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Tax avoidance and persistence of cash flows: moderating role of firm life cycle

Agresividad fiscal y persistencia del flujo de caja: papel moderador del ciclo de vida organizacional

Agressividade tributária e persistência dos fluxos de caixa: papel moderador do ciclo de vida organizacional

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Abstract

Objective: This study aimed to analyze the effect of firm life cycle stages on the relationship between tax avoidance and cash flow persistence in the Brazilian context.

Methodology: A multiple linear regression model estimated using the Ordinary Least Squares (OLS) method was employed on a sample of 2,034 observations of Brazilian non-financial firms listed on the stock exchange. The firm life cycle analysis employed the model proposed by Dickinson (2011). Total and Permanent Book-Tax Differences (BTD) were used to measure tax avoidance.

Results: The results suggest that tax avoidance is positively related to cash flow persistence, with the growth stage strengthening this relationship, while the maturity and decline stages weaken it. These results highlight that permanent tax strategies are superior to temporary ones in terms of firms' ability to retain cash.

Contributions: This study contributes to the literature by highlighting that temporary and permanent tax reduction strategies present distinct results in terms of their ability to influence future cash flows. While previous research has documented that temporary differences harm earning persistence, this study demonstrated that permanent differences favor cash flow persistence. As a practical implication, the research is useful for investors, analysts, and other users of accounting information, who can appropriately utilize information on tax avoidance and business life cycle in their company valuation models.

Keywords: Tax avoidance; cash flow persistence; firm life cycle; quality of accounting information; Permanent Book Tax Differences.

Resumen

Objetivo: Este estudio tuvo como objetivo analizar el efecto de las etapas del ciclo de vida organizacional en la relación entre la agresividad fiscal y la persistencia del flujo de caja en el contexto brasileño.

Metodología: Se utilizó un modelo de regresión lineal múltiple estimado por el método de Mínimos Cuadrados Ordinarios (MCO) sobre una muestra de 2.034 observaciones de empresas brasileñas no financieras listadas en la bolsa de valores. Para analizar el ciclo de vida organizacional se utilizó el modelo propuesto por Dickinson (2011). Para medir la agresividad fiscal se utilizaron las *Book-Tax Differences* (BTD) Totales y Permanentes.

Resultados: Los resultados sugieren que la agresividad fiscal está relacionada positivamente con la persistencia de los flujos de caja, siendo la etapa de crecimiento (madurez y declive) la que potencia (mitigan) esta relación. Estos resultados resaltan que las estrategias fiscales permanentes son superiores a las temporales cuando se trata de la capacidad de retención de efectivo de las empresas.

Contribuciones: El estudio contribuye a la literatura al destacar que las estrategias de reducción de impuestos temporales y permanentes presentan resultados diferentes en términos de su capacidad para influir en los flujos de caja futuros. Si bien investigaciones anteriores han documentado que las diferencias temporales perjudican la persistencia de las ganancias, este

estudio demostró que las diferencias permanentes favorecen la persistencia del flujo de caja. Como implicación práctica, la investigación es útil para inversores, analistas y otros usuarios de información contable, que pueden utilizar adecuadamente la información sobre agresividad fiscal y ciclo de vida en sus modelos de valoración de empresas.

Palabras clave: Agresividad fiscal; persistencia de los flujos de caja; ciclo de vida organizacional; calidad de la información contable, BTD Permanente.

Resumo

Objetivo: Este estudo teve o objetivo de analisar o efeito dos estágios do ciclo de vida organizacional na relação entre agressividade tributária e persistência dos fluxos de caixa no contexto brasileiro.

Metodologia: Foi empregado um modelo de regressão linear múltipla estimado pelo método dos Mínimos Quadrados Ordinários (MQO) sobre uma amostra de 2.034 observações de empresas brasileiras não-financeiras listadas em bolsa. Para a análise do ciclo de vida organizacional, utilizou-se o modelo proposto por Dickinson (2011). Para a mensuração da agressividade tributária, utilizou-se as *Book-Tax Differences* (BTD) Total e Permanente.

