The Cost Behavior of Contemporary Accounting: Cost Stickiness and Reverse Cost

ABSTRACT

The contemporary approach accounting, cost behavior is already an established theme in private sector literature, but it is still emerging when it comes to the public sector. When cost behavior is applied to different areas of accounting, the examples raise doubts. The issue of cost behavior has evolved from the traditional approach to accounting, to the contemporary approach. This study clarifies obscure aspects, unifies concepts, and presents a modern accounting classification of cost behavior, within the contemporary accounting approach. It is a theoretical research built on the deductive method, which provides a broader view of the implications of the evidence phenomena related to cost behavior and contributes to the development of future research with the same conceptual basis, regardless of the sample field of application. The cost behavior within the contemporary approach is something that should be developed in future research. To this end, clear definitions are needed that can guide researchers and be generalized to the different branches of accounting science. The rules for private and public accounting are different, and some similar terms have different concepts in the two sectors. Thus, this paper presents how the topic of cost behavior has evolved from traditional to contemporary approaches, the unification of concepts as part of the classification, and suggests how it can be interpreted. In the modern accounting classification of behavior the costs are symmetrical or asymmetrical, with cost stickiness phenome or reverse phenome. In the stickiness phenomenon, it is further classified with sticky effect or anti-sticky effect.

Keywords: Cost behavior. Contemporary accounting. Cost stickiness. Reverse cost.

Thematic Area: 6. Theoretical contributions to cost determination and management.

1 INTRODUCTION

The issue of cost behavior has evolved from the traditional approach to accounting, which tended to focus on symmetric behavior, to the contemporary approach, which tends to focus on asymmetric behavior, and has already been consolidated in the private sector literature, with the phenomenon of cost stability playing an important role in the academic discussion (Banker & Byzalov, 2014; Richartz & Borgert, 2014; Banker, Byzalov, Fang, & Liang, 2018).

However, the discussion is still in its infancy in the public sector (Campagnoni, Fabre, Borgert, & Rover, 2021), where the topic has only been researched since 2017 and the few studies are not consistent. This has led some authors to suggest that the phenomenon of cost rigidity may not apply to the purely public sector (Cohen, Karatzimas, & Naoum, 2017; Hosomi & Nagasawa, 2018a, 2018b; Nagasawa & Nagasawa, 2021). More recently, Fabre and Borgert (2022) confirmed

the application and uncovered the existence of a new phenomenon called reverse cost, typical of the public sector, whose discovery changed the accounting classification levels of cost behavior.

In the literature, cost behavior is classified as symmetric and asymmetric. In the case of cost asymmetry, the literary classification of the cost stickiness phenomenon includes the sticky effect (Anderson et al., 2003) and the anti-sticky effect (Weiss, 2010). In late 2021, the reverse cost phenomenon was also revealed (Fabre & Borgert, 2022). The issue of cost behavior has evolved from observations in the private sector, where it is already consolidated, but the public sector still faces difficulties in its application, due to the need for conceptual adaptation and to take into account the specificities of government accounting.

The cost behavior within the contemporary approach is something that should be developed in future research. To this end, clear definitions are needed that can guide researchers and be generalized to the different branches of accounting science. The rules for private and public accounting are different, and some similar terms have different concepts in the two sectors. While the private sector focuses on profit and records costs and revenues in the result, the public sector focuses on equilibrium (zero result) and records costs and revenues independently. In addition, accounting uses terms from other fields of knowledge and is sometimes criticized in the original sciences for misapplying the concept.

There are many doubts about how to classify and interpret the phenomena of cost behavior in different samples (public and private). Accordingly, this study clarifies obscure aspects, unifies concepts, and presents a modern accounting classification of cost behavior.

It is a theoretical research that takes a broader look at the phenomena of cost behavior. Its main objective is to contribute to the development of future research on the same conceptual basis, regardless of the sample size. Thus, like most theoretical investigations, it does not follow the formal structure imposed by traditional scientific methodology, since its purpose is to lead the reader to deeper reflections of a reflexive and interpretive nature.

In this sense, the present study is based on the deductive knowledge of a research group that has been studying cost behavior in Brazil for more than a decade and has a fund of at least 200 selected articles on the subject from several countries. The theoretical foundation applied here begins with the seminal work of Anderson, Banker, and Janakiraman (2003), which uncovered the Cost Sticky Effect and established the contemporary accounting approach to cost behavior; it includes the contribution of Weiss (2010), who demonstrated the Anti-Sticky Effect and from which research began to consider the phenomenon of Cost Stickiness (encompassing both the Sticky and Anti-Sticky Effects); and it takes into account the new phenomenon identified by Fabre and Borgert (2022), called Reverse Costs, which are typical of the purely public sector and perhaps applicable to the private sector as well.

