top accounting journals and a 95% confidence interval, including zero. Finally, the overall mean effect size of macroeconomic growth is not significant for specialized management accounting journals and for studies that consider firms from the code law system and Communitarian or Emerging systems of corporate governance.

However, there is heterogeneous residual variability for both the cost asymmetry coefficient and the major determinants of cost stickiness, which indicates that the intensity of cost asymmetry is affected by various determinants that have not been captured by mainstream empirical cost asymmetry econometric modelling. This explains the proliferation of research investigating new determinants, but it may also raise concerns for additional work on the consideration of the instruments that should be employed to model the behavior of major cost asymmetry determinants.

We performed various *meta*-analytical robustness tests. A common issue that is mainly discussed in *meta*-analytic-related literature is the file-drawer problem, which emerges if the lack of significant results of unpublished or unreported studies can reverse the conclusions of a significant relationship between the dependent variables (different cost categories in our case) and the independent variables (Rosenthal, 1979; Rosenthal, 1991). Our *meta*-analytic findings seem to be robust to file drawer problems.

Meta-regression analysis enabled us to identify possible sources of publication bias. There seems to be no publication bias associated with the relative journal rankings and university rankings, or if a study employs an extended log-linear two-way and three-way interaction model. Additionally, there is no publication bias with respect to the cost item examined in an asymmetric cost behavior study. Finally, elimination of outliers via winsorization or investigation of firms exclusively from the U.S. market does not seem to induce publication bias in favor of cost stickiness.

The second theme examined by empirical research is how cost asymmetry affects earnings behavior, earnings prediction, and other economic phenomena. Seeking to expand the agenda in this area of empirical cost asymmetry research, we argue that qualitative research (i.e., case studies, interviews, field studies, and questionnaires) will provide us with valuable insights. In addition, an unexplored area is the relationship between cost asymmetry and management accounting–related concepts, techniques, and methodologies. Finally, exploring the effects of cost asymmetry on earnings quality, financial reporting quality, and equity valuation will enhance our understanding of the economic implications of cost asymmetry on a variety of accounting-related issues.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

Acknowledgments

We are grateful to Editor-in-Chief (Robert K. Larson), three guest editors (Helen Kang, Stergios Leventis, Luke Watson), and two anonymous reviewers for their helpful comments and suggestions. The paper has also benefited substantially from the helpful comments and advice of Hichem Khlif.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.intaccaudtax.2023.100578.

References

Anderson, M., Asdemir, O., & Tripathy, A. (2013). Use of precedent and antecedent information in strategic cost management. *Journal of Business Research, 66*(5), 643–650. https://doi.org/10.1016/j.jbusres.2012.08.021

Determinants of the asymmetric cost behavior phenomenon

Anderson, M. A., Banker, R. D., & Janakiraman, S. (2003). Are selling, general, and administrative costs "sticky"? *Journal of Accounting Research, 41*(1), 47–63. https://doi.org/10.1111/1475-679X.00095

Balakrishnan, R., Labro, E., & Soderstrom, N. S. (2014). Cost structure and sticky costs. *Journal of Management Accounting Research, 26*(2), 91–116. https://doi.org/10.2308/jmar-50831

Balakrishnan, R., & Gruca, T. S. (2008). Cost stickiness and core competency: A note. *Contemporary Accounting Research, 25*(4), 993–1006. https://doi.org/10.1506/car.25.4.2

Balakrishnan, R., Petersen, M. J., & Soderstrom, N. S. (2004). Does capacity utilization affect the "stickiness" of cost? *Journal of Accounting, Auditing and Finance, 19*(3), 283–299. https://doi.org/10.1177/0148558X0401900303

Ballas, A., Naoum, V. C., & Vlismas, O. (2020). The effect of strategy on asymmetric cost behavior of SG&A expenses. *European Accounting Review (forthcoming)*. https://doi.org/10.1080/09638180.2020.1813601

Balios, D., Eriotis, N., Naoum, V. C., & Vasiliou, D. (2020). Sticky behaviour of selling, general, and administrative costs and earnings management practices: An international comparative perspective. *International Journal of Managerial and Financial Accounting, 12*, 242–264. https://doi.org/10.1504/IJMFA.2020.112336

Banker, R. D., Fang, S., & Mehta, M. N. (2020). Anomalous operating performance during economics slowdowns. *Journal of Management Accounting Research, 32*(2), 57–83. https://doi.org/10.2308/jmar-52547