Resultados: Os resultados sugerem que a agressividade tributária está positivamente relacionada com a persistência dos fluxos de caixa, sendo que o estágio do crescimento fortalece essa relação, enquanto os estágios de maturidade e declínio a enfraquecem. Esses resultados destacam que as estratégias tributárias permanentes são superiores às temporárias no que se refere à capacidade de retenção de caixa nas empresas.

Contribuições: O estudo contribui com a literatura ao destacar que estratégias temporárias e permanentes de redução de tributos apresentam resultados distintos em termos da capacidade de influenciar fluxos de caixa futuros. Enquanto pesquisas anteriores documentaram que diferenças temporárias prejudicam a persistência dos lucros, esta demonstrou que diferenças permanentes favorecem a persistência dos fluxos de caixa. Como implicação prática, a pesquisa é útil para investidores, analistas e demais usuários das informações contábeis, que podem utilizar apropriadamente as informações de agressividade tributária e ciclo de vida em seus modelos de avaliação de empresas.

Palavras-chave: Agressividade tributária; persistência dos fluxos de caixa; ciclo de vida organizacional; qualidade da informação contábil; BTD Permanente.

1 Introduction

Literature has examined the persistence of earnings based on their accrual and cash flow components, initially identifying that the portion of earnings attributable to cash flows is more persistent than the portion attributable to accruals (Sloan, 1996). Subsequent studies have suggested that the difference between the persistence of accruals and cash flows depends on other factors, such as time specificity (Francis & Smith, 2005) and special items (Dechow & Ge, 2006), thus relativizing Sloan's (1996) findings. In this sense, for example, Dechow and Ge (2006) demonstrated that earnings are more persistent than cash flows in companies with large positive accruals, and less persistent in companies with large negative accruals.

Reflecting the importance of cash flow persistence, the International Accounting Standards Board (IASB) emphasizes the predictive value of earnings with respect to the entity's future cash flows (Downes et al., 2019; Ball & Nikolaev, 2022). Estimating future cash flows

is especially relevant for companies' valuation using the discounted cash flow method, which highlights the importance of investigating its determinants.

One of the factors that may influence the predictive ability of accruals and cash flows regarding future cash flows is tax avoidance (Hanlon, 2005). The underlying rationale for this influence is that the pursuit of tax savings may be informative about managers' willingness to manipulate accruals and, consequently, future cash flows (Hanlon, 2005).

The relationship between tax avoidance and the quality of accounting information can be explained by Agency Theory, since discretionary managerial actions may affect accounting earnings without affecting taxable earnings, and vice versa (Fonseca & Costa, 2017). On the one hand, managers are motivated to report low taxable earnings to authorities in order to pay less tax; on the other hand, they are motivated to report high accounting earnings to shareholders in order to demonstrate strong organizational performance (Scholes et al., 1990).

The difference between accounting earning and taxable earning is referred to as Book-Tax Differences (BTD), which is one of the proxies for tax avoidance considered in the literature; the larger the BTD, the more aggressive the company is (Hanlon & Heitzman, 2010; Dunbar et al., 2010; Wang et al., 2020). One way of classifying BTDs refers to the reversibility of the items that generate these differences. According to this criterion, BTDs can be classified as permanent or temporary (Fonseca & Costa, 2017). Events (revenues or expenses) that cause permanent differences are not subject to reversal in subsequent periods. In contrast, temporary differences arise from divergences between accounting standards and tax legislation regarding the timing of recognition of an event, so that reversal is expected in future periods.

A stream of the literature has shown that tax avoidance has a detrimental effect on the quality of accounting information (Blaylock et al., 2012; Hanlon, 2005; Martinez & Passamani, 2014; Ferreira et al., 2012; Nakao, 2012; Brunozi Júnior et al., 2019; Martinez & Duarte, 2020; Morais & Macedo, 2021). In contrast to this stream, Furtado et al. (2016) found that higher levels of tax avoidance are associated with better accounting information quality, while Fonseca and Costa (2017) indicated that there is no relationship between the two.

In line with the predominant stream, studies such as Hanlon (2005), Blaylock et al. (2012), and Tang and Firth (2012) showed that the relationship between tax avoidance and earnings persistence is negative. Subsequently, Drake (2012) and Martinez and Bassetti (2016) incorporated Dickinson's (2011) firm life cycle stages as a moderating factor in this relationship.