The main contribution of this study is to unify the concepts and provide a theoretical explanation of how cost behavior is classified in the contemporary accounting approach. Both cost stability and reverse cost phenomena are considered so that future research can move forward in this area, which still has many gaps.

2 MODERN ACCOUNTING CLASSIFICATION OF COST BEHAVIOR

The study of cost behavior in accounting has evolved from the traditional approach that began with Benston in 1966 to the modern approach that began with

the seminal study by Anderson, Banker, and Janakiranan in 2003. The modern approach to accounting assumes that costs are generally asymmetric (but in some cases symmetric) and can be characterized by the phenomenon of cost stickiness or reverse cost.

2.1 Evolution of the cost behavior thematic

The study of costs, revenues, and results was intensified in 1937 with the Theory of the Firm developed by Ronald Harry Coase. Production costs were primarily concerned with measurement and disclosure. In the traditional view, costs had a mechanistic linear relationship with cost drivers (variable costs) or remained constant (fixed costs). During this time, there was no discussion of how costs behaved (Banker et al., 2018).

Beginning in the 1960s, researchers began to consider that not all costs are static (Reis & Borgert, 2018). Transaction costs, addressed by Oliver Williamson in 1977, expanded the scope of costs associated with products. Years later, in 1985, Miller and Vollmann examined the non-symmetry of costs using factory automation, which appeared to reduce production costs but increased overhead. The cost drivers proposed by Cooper and Kaplan (1988) and Shank and Govindarajan (1992) also contributed to the advancement of the literature.

The study of cost behavior began with studies that focused on factors of production. The first empirical study was conducted by Benston in 1966, while the first study dealing with theoretical aspects was conducted by Raffi and Swamidass in 1987 (Reis & Borgert, 2018). A traditional view of managerial accounting assumes that costs behave linearly in relation to sales or profits (Anderson et al., 2003; Richartz & Borgert, 2014). Cost behavior is calculated based on the comparison of time periods, measuring the relationship between costs and the volume of activities or revenues. Traditionally, they are considered symmetric if cost variation is in the same proportion and direction as revenue variation (example: if revenue increases by 1%, costs increase by 0.5%; if revenue decreases by 1%, costs decrease by 0.5%).

Research on cost management was refocused beginning in 1992 with Copper and Kaplan's assertion that the most important conceptual foundation for contemporary research was the recognition that costs arise from management decisions (Banker et al., 2018). Despite the traditional literary affirmation that costs are symmetrical relative to revenues, it has since been admitted that they can behave differently. They are considered asymmetric when the change in costs does not have the same relationship with the increase/decrease in the change in revenues.

Assuming that costs behave asymmetrically, Pfann and Palm (1993) have suggested the existence of an asymmetry between the periods in which workers are hired and fired. Noreen and Soderstrom (1994, 1997) studied and explained cost behavior in hospitals and found moderate evidence that costs increase more when output increases than when output decreases.

According to Calleja et al. (2006), until 2003, the studies did not provide sufficient theoretical contributions because they did not find evidence of cost rigidity as revenues declined, but they did suggest ways forward. In 2003, however, a new approach emerged with the empirical-theoretical study by Anderson, Banker, and Janakiraman, which claimed not only that costs are asymmetric but also that they are sticky. This is the most recent seminal research in the cost behavior literature (Richartz & Borgert, 2014; Banker et al., 2018; Reis & Borgert, 2018; Fabre & Borgert, 2022).

In studying asymmetric costs, Anderson et al. (2003) find that the proportion of change in costs relative to the change in revenues increases when revenues increase but does not decrease by the same amount when revenues decrease. For example, revenues increase by 1% and costs increase by 0.8%, but when revenues decrease by 1%, costs do not decrease by 0.8%. This behavior was referred to by the authors as the sticky cost effect. In Brazilian research, the term has been translated as "sticky costs," "rigid costs," "viscous costs," or "sticky costs".

Among the relevant theoretical contributions is that of Weiss (2010), who assumes that a behavior can have an anti-sticky effect by assuming that when revenues decrease, costs do not decrease in the same proportion as they increased, that is, the deviation is smaller when revenues increase than when they decrease. For example, revenues increase by 1% and costs increase by 0.8%, but when revenues decrease by 1%, costs decrease by more than 0.8%.