Banker, R. D., & Byzalov, D. (2014). Asymmetric cost behavior. *Journal of Management Accounting Research, 26*(2), 43–79. https://doi.org/10.2308/jmar-50846

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

Banker, R. D., Byzalov, D., Ciftci, M., & Mashruwala, R. (2014b). The moderating effect of prior sales changes on asymmetric cost behavior. *Journal of Management Accounting Research, 26*(2), 221–242. https://doi.org/10.2308/jmar-50726

Banker, R. D., Byzalov, D., & Chen, L. T. (2013). Employment protection legislation, adjustment costs and cross-country differences in cost behavior. *Journal of Accounting and Economics, 55*(1), 111–127. https://doi.org/10.1016/j.jacceco.2012.08.003

Belina, H., Surysekar, K., & Weismann, M. (2019). On the medical loss ratio (MLR) and sticky selling general and administrative costs: Evidence from health insurers. *Journal of Accounting and Public Policy, 38*(1), 53–61. https://doi.org/10.1016/j.jaccpubpol.2019.01.004

Ben-Nasr, H., & Alshwer, A. A. (2016). Does stock price informativeness affect labor investment efficiency? *Journal of Corporate Finance, 38*(1), 249–271. https://doi.org/10.1016/j.jcorpfin.2016.01.012

Bradbury, M. E., & Scott, T. (2018). Do managers forecast asymmetric cost behaviour? *Australian Journal of Management, 43*(4), 538–554. 10.1177%2F0312896218773136.

Brüggen, A., & Zehnder, J. O. (2014). SG&A cost stickiness and equity-based executive compensation: Does empire building matter? *Journal of Management Control, 25*, 169–192. https://doi.org/10.1007/s00187-014-0195-5

Bu, D., Wen, C., & Banker, R. D. (2015). Implications of asymmetric cost behaviour for analysing financial reports of companies in China. *China Journal of Accounting Studies, 3*(3), 181–208. https://doi.org/10.1080/21697213.2015.1062343

Bugeja, M., Lu, M., & Shan, Y. (2015). Cost stickiness in Australia: Characteristics and determinants. *Australian Accounting Review, 25*(3), 248–261. https://doi.org/10.1111/auar.12066

Cai, C., Zheng, Q., & Zhu, L. (2019). The effect of shared auditors in the supply chain on cost stickiness. *China Journal of Accounting Research, 12*(4), 337–355. https://doi.org/10.1016/j.cjar.2019.09.001

Calleja, K. M., Steliaros, M., & Thomas, D. (2006). A note on cost stickiness: Some international comparisons. *Management Accounting Research, 17*(2), 127–140. https://doi.org/10.1016/j.mar.2006.02.001

Cannon, J. N., Hu, B., Lee, J. J., & Yang, D. (2020). The effect of international takeover laws on corporate resource adjustments: Market discipline and/or managerial myopia? *Journal of International Business Studies, 51*, 1443–1477. https://doi.org/10.1057/s41267-020-00370-6

Cannon, J. N. (2014). Determinants of "sticky costs'': An analysis of cost behavior using United States air transportation industry data. *The Accounting Review, 89*(5), 1645–1672. https://doi.org/10.2308/accr-50806

Chang, H., Guo, Y., & Mo, P. L. L. (2019). Market competition, audit fee stickiness, and audit quality: Evidence from China. *Auditing: A Journal of Practice & Theory, 38*(2), 79–99. https://doi.org/10.2308/ajpt-52173

Chen, J. V., Kama, I., & Lehavy, R. (2019b). A contextual analysis of the impact of managerial expectations on asymmetric cost behavior. *Review of Accounting Studies, 24*, 665–693. https://doi.org/10.1007/s11142-019-09491-2

Chen, C. X., Lu, H., & Sougiannis, T. (2012). The agency problem, corporate governance, and the asymmetrical behavior of selling, general, and administrative costs. *Contemporary Accounting Research, 29*(1), 252–282. https://doi.org/10.1111/j.1911-3846.2011.01094.x

Cheng, S., Jiang, W., & Zeng, Y. (2018). Does access to capital affect cost stickiness? Evidence from China. *Asia-Pacific Journal of Accounting and Economics, 25*, 177–198. https://doi.org/10.1080/16081625.2016.1253483

Cheung, J., Kim, H., Kim, S., & Huang, R. (2018). Is the asymmetric cost behavior affected by competition factors? *Asia-Pacific Journal of Accounting and Economics, 25*(1–2), 218–234. https://doi.org/10.1080/16081625.2016.1266271

Chung, C.Y., Hur, S.K., Liu, C., 2019. Institutional investors and cost stickiness: Theory and evidence. https://doi.org/10.1016/j.najef.2018.05.002.