However, it is still unclear in the literature how firm life cycle stages affect the relationship between tax avoidance and cash flow persistence. Studies such as Drake (2012) and Martinez and Bassetti (2016) analyzed only earnings persistence, leaving a gap regarding the effect of the life cycle on the relationship between tax avoidance and cash flow persistence. Within this context, this study addresses the following research question: **what is the effect of firm life cycle stages on the relationship between tax avoidance and cash flow persistence?** Thus, the objective of this study is to analyze the effect of firm life cycle stages on the relationship between tax avoidance and cash flow persistence in the Brazilian context.

The importance of predicting future cash flows is associated with its use in business valuation models (Dechow et al., 2010; Ball & Nikolaev, 2022). Thus, this research is relevant to investors, creditors, and analysts, as it justifies the inclusion of tax avoidance and life cycle stages in their valuation models, helping them to obtain more consistent results.

This study differs from previous studies in three main aspects. First, previous studies assessed the persistence of earnings but did not consider that of cash flows (Hanlon, 2005; Blaylock et al., 2012; Tang & Firth, 2012; Drake; 2012; Martinez & Bassetti, 2016). Second, the studies by Drake (2012) and Martinez and Bassetti (2016) used dichotomous variables as proxies for tax avoidance (high tax debt), while this research used continuous variables, which eliminates the need for the arbitrary adoption of cut-off limits (the point from which a Book-

Tax Differences (BTD) is considered "high"). Finally, previous studies that included the moderation of life cycle stages used only Total Book-Tax Differences (BTD) (Martinez & Bassetti, 2016) and Temporary BTD (Drake, 2012), while this study included the analysis of Permanent BTD, which adds another layer of knowledge to the topic.

In operational terms, non-financial Brazilian companies listed on the B3 were analyzed from 2011 to 2019, totaling 2,034 observations. To measure the predictive capacity of earnings on cash flows, the accruals-future cash flow association model, initially developed by Barth et al. (2001) and used in research such as Downes et al. (2019) and Ball and Nikolaev (2022), was used.

The results demonstrate that the growth phase intensifies the positive influence of tax avoidance on the persistence of cash flows, while the maturity and decline phases reduce this influence. Additionally, the study suggests that the moderating effect of the life cycle is sensitive to different proxies of tax avoidance, with different results identified for Total BTD and Permanent BTD.

These results present some relevant practical implications. From this study, valuation models based on discounted cash flow can be enriched with information on tax avoidance and the firm life cycle. These insights can be especially useful for investors, creditors, analysts, and other external users of accounting information, who should pay attention to the stage of the life cycle in order to appropriately use tax avoidance information in their business valuation models.

The results are also useful for tax managers, who can understand, in light of this study, that growing companies benefit from tax planning based on permanent differences, while mature and declining companies should be cautious, as the effect is limited.

2. Literature Review: Research Background and Hypotheses

Since taxes represent significant costs for companies, reducing the cash flows available for investments and shareholders, value creation through cash retention is one of the main motivations for tax avoidance (Chen et al., 2010; Wang et al., 2020). Thus, the pursuit of reducing a companies' tax burden is desirable from the shareholders' perspective and is implemented by managers through a diverse set of actions and strategies. The literature refers to this set of practices as tax avoidance, with BTD being one of the most widely used proxies (Santos et al., 2024).

Regarding the segregation between Permanent and Temporary BTDs, the international literature recognizes that tax avoidance may be related to both types (Wilson, 2009; Tang & Firth, 2011). However, the main tax planning strategies in the Brazilian context are associated with permanent differences, such as the tax amortization of goodwill, the triangulation of exports carried out to avoid the application of transfer pricing legislation, the lack of taxation on profits earned by foreign subsidiaries, and the exclusion of investment subsidies, among others (Zeca, 2021).Thus, this study used Permanent BTD as the primary proxy for tax avoidance. Specifically, the proxies Permanent BTD and Total BTD were employed, the latter to increase comparability with previous studies.