The issue of cost behavior, which emerged in the 1960s, has evolved and contributed to research that focuses on managers and management. According to Banker et al. (2018), the current view of cost behavior in accounting dates back to the seminal study by Anderson et al. (2003) and subsequent contributions by several authors from different countries. Historically, research on cost management was developed out of the need to control production processes. While the traditional behavioral approach focused on production costs, the contemporary approach of Anderson et al. (2003) used total company costs (including selling, administrative, and overhead costs) that appear in the accounting records of the compustat base. Subsequent research, according to Malik (2012), has also diversified the basis for calculating costs and even compared different departments within companies. Fabre and Borgert (2022) note that research on cost behavior has gone beyond production costs and all expenses reflected in accounting accounts in a grouped (total cost) or segregated (with specific labels) manner have always been compared to the change in revenue or some other proxy representing production/sales volume.

Since 2016, researchers have used the term "contemporary approach" or "contemporary view" when including the phenomenon of cost rigidity in the classification of cost behavior. Under the contemporary approach to cost behavior, the literature on cost rigidity for the private sector has already been consolidated, examining Anderson et al.'s (2003) proposal from three aspects: Highlighting the phenomenon, identifying the determinants, and explaining the consequences (Malik, 2012). In 2022, it can be said that for the private sector, the phenomenon has already been recognized and several determinants have been identified, and current research is trying to explain the consequences. For the public sector, on the other hand, studies on cost behavior are still in their infancy.

Since 2017, the first studies on cost behavior in the public sector have been conducted, linked to the contemporary approach to studying the phenomenon of cost rigidity. But cost behavior is something that has not yet awakened in the public sector literature, perhaps due to the specificity of the sector and the complexity of accounting information that requires a sharp and nuanced look (Cohen et al., 2017) Between 2003 and 2021, only 9 articles were published on this topic, of which only Cohen et al. (2017), Bradbury and Scott (2018), and Campagnoni et al. (2021) examined pure public sector data. The authors pointed out limitations in their research, noting that the phenomenon of cost rigidity in the pure public sector has still not been consistently demonstrated.

Other studies have applied the contemporary approach in the public sector, but with sample limitations. The study by Wu, Young, Yu, and Hsu (2020) was

applied to local public entities with mixed budgets-part public and part private-that follow private accounting standards, while the works by Hosomi and Nagasawa (2018a; 2018b), Nagasawa (2018; 2019), and Nagasawa and Nagasawa (2021) were applied to public enterprises in Japan that have typical characteristics of private enterprises due to legal regulations. Based on the characteristics of the samples, the authors themselves pointed out that their research results cannot be considered as evidence of the public sector phenomenon and that the contemporary accounting approach is not applicable to the purely public sector.

In late 2021, a more in-depth study in Brazil confirmed the cost rigidity phenomenon for the purely public sector and uncovered a new phenomenon called reverse cost. Fabre and Borgert (2022) used a sample of 295 local governments (municipalities) from 2005 to 2020 (16 years), yielding 141,600 observations. Their study provided relevant contributions and identified ways to explore the topic in more depth (comparing the public and private sectors).

Until 2021, the prevailing view in the literature was still that costs in the purely public sector were symmetric relative to revenues, due in large part to the unique characteristics of government, such as nonprofit status, budget balancing obligations, and different accounting rules for recording revenues and costs. With empirical evidence that the contemporary approach also applies to the pure public sector and the unprecedented revelation of a new phenomenon called reverse costs (Fabre & Borgert, 2022), research in the pure public sector can move to generalize and consolidate the topic in several areas of accounting science. Of the three aspects of consolidation cited by Malik (2012), if we consider research focused on the public sector, we can already assume that the phenomenon is proven), it remains to identify the determinants and explain their consequences.

2.2 Unifying concepts for measuring cost behavior

The topic of cost behavior was developed using samples from the private sector, whose literature in this area of accounting had already been consolidated but encountered conceptual difficulties when it was transferred to the public sector. For Lapsley and Wright (2004), the standardization of government accounting is a difficulty for researchers unfamiliar with government. In this sense, this topic aims to clarify unclear aspects and unify concepts to support the development of new research on the topic.

The study by Anderson et al. (2003), whose proposed formula was one of the most important innovations and is still used in cost behavior studies. However, with the theoretical and empirical works developed on this topic, the concept of the terms used in the formula has changed according to the samples used by the researchers.