Ciftci, M., & Zoubi, T. A. (2019). The Magnitude of Sales Change and Asymmetric Cost Behavior. *Journal of Management Accounting Research, 31*(3), 65–81. https://doi.org/10.2308/jmar-52331

Cohen, S., Karatzimas, S., & Naoum, V. C. (2017). The sticky cost phenomenon at the local government level: Empirical evidence from Greece. *Journal of Applied Accounting Research, 18*(4), 445–463. https://doi.org/10.1108/JAAR-03-2015-0019

Cook, D. O., Kieschnick, R., & Moussawi, R. (2019). Operating leases, operating leverage, operational inflexibility and sticky costs. *Finance Research Letters, 31*, 369–373. https://doi.org/10.1016/j.frl.2018.12.012

Dalla Via, N., & Perego, P. (2014). Sticky cost behaviour: Evidence from small and medium sized companies. *Accounting and Finance, 54*(3), 753–778. https://doi.org/10.1111/acfi.12020

de Villiers, C., Hay, D., & Zhang, Z. J. (2014). Audit fee stickiness. *Managerial Auditing Journal, 29*(1), 2–26. https://doi.org/10.1108/MAJ-08-2013-0915

Dierynck, B., Landsman, W. R., & Renders, A. (2012). Do managerial incentives drive cost behavior? Evidence about the role of the zero earnings benchmark for labor cost behavior in Belgian private firms. *The Accounting Review, 87*(4), 1219–1246. https://doi.org/10.2308/accr-50153

Ding, H., Lu, X., & Zheng, Y. (2019). Globalization and firm-level cost structure. *Review of International Economics, 27*(4), 1040–1062. https://doi.org/10.1111/roie.12409

Dogan, F. G. (2016). Non-cancellable Operating Leases and Operating Leverage. *European Financial Management, 22*(4), 576–612. https://doi.org/10.1111/eufm.12069

Golden, J., Masruwala, R., & Pevzner, M. (2020a). Labor adjustment costs and asymmetric cost behavior: An extension. *Management Accounting Research, 46*, 01–10. https://doi.org/10.1016/j.mar.2019.07.004

Golden, J., Kohlbeck, M., & Rezaee, Z. (2020b). Is cost stickiness associated ega sustainability factors? *Advances in Management Accounting, 32*, 35–73. https://doi.org/10.1108/S1474-787120200000032002

Gray, D. L. (2020). Are operating lease costs sticky for retail firms? *Advances in Management Accounting, 32*, 75–100. https://doi.org/10.1108/S1474-787120200000032003

Habib, A., & Hassan, M. M. (2019). Corporate social responsibility and cost stickiness. *Business & Society, 58*(3), 453–492. https://doi.org/10.1177/0007650316677936

Haga, J., Höglund, H., & Sundvik, D. (2019). Cost behavior around corporate tax rate cuts. *Journal of International Accounting, Auditing and Taxation, 34*, 1–11. https://doi.org/10.1016/j.intaccaudtax.2019.01.001

Hall, C. M. (2016). Does ownership structure affect labor decisions? *The Accounting Review, 91*(6), 1671–1696. https://doi.org/10.2308/accr-51384

Hartlieb, S., Loy, T. R., & Eierle, B. (2020a). Does community social capital affect asymmetric cost behaviour? *Management Accounting Research, 46*, 01–15. https://doi.org/10.1016/j.mar.2019.02.002

Hartlieb, S., Loy, T. R., & Eierle, B. (2020b). The effect of generalized trust on cost stickiness: Cross-country evidence. *The International Journal of Accounting, 55*(4), 01–37. https://doi.org/10.1142/S1094406020500183

Höglund, H., & Sundvik, D. (2019). Do auditors constrain intertemporal income shifting in private companies? *Accounting and Business Research, 49*(3), 245–270. https://doi.org/10.1080/00014788.2018.1490166

Holzhacker, M., Krishnan, R., & Mahlendorf, M. D. (2015b). The impact of changes in regulation on cost behavior. *Contemporary Accounting Research, 32*(2), 534–566. https://doi.org/10.1111/1911-3846.12082