Previous studies have analyzed the relationship between BTD and the quality of accounting information. Hanlon (2005) demonstrated that large absolute values of Temporary BTD were associated with less persistent earnings than the earnings of companies with small Temporary BTD. Tang and Firth (2012) separated BTD into its Normal and Abnormal components and found that companies with high absolute values of NBTD and ABTD exhibited lower earning persistence. Blaylock et al. (2012) documented that large Temporary BTDs exhibit lower persistence of earnings and accruals. The authors also demonstrated that large Temporary BTD carried incremental information for earning persistence, relative to the magnitude of accruals. By excluding Permanent BTD, the studies by Hanlon (2005) and

Blaylock et al. (2012) examined only corporate strategies aimed at the mere postponement of taxes.

Dickinson (2011) established five possible stages in the business life cycle: introduction, growth, maturity, shake-out, and decline. Classification into each stage depends on the signs of the cash flow components of each observation. Drake (2012) used Dickinson's (2011) model to adapt Hanlon's (2005) study and analyze the interaction between Temporary BTD and the life cycle stages. In general, Drake (2012) concluded that the life cycle stages partially explained the relationship between Temporary BTD and earning persistence. Theoretically, Drake (2012) argued that the Business Life Cycle Theory explains how businesses grow, mature, and decline, which differs from the product life cycle, which focuses on how products are received by the market. Regarding the business life cycle, the author argued that it directly impacts the strategies adopted throughout its stages. Thus, it is understood that tax expenditure reduction strategies are also affected by the stages of the business life cycle.

In the Brazilian context, Martinez and Bassetti (2016) followed Drake (2012) and adapted Hanlon's (2005) model to assess the effects of the stages of the business life cycle on the relationship between BTDs and earning persistence. The results of Martinez and Bassetti (2016) indicated a positive relationship between low absolute values of BTD and earning persistence, corroborating, in this respect, the study by Hanlon (2005).

Regarding life cycle stages, Martinez and Bassetti (2016) documented that, for companies in the introduction and shake-out stages, there was a smaller positive effect of current earning on future earnings, that is, lower earning persistence; and that, for companies in the growth stage, there was a greater positive effect of current earning on future earnings. However, Martinez and Bassetti (2016) did not test the effects of the interaction between BTD and life cycle stages and obtained non-significant results for the interaction between BTD and current-period earnings.

In this study, however, the introduction and growth stages were combined into a single category, as were the shake-out and decline stages, so that only three stages were considered: growth, maturity, and decline. The criteria for classifying firm-year observations into each stage are presented in Table 1.

Table 1

Life cycle stages based on cash flow components.

	Growth		**Maturity**	**Decline**				
Operational	-	+	+	-	+	+	-	-
Investment	-	-	-	-	+	+	+	+
Financing	+	+	-	-	+	-	+	-

Source: *adapted from Dickinson (2011).*

The choice to consider only three of the five stages proposed by Dickinson (2011) stems from the understanding of previous research that indicated the low number of companies that fall into the birth and turbulence stages (Faff et al., 2016; Flavin & O'Connor, 2017). Such research indicated a high concentration of companies in the intermediate stages of the life cycles. Therefore, following this trend, the introduction stage was grouped with growth and the turbulence stage was grouped with decline.

Considering the Life Cycle Theory, it is understood that different phases will affect how companies use their tax avoidance strategies and their consequent impact on the persistence of cash flows. Thus, it is understood that in the growth phase, aggressive fiscal behavior is motivated by the need to retain cash in the company, in such a way that, by carrying out tax planning, companies can exercise greater control over their tax expenses, which can improve the persistence of their cash flows (Wang et al., 2020). In addition, to meet their cash needs for

investments (Dickinson, 2011), companies in the growth phase may adopt more aggressive tax practices.

Additionally, based on the arguments of Almeida and Kale (2024), companies in the growth stage face less uncertainty due to a stronger market position compared to companies in the decline stage. Moreover, in the growth stage, companies have greater technical knowledge among their personnel, presenting a more capable and skilled workforce to deal with such uncertainties. Taken together, more refined technical knowledge and reduced market uncertainties contribute to tax planning and its consequent beneficial role in terms of more reliable forecasts that will translate into future cash flows. Based on the aforementioned arguments, the first research hypothesis was established:

H_1: The growth stage positively moderates the relationship between tax avoidance and cash flow persistence.