Figure 1 expresses the original formula, followed by the descriptions adapted here for use in the various fields of application.

$$\log\left(\frac{Costs_{i,t}}{Costs_{i,t-1}}\right) = \alpha + \beta_1 \log\left(\frac{Revenues_{i,t}}{Revenues_{i,t-1}}\right) + \beta_2 dummy_{decrease} * \log\left(\frac{Revenues_{i,t}}{Revenues_{i,t-1}}\right) + \mu_{i,t}$$

Revenues*:* Represents the proxy$_{proxi}$ for the volume of production, goods sold, or services rendered.
Costs: A group of costs that you want to analyze (individually, partially, or collectively)
α: constant angular coefficient
β_1: coefficient that measures the percentage increase in costs with a 1% increase in revenue.
β_2: coefficient measuring the percentage decrease in costs for a 1% decrease in revenue.
dummy$_{decrease}$: takes the value 1 (revenue$_{i,\,t}$ < revenue$_{i,\,t-1)}$, or 0 (revenue$_{i,\,t}$ >or= revenue$_{i,\,t-1}$).
i: observed company
t: reference year
t-1: year immediately before
μ: standard error

Figure 1. The formula for calculating cost behavior
Source: adapted from Anderson et al. (2003)

Revenue, which is now normally used as a proxy for the volume of production, can be exchanged for another proxy representing the product, good or service provided by the company, since the comparability with revenue is not always the best way to describe the determining costs behaves. If one wants to analyze cost behavior, the researcher must ask: cost behavior in relation to what?

It should be noted that regardless of the area of application (private or public), the revenues and costs to be analyzed must be chosen in such a way that they are in relation to the results of the unit under consideration.

Conceptually, in the traditional cost accounting approach, especially in Brazil, costs are considered to be only the expenses related to production. As of the contemporary approach, the term costs include all expenses recorded in the accounts, since it is not only the production costs that influence the result. Thus, the contemporary accounting approach expands the concept of cost and allows association with the concept of expenditure as something more general. In order to unify the nomenclature, studies of the contemporary accounting approach to cost behavior must use the international nomenclature of costs, which includes all costs recorded in the accounts and not just production costs.

The logic of a profitable result (private sector) differs from the logic of a balanced outcome (public sector). Furthermore, the activities with different management strategies and accounting standards that establish differentiated accounting in the public sector should also be considered when transferring the knowledge about cost behavior developed in the private sector to the public sector. According to Hosomi and Nagasawa (2018b), the pure public sector is characterized by exclusively public revenue and expenditure, charitable purposes and balanced planning and budgeting. The public sector is therefore concentrating on the balanced result (a zero result is aimed for in the period), which, if achieved, can lead to a symmetrical behavior of the total costs in relation to the total income in subsequent periods.

Nagasawa (2018) highlights that public cost behavior, by the current approach, public cost behavior should preferably be separated according to areas of government activity. Following this logic, the research of Campagnoni et al. (2021) advanced in evidencing the phenomenon in the pure public sector, but the authors themselves highlight that their results should be used with the ponderation that the approach of Anderson et al. (2003) was adapted in order to associate it with the flypaper effect (a concept not yet consolidated in the public sector and that refers to another approach). However, Fabre and Borgert (2022), with a more robust sample, proved that the balanced result does not occur in practice when analyzed by

government function, and evidenced the cost stickiness for both total costs and specific costs.

Most countries had their governmental accounting standards defined based on the techniques disseminated internationally in relation to public finances. In Brazilian public accounting, it was no different; the specific costs (by purpose) are recorded in accounts called budgetary functions, established by Ordinance No. 42, 1999, which listed the functional classification accounts. Member countries of the Organization for Economic Cooperation and Development (OECD) also use accounting accounts that group costs by purpose called government functions, which were established in 2011. Therefore, researchers that observe specific costs by purpose, in government samples, may use these groups of accounts for the measurement of cost behavior, or others that are more consistent with the object of study, as long as they reflect the public expenditures actually incurred.

The Brazilian legislation adopts the term “budget expenditures” as the equivalent of all expenditures authorized in government budgets. This also occurs in the accounting publications of the OECD member countries. It should be noted that in the public sector, the phases of revenue and expenditure include posting records in forecasting and budgeting accounts. The accounts reflecting budget execution should be used to measure public spending behavior. The Anderson et al. (2003) can be equated with implemented household expenditure, general or specific, as reported in the research by Campagnoni et al. (2021) and Fabre and Borgert (2022). It is worth remembering that the standardization of terminology (cost) for cost behavior studies is important in the contemporary approach.

The calculation of the cost behavior is based on the fluctuations that occur between periods. Thus, it is observed how the fluctuations in costs behave in relation to the fluctuations in sales or income. In the accounting literature, the behavior is considered symmetrical when the fluctuations of costs in relation to the fluctuations of revenues have the same ratio and direction (increase in revenues = increase in costs; decrease in revenues = decrease in costs). If the relationship between the two is different, the behavior is said to be asymmetric.