Huang, W., & Kim, J. (2020). Linguistically induced time perception and asymmetric sost behavior. *Management International Review, 60*, 755–785. https://doi.org/10.1007/s11575-020-00429-4

Ibrahim, A. E. A. (2018). Board characteristics and asymmetric cost behavior: Evidence from Egypt. *Accounting Research Journal, 31*(2), 301–322. https://doi.org/10.1108/ARJ-11-2015-0148

Ibrahim, A. E. A., & Ezat, A. N. (2017). Sticky cost behavior: Evidence from Egypt. *Journal of Accounting in Emerging Economies, 7*(1), 16–34. https://doi.org/10.1108/JAEE-06-2014-0027

Jang, Y., & Yehuda, N. (2020). Resource adjustment costs, cost stickiness, and value creation in mergers and acquisitions. *Contemporary Accounting Research, 38*(3), 2264–2301. https://doi.org/10.1111/1911-3846.12668

Kama, I., & Weiss, D. (2013). Do earnings targets and managerial incentives affect sticky costs? *Journal of Accounting Research, 51*(1), 201–224. https://doi.org/10.1111/j.1475-679X.2012.00471.x

Khedmati, M., Sualihu, M. A., & Yawson, A. (2019). CEO-director ties and labor investment efficiency. *Journal of Corporate Finance, 65*, 01–24. https://doi.org/10.1016/j.jcorpfin.2019.101492

Kim, J. B., Lee, J. J., & Park, J. C. (2019). Internal control weakness and the asymmetrical behavior of selling, general, and administrative costs. *Journal of Accounting, Auditing and Finance*, 1–34. 10.1177%2F0148558X19868114.

Kitching, K., Mashruwala, R., & Pevzner, M. (2016). Culture and cost stickiness: A cross-country study. *The International Journal of Accounting, 51*(3), 402–417. https://doi.org/10.1016/j.intacc.2016.07.010

Ko, H., Chung, Y., & Woo, C. (2020). Choice of R&D strategy and asymmetric cost behaviour. *Technology Analysis and Strategic Management, 33*(9), 1022–1035. https://doi.org/10.1080/09537325.2020.1862786

Krisnadewi, K. A., & Soewarno, N. (2020). Competitiveness and cost behaviour: Evidence from the retail industry. *Journal of Applied Accounting Research, 21*(1), 125–141. https://doi.org/10.1108/JAAR-08-2018-0120

Kuiate, C., & Noland, T. R. (2019). Attracting and retaining core competency: A focus on cost stickiness. *Journal of Accounting and Organizational Change, 15*(4), 678–700. https://doi.org/10.1108/JAOC-04-2018-0038

Lee, W. J., Pittman, J., & Saffar, W. (2020a). Political uncertainty and cost stickiness: Evidence from national elections around the world. *Contemporary Accounting Research, 37*(2), 1107–1139. https://doi.org/10.1111/1911-3846.12547

Lee, E., Kim, C., & Leach-López, M. (2020b). Banking competition and cost stickiness. *Finance Research Letters, 41*. 10.1016/j.frl.2020.101859.

Li, W., Natarajan, R., Zhao, Y., & Zheng, K. (2020a). The effect of management control mechanisms through risk–taking incentives on asymmetric cost behavior. *Review of Quantitative Finance and Accounting*(forthcoming). https://doi.org/10.1007/s11156-020-00891-z.

Li, Z., Ying, Q., Chen, Y., & Zhang, X. (2020b). Managerial risk appetite and asymmetry cost behavior: Evidence from China. *Accounting and Finance, 60*(5), 4651–4692. https://doi.org/10.1111/acfi.12692

Li, W. L., & Zheng, K. (2020). Rollover risk and managerial cost adjustment decisions. *Accounting and Finance, 60*, 2843–2878. https://doi.org/10.1111/acfi.12417

Li, W. L., & Zheng, K. (2017). Product market competition and cost stickiness. *Review of Quantitative Finance and Accounting, 49*, 283–313. https://doi.org/10.1007/s11156-016-0591-z

Liang, S., Chen, D., & Hu, X. (2014). External auditor types and the cost stickiness of listed companies. *China Journal of Accounting Studies, 2*(4), 294–322. https://doi.org/10.1080/21697213.2014.982004

Liu, X., Liu, X., & Reid, C. D. (2019). Stakeholder orientations and cost management. *Contemporary Accounting Research, 36*(1), 486–512. https://doi.org/10.1111/1911-3846.12389