Regarding maturity, Dickinson (2011) argues that this stage is characterized by maximum operational efficiency, which implies positive operating cash flows and, due to new investments essential to compensate for obsolete initial investments, by negative investment cash flows. Finally, due to the shift in focus of these companies to minimize debt, instead of leveraging, the financing flow is also characterized by being negative. Given this configuration, it is understood that companies in maturity have already exhausted the expected net present value of their investments, in such a way that they have fewer opportunities in their projects.

Thus, the characteristics of maturity support the understanding that operating cash will be sufficient to meet the needs of investment and financing cash flows, so that the additional cash resulting from tax planning strategies has less relevance for the persistence of cash flows. Based on these arguments, the second research hypothesis was established:

H_2: The maturity stage negatively moderates the relationship between tax avoidance and cash flow persistence.

Finally, the decline stage is characterized by companies' propensity to liquidate their assets as a way to pay off debts and finance operations, which leads to a positive investment cash flow (Dickinson, 2011). Therefore, tax strategies will not be as relevant in generating cash compared to other phases, and especially the growth phase. Furthermore, according to Almeida and Kale (2024), companies in the decline stage face even greater business uncertainty, which hinders the potential of additional cash generated by tax planning to improve the persistence of cash flows. Based on these arguments, the third research hypothesis was established:

H_3: The decline stage negatively moderates the relationship between tax avoidance and cash flow persistence.

3. Methodological procedures

3.1 Sample

Information on Brazilian non-financial publicly traded companies was collected from the Refinitiv Eikon database for the period 2011 to 2019. The initial period for data collection was defined as the year following the mandatory adoption of International Financial Reporting Standards (IFRS). The exclusion of the initial year (2010) is justified by the biases that could arise from the special rules relating to initial adoption, such as the deemed cost. Observations from companies that did not contain the necessary information for calculating the essential

variables for the research were excluded. Thus, the unbalanced sample consisted of 2,034 observations, as shown in Table 2.

Table 2
Sample by sector and period

Sector	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Consumer staples	15	15	18	18	20	20	19	21	22	168
Consumer discretionary	48	49	49	50	52	53	57	62	63	483
Energy	7	7	7	7	6	6	7	7	8	62
Real estate	13	12	13	14	15	15	16	18	20	136
Industrial	35	34	34	34	35	37	38	45	49	341
Materials	23	21	21	22	20	20	22	25	23	197
Other	7	8	10	11	14	15	17	16	18	116
Health care	6	7	7	7	11	12	13	13	17	93
Communication services	5	5	5	5	5	5	5	7	9	51
Information technology	4	4	4	4	5	6	8	11	13	59
Utilities	34	34	36	36	36	37	38	39	38	328
Total	**197**	**196**	**204**	**208**	**219**	**226**	**240**	**264**	**280**	**2,034**

Note: Sectors classified according to the two-digit Global Industry Classification Standard (GICS).
Source: *research data*.

3.2 Variables of tax avoidance

To measure tax avoidance, two metrics were used: Total BTD and Permanent BTD, calculated as shown in Table 3. It should be noted that Temporary BTD was calculated only as a stage in the calculation of Permanent BTD, and was not used in the operationalized models. This is because the main tax planning strategies in Brazil involve only permanent differences (Zeca, 2021). The calculation strategy considered that taxable earning is not directly observable, being estimated by dividing the expense with income tax and social contribution on net profit by the combined nominal rate of these two taxes (34%).