The structure for presenting the results of measuring cost behavior has been repeated in contemporary approach research in recent years, making it easier for the reader to interpret. Thus, Table 1 can serve as an example to illustrate the interpretations whose data are fictitious.

Table 1
Contemporary Accounting Approach to Cost Behavior

Cost	% variation of costs with		Behavior		Phenomenon (effect)
	1% revenue increase	1% decrease in revenue	Type	Level of Asymmetry	
Total	0,33	0,03	Asymmetrical	0,36	Sticky
Case 1	0,35	-0,35	Symmetrical	0,00	-
Case 2	-0,33	0,33	Symmetrical	0,00	Reverse
Case 3	-0,03	0,09	Asymmetrical	0,06	Reverse
Case 4	0,39	-0,68	Asymmetrical	-0,29	Anti-sticky

Source: Elaborated by the author (2022).
Note: fictitious data, only for exemplification.

The form of presentation of the results used in the study is shown in Table 1:

- **In column 1:** the name of the cost used, usually a name describing its property;
- **In columns 2 and 3**: the quantitative result of the measurement of cost behavior obtained using the standard formula of Anderson et al. (2003), as shown in Figure 1. It represents the percentage change in cost when revenue decreases or increases by 1%.
- **In column 4:** the type of behavior, i.e., symmetric (when the values in columns 2 and 3 indicate the same change but in opposite directions; asymmetric (when the values in columns 2 and 3 indicate different changes).
- **In column 5:** The degree of asymmetry is the difference between the expected symmetric point (when the behavior is symmetric) and the cost variation result when revenues decrease by 1%. The positive sign means that the direction
- **In column 6:** the effect determined according to the contemporary classification of cost behavior. In the case of standard symmetric behavior, it is not necessary to determine the effect.

The current classification of cost behavior includes two possible behaviors (symmetric and asymmetric), two distinct phenomena (cost stickiness and reverse cost), and three effects identified in the literature (sticky, anti-sticky, and reverse), each with distinct characteristics. Figure 2 illustrates the new classification according to the literature updated to 2022.