Lopatta, K., Kaspereit, T., & Gastone, L. M. (2020). Managerial style in cost asymmetry and shareholder value. *Managerial and Decision Economics, 41*(5), 800–826. https://doi.org/10.1002/mde.3139

Loy, T. R., & Hartlieb, S. (2020). A look on the bright side – The real effect of mood on corporate short-term resource adjustment decisions: Research note. *Advances in Management Accounting, 32*, 101–115. https://doi.org/10.1108/S1474-787120200000032004

Loy, T. R., & Hartlieb, S. (2018). Have estimates of cost stickiness changed across listing cohorts? *Journal of Management Control, 29*, 161–181. https://doi.org/10.1007/s00187-018-0263-3

Ma, L., Wang, X., & Zhang, C. (2019). Does religion shape corporate cost behavior? *Journal of Business Ethics, 170*, 835–855. https://doi.org/10.1007/s10551-019-04377-4

Mohammadi, A., & Taherkhani, P. (2017). Organizational capital, intellectual capital and cost stickiness (evidence from Iran). *Journal of Intellectual Capital, 18*(3), 625–642. https://doi.org/10.1108/JIC-06-2016-0066

Nagasawa, S. (2018). Asymmetric cost behavior in local public enterprises: Exploring the public interest and striving for efficiency. *Journal of Management Control, 29*, 225–273. https://doi.org/10.1007/s00187-018-0269-x

Namitha, C., & Shijin, S. (2016). Managerial discretion and agency cost in Indian market. *Advances in Accounting, 35*, 159–169. https://doi.org/10.1016/j.adiac.2016.06.002

Noreen, E. (1991). Conditions under which activity-based cost systems provide relevant costs. *Journal of Management Accounting Research, 3*, 159–168.

Özkaya, H. (2020). Sticky cost behavior: Evidence from small and medium sized enterprises in Turkey. *Eurasian Business Review, 11*, 349–369. https://doi.org/10.1007/s40821-020-00156-8
Prabowo, R., Hooghiemstra, R., & Van Veen-Dirks, P. (2018). State ownership, socio-political factors, and labor cost stickiness. *European Accounting Review, 27*(4), 771–796. https://doi.org/10.1080/09638180.2017.1329659
Shi, Y., Zhu, X., Zhang, S., & Lin, Y. (2019). The role of operational stickiness in impacting new venture survival. *Journal of Manufacturing Technology Management, 30*(5), 876–896. https://doi.org/10.1108/JMTM-07-2018-0206
Shust, E., & Weiss, D. (2014). Discussion of asymmetric cost behavior—Sticky costs: Expenses versus cash flows. *Journal of Management Accounting Research, 26*(2), 81–90. https://doi.org/10.2308/jmar-10406
Silge, L., & Wöhrmann, A. (2019). Market reaction to asymmetric cost behavior: The impact of long-term growth expectations. *Review of Managerial Science, 1–39*. https://doi.org/10.1007/s11846-019-00341-8
Stimolo, M. I., & Porporato, M. (2020). How different cost behaviour is in emerging economies? Evidence from Argentina. *Journal of Accounting in Emerging Economies, 10*(1), 21–47. https://doi.org/10.1108/JAEE-05-2018-0050
Subramaniam, C., & Watson, M. C. (2016). Additional evidence on the sticky behavior of costs. *Advances in Management Accounting, 26*, 275–305. https://doi.org/10.1108/S1474-787120150000026006
Venieris, G., Naoum, V. C., & Vlismas, O. (2015). Organisation capital and sticky behavior of selling, general and administrative expenses. *Management Accounting Research, 26*(1), 54–82. https://doi.org/10.1016/j.mar.2014.10.003
Wu, T. C., Young, C. S., Yu, C. C., & Hsu, H. T. (2020). Are governmental expenditures also sticky? Evidence from the operating expenditures of public schools. *Applied Economics, 52*(16), 1763–1776. https://doi.org/10.1080/00036846.2019.1678731
Xu, S., & Zheng, K. (2020). Tax avoidance and asymmetric cost behavior. *Journal of Accounting, Auditing & Finance, 35*(4), 723–747. 10.1177%2F0148558X18793757.
Xu, J., & Sim, J. W. (2017). Are costs really sticky and biased? Evidence from manufacturing listed companies in China. *Applied Economics, 49*, 5601–5613. https://doi.org/10.1080/00036846.2017.1316823
Xue, S., & Hong, Y. (2016). Earnings management, corporate governance and expense stickiness. *China Journal of Accounting Research, 9*(1), 41–58. https://doi.org/10.1016/j.cjar.2015.02.001
Yang, G., Kuang, Y., & Li, B. (2020). Staying idle or investing in prevon: The short-term and long-term impact of cost stickiness on firm value. *China Journal of Accounting Studies, 8*(2), 298–329. https://doi.org/10.1080/21697213.2020.1859251
Yang, Y. (2019). Do accruals earnings management constraints and intellectual capital efficiency trigger asymmetric cost behaviour? *Evidence from Australia. Australian Accounting Review, 29*(1), 177–192. https://doi.org/10.1111/auar.12250
Yang, D. (2015). Mergers, CEO hubris, and cost stickiness. *Emerging Markets Finance and Trade, 51*(5), 546–563. https://doi.org/10.1080/1540496X.2015.1062313
Zanella, F., Oyelere, P., & Hossain, S. (2015). Are costs really sticky? Evidence from publicly listed companies in the UAE. *Applied Economics, 47*(60), 6519–6528. https://doi.org/10.1080/00036846.2015.1080807
Zhang, J., Yin, M., Han, J., & Aroskar, R. (2019a). Why is asset-light strategy necessary? An empirical analysis through the lens of cost stickiness. *Tourism Management Perspectives, 32*, 1–8. https://doi.org/10.1016/j.tmp.2019.100571
Zhang, L., Li, J., & Wang, H. (2019b). IPO over-funding and cost stickiness. *Asia-Pacific Journal of Accounting and Economics*, 1–16. 10.1080/16081625.2019.1601024.
Zhu, G. Z., Hu, W., Peng, T., & Xue, C. (2020). The influence of corporate financialization on asymmetric cost behavior: Weakening or worsening. *Journal of Business Economics and Management, 22*(1), 21–41. https://doi.org/10.3846/jbem.2020.13634