Table 3
Variables of tax avoidance

Variable / Definition		Formula	Source	Authors
BTD	*Total Book-Tax Differences*	$\frac{EBT_{it} - \frac{Current\ IT_{it}}{34\%}}{Total\ Assets_{it}}$	*Refinitiv Eikon*	Dunbar et al. (2010), Hanlon e Heitzman (2010); Martinez e Bassetti (2016); Fonseca e Costa (2017)
TBTD	*Temporary Book-Tax Differences*	$\frac{\frac{Deferred\ IT_{it}}{34\%}}{Total\ Assets_{it}}$	*Refinitiv Eikon*	Dunbar et al. (2010), Hanlon e Heitzman (2010); Fonseca e Costa (2017)
PBTD	*Permanent Book-Tax Differences*	$BTD\text{-}TBTD$	*Refinitiv Eikon*	Dunbar et al. (2010); Hanlon e Heitzman (2010); Fonseca e Costa (2017)

Note: EBT: Earning before income tax; Current IT = current expense with income tax and social contribution on net profit; Deferred IT = deferred expense with income tax and social contribution on net profit.
Source: *research data.*

3.3 Persistence of cash flows

The cash flow persistence model is derived from the disaggregation of earnings into cash flows and accruals (Lev et al., 2010). This model has been used in previous research as a measure of earnings quality (Barth et al., 2001; Dechow & Dichev, 2002; Downes et al., 2019). The premise is to predict future cash flows based on the net earnings for the period, which is simply the sum of the cash and accruals components, as shown in Equation 1.

$$CFO_{it+1} = \beta_0 + \beta_1 CFO_{it} + \beta_2 ACC_{it} + \beta_3 CAPEX_{it} + \gamma_s + \gamma_t + \varepsilon_{it+1} \quad (1)$$

Where CFO_{t+1} represents the operating cash flow in period t+1; CFO_t represents the operating cash flow in period t; ACC_t represents the total accrual in period t, measured by the sum of operating accrual (change in working capital) and non-operating accrual (net earnings before extraordinary items less current period cash flow less change in working capital); $CAPEX_{it}$ represents capital expenditure; γ_s and γ_t represent the control for sector and year fixed effects; and ε_{t+1} represents the regression residual.

The inclusion of the $CAPEX_{it}$ variable serves as a control for the fact that current investments impact future cash flows (Lev et al., 2010; Downes et al., 2019). All variables were scaled by the average total assets. It is expected that both accruals and present cash flows will have significant explanatory power over future cash flows, in line with the studies by Downes et al. (2019) and Ball and Nikolaev (2022).

3.4 Data analysis technique

Initially, future cash flow was regressed against PBTD and BTD, in addition to the other variables that make up the cash flow persistence model (CFO_{it}, ACC_{it}, and $CAPEX_{it}$), as shown in Equation 2. Subsequently, the interaction terms between tax avoidance and earning components were inserted, as shown in Equation 3.

$$CFO_{it+1} = \beta_0 + \beta_1 CFO_{it} + \beta_2 ACC_{it} + \beta_3 CAPEX_{it} + \beta_4 TA_{it} + \gamma_s + \gamma_t + \varepsilon_{it+1} \quad (2)$$

$$CFO_{it+1} = \beta_0 + \beta_1 CFO_{it} + \beta_2 ACC_{it} + \beta_3 CAPEX_{it} + \beta_4 TA_{it} + \beta_5 CFO_{it} * TA_{it} + \beta_6 ACC_{it} * TA_{it} + \gamma_s + \gamma_t + \varepsilon_{it+1} \quad (3)$$

In Equations 2 and 3, TA_{it} represents the tax avoidance measures, $PBTD_{it}$ or BTD_{it}, as appropriate. The other variables follow the definition of Equation 1.

Finally, the research hypotheses were tested using six models estimated by the Ordinary Least Squares (OLS) method containing the interactions between the life cycle stages, the tax avoidance measures and the earning components of the current period, as per Equation 4.

$$CFO_{it+1} = \beta_0 + \beta_1 CFO_{it} + \beta_2 ACC_{it} + \beta_3 CAPEX_{it} + \beta_4 TA_{it} + \beta_5 CFO_{it} * TA_{it} + \beta_6 ACC_{it} * TA_{it} + \beta_7 LC_{it} + \beta_8 LC_{it} * CFO_{it} + \beta_9 LC_{it} * ACC_{it} + \beta_{10} TA_{it} * LC_{it} + \beta_{11} CFO_{it} * TA_{it} * LC_{it} + \beta_{12} ACC_{it} * TA_{it} * LC_{it} + \gamma_s + \gamma_t + \varepsilon_{it+1} \quad (4)$$

In Equation 4, LC_{it} refers to the life cycle stages: growth ($GROWTH_{it}$), maturity ($MATUR_{it}$), or decline ($DECLI_{it}$), measured by dummy variables that indicate whether the company is in the aforementioned life cycle stage in the year of observation. The other variables follow the definitions of Equations 1, 2, and 3. The three variables indicative of the life cycle stage were entered into the model separately. The combination with the two tax avoidance metrics resulted in the six models presented in Table 7.