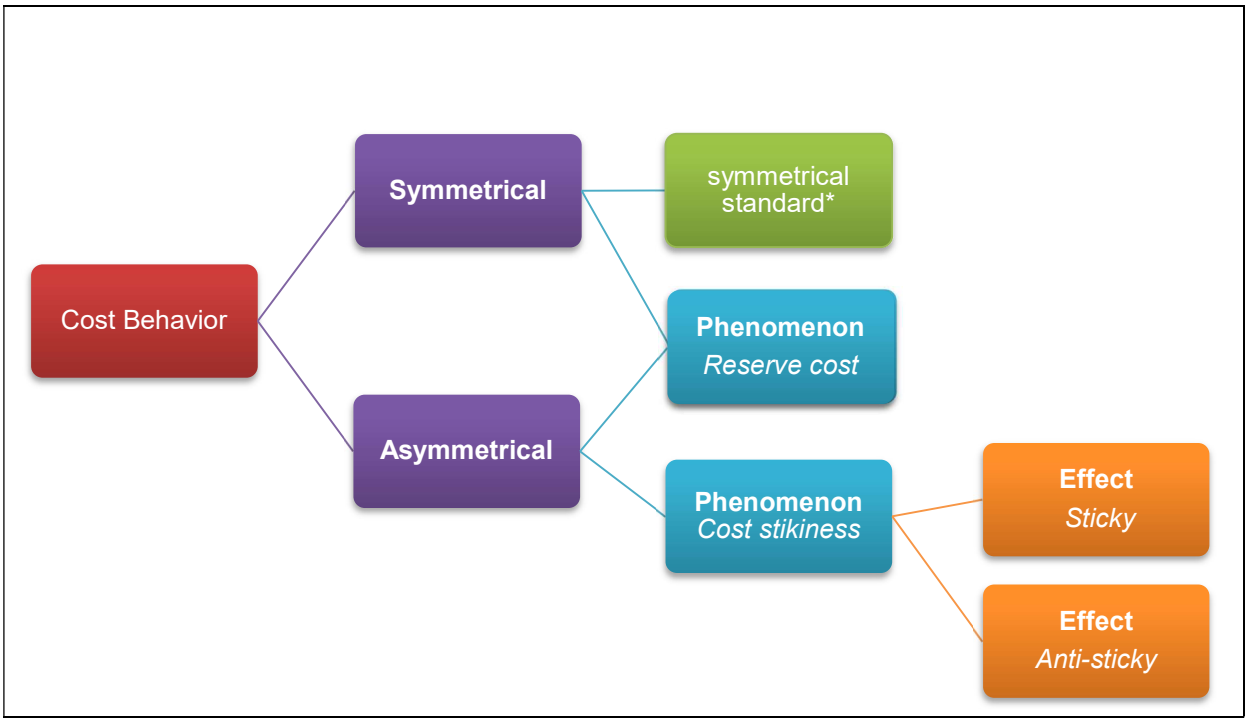

Figure 2. Contemporary classification of cost behavior
Source: Elaborated by the author (2022).
* Traditional accounting literature already recognizes this symmetry pattern as the symmetry pattern. It is not classified as a phenomenon.

According to the unification of concepts proposed here, the following updated characteristics are highlighted for each of the classifications presented in Figure 2:

- **Symmetric behavior:** The proportion of cost variations remains the same relative to revenue variations as the latter increase or decrease. The variations are symmetric with respect to the zero point and are called inverse symmetry (positive point x negative point).
- **Asymmetric behavior:** occurs when revenue increases or decreases. When revenues change, the proportion of cost variation also changes. Although there is no inverse symmetry, reflexive symmetry is allowed.
- **Reverse cost phenomenon:** cost variation decreases when revenue variation increases and is independent of the opposite symmetric point expected when revenue decreases.
- **The phenomenon cost stickiness:** the variation of costs increases when the variation of revenues increases, but it does not decrease to the same extent when revenues decrease.
- **Effect sticky:** the variation of costs increases when the variation of revenues increases, but it does not decrease to the same extent when revenues decrease.
- **Effect anti-sticky:** the change in cost increases when the change in revenue increases and decreases beyond the expected symmetric counterpoint when revenue decreases.

The concept of symmetry and asymmetry originated in mathematical science and has been used in accounting science to characterize cost behavior through similarity. In this sense, for the better understanding of the researchers and to facilitate the interpretations in the future research, the interpretations of each phenomenon and the implications of the cost behavior are explained below.

2.3 Interpretations of the contemporary classification of cost behavior

This research found that the concepts of symmetry and asymmetry in the cost behavior literature do not provide a deeper explanation that is more adaptable to different accounting contexts (public or private). Rohde (1997) notes that these concepts originated in mathematical science and that they are sometimes used piecemeal in other fields of knowledge, leading to misinterpretation and partial analysis, making generalization impossible. Therefore, with the aim of clarifying some unclear aspects so that they can be better interpreted in future research, this topic was developed considering the consolidated literature on the contemporary accounting approach to cost behavior and the previous literary contributions.

In mathematics, symmetry refers to a representation of corresponding parts that is subjected to a particular operation such that an invariant form is maintained and the transformation starts from a point, line, or axis that divides the representation into two symmetrical parts (Rohde, 1997). While the accounting literature on symmetric behavior assumes that the direction of cost variation follows the direction of revenue variation as the latter increases (which is typical of the origin of the approach: the private sector), the original literature on symmetry (mathematics) considers that direction and sense do not de-characterize symmetry, since its main aspect is isometry (the graphical representation is transformed, but the distances between points and the angles are preserved).

Rohde (1997) also presents several types of symmetry and explains that they all represent a mirror effect, but one should emphasize inverse symmetry (where symmetrical points point in the opposite direction, but if one draws an imaginary

straight line between them, the line follows the same direction) and reflective symmetry (which reflects exactly the same point, angle, in its shape, direction, or sense). For the purposes of symmetric cost behavior, symmetry is characterized as inverse whether or not the cost follows the direction of the revenue, because if you draw an imaginary straight line between the results of the cost variation, the points will be in opposite directions (positive and negative), even if the line follows the same direction (X or Y axis) where the central imaginary point is zero.

In studies that establish the symmetric behavior of costs, one must take into account the standard symmetry already consolidated in the accounting literature and the reverse symmetry, which is the opposite of the symmetry defined in the consolidated accounting literature, but whose effect was established by Fabre and Borgert (2022) in studies with a public sector sample. Thus, for the interpretation of cost behavior in accounting science, one should consider as symmetric those behaviors that lead to the representation of opposite symmetry points (called inverse symmetry in mathematics).

It should be noted that for the purposes of cost behavior, it is assumed that the fluctuations in revenues increase and decrease in the same proportion (1%), so the observation should refer to the fluctuations in costs. If the costs (periods 1 and 2) have the same proportion, the behavior is symmetric; if they do not have the same proportion, the behavior is asymmetric. Figure 3 illustrates for accounting purposes the possibilities of symmetric behavior of costs relative to revenues when the latter increase by 1% (period 1) or decreases by 1% (period 2) in each situation (note the values at the bottom of the graph).