Meta analysis of the determinants of the asymmetric cost behavior phenomenon

Ahmed, K., & Courtis, J. K. (1999). Associations between corporate characteristics and disclosure levels in annual reports: A meta-analysis. *British Accounting Review, 31*, 35–61. https://doi.org/10.1006/bare.1998.0082
Derfuss, K. (2009). The relationship of budgetary participation and reliance on accounting performance measures with individual-level consequent variables: A meta-analysis. *European Accounting Review, 18*(2), 203–239. https://doi.org/10.1080/09638180802652371
García-Meca, E., & Sánchez-Ballesta, J. P. (2009). Corporate governance and earnings management: A meta-analysis. *Corporate Governance: An International Review, 17*(5), 594–610. https://doi.org/10.1111/j.1467-8683.2009.00753.x
Habib, A. (2013). A meta-analysis of the determinants of modified audit opinion decisions. *Managerial Auditing Journal, 28*(3), 184–216. https://doi.org/10.1108/02686901311304349
Habib, A. (2012). Non-audit service fees and financial reporting quality: A meta-analysis. *Abacus, 48*(2), 214–248. https://doi.org/10.1111/j.1467-6281.2012.00363.x
Hay, D., Knechel, W. R., & Wong, N. (2006). Audit fees: A meta-analysis of the effect of supply and demand attributes. *Contemporary Accounting Research, 23*(1), 141–191. https://doi.org/10.1506/4XR4-KT5V-E8CN-91GX
Hay, D., & Knechel, W. R. (2017). Meta-regression in auditing research: Evaluating the evidence on the Big N audit firm premium. *Auditing: A Journal of Practice & Theory, 36*(2), 133–159. https://doi.org/10.2308/ajpt-51572
Hay, D. (2019). The potential for greater use of meta-analysis in archival auditing research. *Managerial Auditing Journal, 34*(1), 76–95. https://doi.org/10.1108/MAJ-05-2017-1562
Khlif, H., & Chalmers, K. (2015). A review of meta-analytic research in accounting. *Journal of Accounting Literature, 35*, 1–27. https://doi.org/10.1016/j.acclit.2015.09.001
Khlif, H., & Souissi, M. (2010). The determinants of corporate disclosure: A meta-analysis. *International Journal of Accounting and Information Management, 18*(3), 198–219. https://doi.org/10.1108/18347641011068965
Lipsey, W., & Wilson, D. (2001). *Practical meta-analysis*. Thousand Oaks, CA: SAGE Publications.
Liu, X., Vredenburg, H., & Steel, P. (2014). A meta-analysis of factors leading to management control in international joint ventures. *Journal of International Management, 20*(2), 219–236. https://doi.org/10.1016/j.intman.2013.07.001
Pomeroy, B., & Thornton, D. B. (2008). Meta-analysis and the accounting Literature: The case of audit committee independence and financial reporting quality. *European Accounting Review, 17*(2), 305–330. https://doi.org/10.1080/09638180701819832
Rosenthal, R. (1979). The "file drawer problem'' and tolerance for null results. *Psychological Bulletin, 86*(3), 638–641. 10.1037/0033-2909.86.3.638.
Rosenthal, R. (1991). Meta-analysis: A review. *Psychosomatic Medicine, 53*(3), 247–271. https://doi.org/10.1097/00006842-199105000-00001
Siddiqui, S. S. (2014). The association between corporate governance and firm performance – A meta-analysis. *International Journal of Accounting and Information Management, 23*(3), 218–237. https://doi.org/10.1108/IJAIM-04-2014-0023
Singh, H. P., Kumar, S., & Colombage, S. (2017). Working capital management and firm profitability: A meta-analysis. *Qualitative Research in Financial Markets, 9*(1), 34–47. https://doi.org/10.1108/QRFM-06-2016-0018
Souissi, M., & Khlif, H. (2012). Meta-analytic review of disclosure level and cost of equity capital. *International Journal of Accounting and Information Management, 20*(1), 49–62. https://doi.org/10.1108/18347641211201072
Stanley, T. D., & Jarrell, S. (1989). Meta-regression-analysis: A quantitative method of literature surveys. *Journal of Economic Surveys, 3*, 161–170. https://doi.org/10.1111/j.0950-0804.2005.00249.x
Stanley, T. D., Doucouliagos, C., & Jarrell, S. (2008). Meta-regression-analysis as the socio-economics of economics research. *Journal of Socio-Economics, 37*, 276–292. https://doi.org/10.1016/j.socec.2006.12.030
Stanley, T. D., & Doucouliagos, H. (2012). *Meta-regression analysis in economics and business*. London, UK and New York, NY: Routledge.
Wang, K., & Shailer, G. (2015). Ownership concentration and firm performance in emerging markets: A meta-analysis. *Journal of Economic Surveys, 29*(2), 199–229. https://doi.org/10.1111/joes.12048