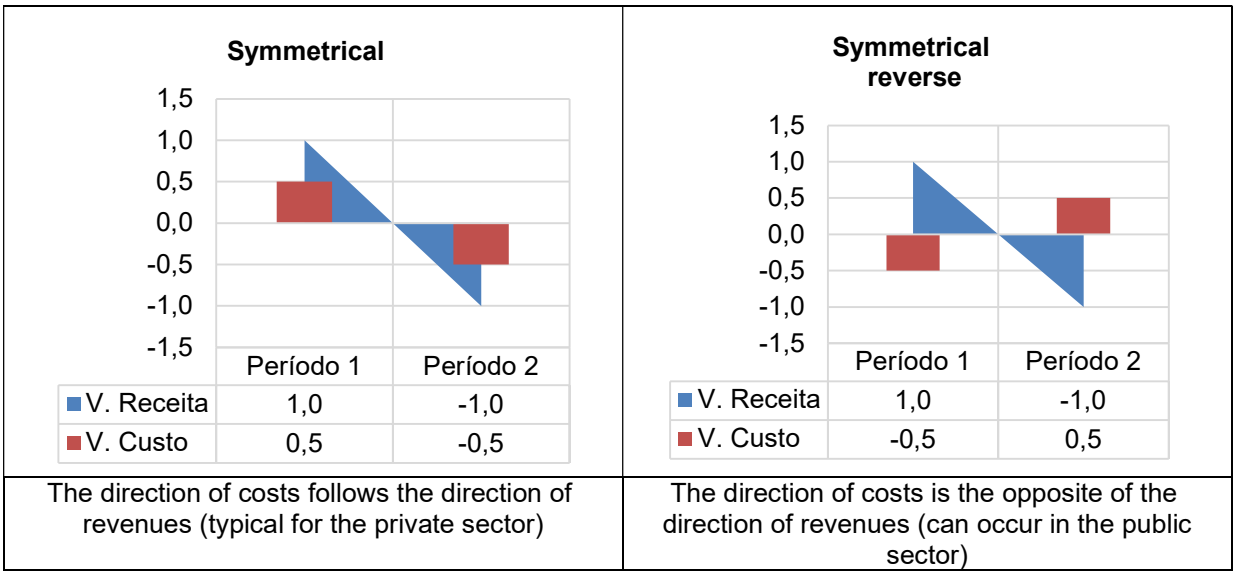

Figure 3. Example of a graphical representation of symmetric cost behavior
Source: Elaborated by the author (2022)

Both traditional and contemporary approaches to cost behavior in accounting assume that costs change in the same direction as revenues when the latter increase (which is mainly due to the origin of the approach, namely accounting practiced in the private sector, where costs are related to revenues because they are recorded simultaneously). Future research should observe symmetric behavior in its broadest sense (which corresponds to the origin of the term from mathematics). According to Fabre and Borgert (2022), costs cannot move in the same direction as revenues for reasons of management strategy or accounting standardization, which requires

independent recording of public costs and revenues. Thus, with respect to the symmetric behavior of costs, the standard phenomenon of accounting symmetry is considered when costs move in the same direction as revenues, while the opposite phenomenon is that in which costs move in the opposite direction of revenues.

In mathematical concept, asymmetry is the complete absence of symmetry (Rohde, 1997). In accounting, asymmetry can also be considered as the absence of symmetry in the contemporary cost approach, provided it is weighted as the absence of reverse symmetry (symmetrical points in opposite directions). It is worth noting that for accounting purposes, mirror symmetry can occur (reflecting the exact same point) and be considered asymmetric behavior. The reason for this is that the symmetrical points in accounting are represented by the variations in costs and revenues. So, if we consider a mirror symmetric cost variation (same value and same direction) relative to the inverse symmetric revenue variation (same value with opposite direction), both are mathematical results of symmetry, but for the purposes of accounting cost behavior, they do not represent a mirror effect (symmetric) and should be considered asymmetric behavior.

For accounting purposes, the diagrams in Figure 4 illustrate the possibilities of asymmetric behavior of costs relative to revenues. If the latter increase by 1% (period 1) or decrease by 1% (period 2) in each situation (note the values at the bottom of the graphs), the dotted box corresponds to the expected symmetric point.

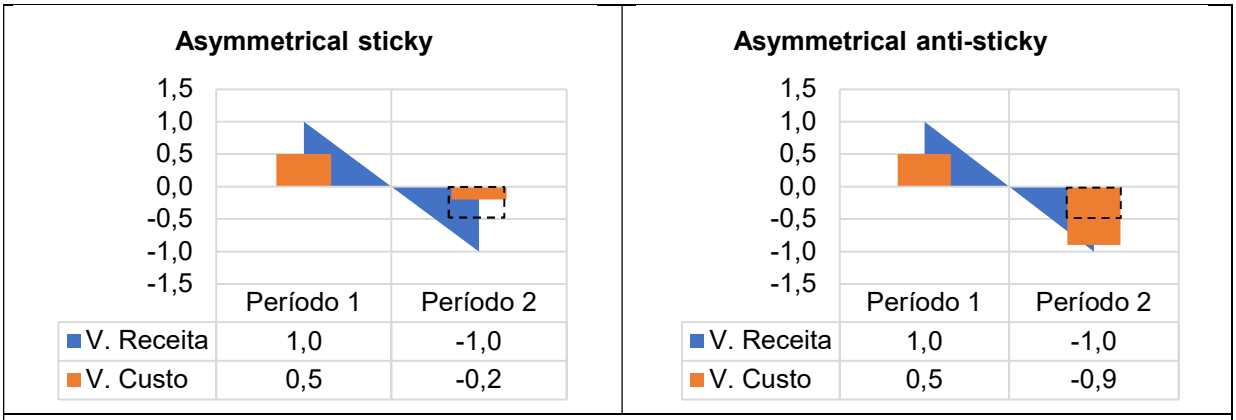

Figure 4. Example of a graphical representation of asymmetric cost behavior
Source: Elaborated by the author (2022).

The phenomena of asymmetric cost behavior (cost rigidity and reverse cost) are distinguished by the direction costs take when revenues rise (period 1). When the behavior is asymmetric and costs in period 1 fluctuate in the same direction as revenues, it is called cost rigidity. If costs in period 1 fluctuate in the opposite direction of revenues, this is called reverse cost rigidity.

In the case of asymmetric behavior and the phenomenon of cost stickiness, a further distinction is made into sticky or anti-sticky effects. These effects are distinguished by the direction that the cost (period 2) takes with respect to the symmetric point opposite that in period 1 (dashed box). If the outcome of the cost variation (period 2) is larger than the expected symmetric point, the effect is sticky (the cost is sticky); if the outcome is smaller, the effect is anti-sticky (the cost is sticky). If the costs in period 2 occupy only part of the dotted field (which is the expected symmetric point), they are sticky (they cannot be reduced to the expected symmetric point: sticky); if they exceed the dotted field, they are anti-sticky (they reduce beyond the expected symmetric point: sticky).

The values at the bottom of the diagrams in Figure 4 can be used to determine the degree of asymmetry: I) In the diagram Asymmetric Sticky: symmetric point compared to the expected (-0.5), point of occurred cost variation (-0.2), degree of asymmetry of 0.3 (the cost sticks, so it cannot decrease to the expected symmetric point, it is larger than the symmetric point); II) In the graph Asymmetric Anti-Sticky: expected symmetric point opposite (-0.5), point of cost variation occurred (-0.9), degree of asymmetry of -0.7 (the cost decreases beyond the expected value, therefore it decreases beyond the expected symmetric point, the value is smaller than the symmetric point); III) In the graph Asymmetric Reversal: what characterizes the reversal is the different direction of costs in relation to revenues (in period 1), regardless of the degree of asymmetry or symmetry found (in point 2), but in this example an asymmetry of 0.3 occurs (costs increase in a lower proportion than expected to characterize the symmetry).

CONCLUSION

The aim of this research was to clarify unclear aspects, to unify concepts and to present the new classification of cost behavior from the point of view of the contemporary accounting approach.

In this sense, it has provided the necessary explanations so that the reader knows the state of the art when it comes to cost behavior from the perspective of the contemporary accounting approach.

The literature review used to unify the concepts in this study covers research on cost behavior through the year 2022 and is therefore limited to results published during this time period It is hoped that new research can contribute even more to this topic, which is so relevant and still lacks depth, especially in relation to public sector samples.

To this end, it is important to standardize terminology, unify concepts, and direct research toward generalizing the topic to the entire field of accounting science, regardless of the industry used in the sample studied. The contemporary accounting approach to cost behavior is already consolidated in the literature, especially in terms of evidence of the phenomena, but there are still many research gaps, especially in terms of identifying the determinants and explaining the possible consequences of the identified behaviors, especially in the purely public sector.

Therefore, this study is an important reference for researchers who want to address the issue of cost behavior in modern accounting.

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