Cost asymmetry as determinant of earnings behavior, earnings prediction, and other economic phenomena

Aboody, D., Levi, S., & Weiss, D. (2018). Managerial incentives, options, and cost-structure choices. *Review of Accounting Studies, 23*, 422–451. https://doi.org/10.1007/s11142-017-9432-0
Anderson, M. A., Banker, R. D., Huang, R., & Janakiraman, S. (2007). Cost behavior and fundamental analysis of SG&A costs. *Journal of Accounting, Auditing and Finance, 22*(1), 1–28. https://doi.org/10.1177/0148558X0702200103
Banker, R. D., Basu, S., Byzalov, D., & Chen, J. Y. S. (2016). The confounding effect of cost stickiness on conservatism estimates. *Journal of Accounting and Economics, 61*, 203–220. https://doi.org/10.1016/j.jacceco.2015.07.001
Banker, R. D., & Chen, L. (2006). Predicting earnings using a model based on cost variability and cost stickiness. *The Accounting Review, 81*(2), 285–307. https://doi.org/10.2308/accr.2006.81.2.285
Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting and Economics, 24*(1), 3–37. https://doi.org/10.1016/S0165-4101(97)00014-1
Baumgarten, D., Bonenkamp, U., & Homburg, C. (2010). The information content of the SG&A ratio. *Journal of Management Accounting Research, 22*(1), 1–22. https://doi.org/10.2308/jmar.2010.22.1.1
Chen, Z., Harford, J., & Kamara, A. (2019a). Operating leverage, profitability, and capital structure. *Journal of Financial and Quantitative Analysis, 54*(1), 369–392. https://doi.org/10.1017/S0022109018000595
Ciftci, M., & Salama, F. M. (2018). Stickiness in costs and voluntary disclosures: Evidence from management earnings forecasts. *Journal of Management Accounting Research, 30*(3), 211–234. https://doi.org/10.2308/jmar-51966
Ciftci, M., Mashruwala, R., & Weiss, D. (2016). Implications of cost behavior for analysts' earnings forecasts. *Journal of Management Accounting Research, 28*(1), 57–80. https://doi.org/10.2308/jmar-51073
Cohen, D. A., & Li, B. (2020). Customer-base concentration, investment, and profitability: The U.S. government as a major customer. *The Accounting Review, 95*(1), 101–131. https://doi.org/10.2308/accr-52490
Feltham, G., & Ohlson, J. A. (1995). Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research, 11*(2), 689–731. https://doi.org/10.1111/j.1911-3846.1995.tb00462.x
Han, S., Rezaee, Z., & Tuo, L. (2020). Is cost stickiness associated with management earnings forecasts? *Asian Review of Accounting, 28*(2), 173–211. https://doi.org/10.1108/ARA-04-2018-0096
Harrison, D. M., Panasian, C. A., & Seiler, M. J. (2011). Further evidence on the capital structure of REITs. *Real Estate Economics, 39*, 133–166. https://doi.org/10.1111/j.1540-6229.2010.00289.x
He, J., Tian, X., Yang, H., & Zuo, L. (2020). Asymmetric cost behavior and dividend policy. *Journal of Accounting Research, 58*(4), 989–1021. https://doi.org/10.1111/1475-679X.12328
Holzhacker, M., Krishnan, R., & Mahlendorf, M. D. (2015a). 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. https://doi.org/10.2308/accr-51092

Kahl, M., Lunn, J., & Nilsson, M. (2019). *Operating leverage and corporate financial policies*. The University of Texas at Austin. Working paper,.

Kaspereit, T., & Lopatta, K. (2019). Improving predictions of upward cost adjustment and cost asymmetry at the firm-year level. *Journal of Management Accounting Research, 31* (3), 99–127. https://doi.org/10.2308/jmar-52345

Kumar, P., & Yerramilli, V. (2016). *Optimal financial and operating leverage with real options*. University of Houston. Working paper,Retrieved from.

Lu, M., Shan, Y., Wright, S., & Yu, Y. (2020). Operating cash flow asymmetric timeliness in Australia. *Accounting and Finance, 60*, 587–627. https://doi.org/10.1111/acfi.12349

Ohlson, J. A. (1995). Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research, 11*(2), 661–687. https://doi.org/10.1111/j.1911-3846.1995.tb00461.x

Riegler, C., & Weiskirchner-Merten, K. (2020). Research note: An analytical perspective on market decisions and asymmetric cost behavior. *Review of Managerial Science, 15*, 991–1005. https://doi.org/10.1007/s11846-020-00379-z

Rouxelin, F., Wongsunwai, W., & Yehuda, N. (2018). Aggregate cost stickiness in GAAP financial statements and future unemployment rate. *The Accounting Review, 93*(3), 299–325. https://doi.org/10.2308/accr-51939

Salehi, M., Ziba, N., & Gah, A. D. (2018). The relationship between cost stickiness and financial reporting quality in Tehran Stock Exchange. *International Journal of Productivity and Performance Management, 67*(9), 1550–1565. https://doi.org/10.1108/IJPPM-10-2017-0255

Simintzi, E., Vig, V., & Volpin, P. (2015). Labor protection and leverage. *Review of Financial Studies, 28*(2), 561–591. https://doi.org/10.1093/rfs/hhu053

Tang, L., Huang, Y., Liu, J., & Wan, X. (2020). Cost stickiness and stock price crash risk: Evidence from China. *Emerging Markets Finance and Trade*, 1–26. 10.1080/1540496X.2020.1787148.

Weiss, D. (2010). Cost behaviour & analysts' earnings forecasts. *The Accounting Review, 85*(4), 1441–1471. https://doi.org/10.2308/accr.2010.85.4.1441

Prior Literature Review on Cost Asymmetry

Banker, R. D., Byzalov, D., Fang, S., & Liang, Y. (2018). Cost management research. *Journal of Management Accounting Research, 30*(3), 187–209. https://doi.org/10.2308/jmar-51965

Guenther, T. W., Riehl, A., & Rößler, R. (2013). Cost stickiness: State of the art of research and implications. *Journal of Management Control, 24*, 301–318. https://doi.org/10.1007/s00187-013-0176-0

Ibrahim, A.E.A., Ali, H.M.H.O., & Aboelkheir, H.N.E.R. (2022). Cost stickiness: A systematic literature review of 27 years of research and a future research agenda. *Journal of International Accounting, Auditing and Taxation*, 46, article 100439. https://doi.org/10.1016/j.intaccaudtax.2021.100439.