A positive and significant β_{11} coefficient indicates that the studied life cycle stage enhances the effect of tax avoidance on the ability of present cash flow to predict future cash flow. Similarly, a positive and significant β_{12} coefficient indicates that the studied life cycle stage enhances the effect of tax avoidance on the ability of accruals to predict future cash flow.

All continuous variables were winsorized to 1% at their extremes before the regressions were performed. All regressions were performed using the OLS method with robust standard errors clustered by firm to minimize the effects of heteroscedasticity of the residuals. Furthermore, it was observed that the other assumptions of the OLS model were also met in all regressions. In this sense, according to the Central Limit Theorem, the sample size allows the assumption of normality of the residuals, and no problems of multicollinearity (Variance Inflation Factor [VIF] below 10) or serial autocorrelation of the residuals (Durbin-Watson [DW] statistic close to 2.2) were identified.

4. Analysis and discussion of the results

The descriptive statistics of the sample variables are presented first (Table 4), followed by the correlation matrix (Table 5). The regression analysis is initially presented using the cash flow persistence model, which includes tax avoidance (Table 6). Finally, the regression results are presented, indicating the moderating effect of life cycle stages on the relationship between tax avoidance and cash flow persistence (Table 7).

Table 4

Descriptive statistics (N = 2,034)

Variable	Mean	SD	Min	Q1	Median	Q3	Max
CFO_{it+1}	0.0773	0.0996	-0.7836	0.0268	0.0728	0.1284	0.7600
CFO_{it}	0.0667	0.0840	-0.9792	0.0237	0.0654	0.1137	0.3595
ACC_{it}	-0.0441	0.1079	-0.7551	-0.0827	-0.0391	0.0046	0.3835
$CAPEX_{it}$	0.0361	0.0399	0	0.0051	0.0245	0.0517	0.1878
BTD_{it}	-0.0030	0.0966	-0.4600	-0.0092	0.0105	0.0320	0.2682
$PBTD_{it}$	-0.0010	0.1173	-0.5422	-0.0208	0.0118	0.0455	0.3755

Note: SD denotes standard deviation; Min denotes minimum values; Q1 denotes the first quartile; Q3 denotes the third quartile; Max denotes maximum values.
Source: *survey data*.

CFO_{it+1} and CFO_{it} have positive mean values close to their median, which means that extreme values were controlled by the winsorization method. The mean values also approximate those evidenced by Downes et al. (2019) in companies from the European Union and those observed by Ball and Nikolaev (2022) and Nallareddy et al. (2020) in American companies. In addition, the values of the first quartile are positive, which means that more than 75% of the companies in the sample have positive operating cash flow, although there are companies with negative operating cash flows, which may indicate companies in financial difficulty and that will possibly compose the decline life cycle stage.

Regarding the mean value of accruals, it is observed that it is negative, as expected, since this measure includes several adjustments that, by their nature, reduce earnings, such as depreciation, amortization, asset write-offs, and other charges (Downes et al., 2019). Regarding the measures of tax avoidance, it is noticeable that BTD and PBTD have negative means and positive medians, indicating the persistence of negative extreme values, even after winsorization, although most observations show positive values.

This situation indicates that BTD is, on mean, negative in the Brazilian context, in line with the values observed in China and in contrast to those in the United States of America (Tang & Firth, 2011). Additionally, it is observed that the BTD and PBTD values show high variability

and amplitude, in line with what has been observed in previous studies (Fonseca & Costa, 2017; Tang & Firth, 2011), which corroborates the view that the phenomenon of tax avoidance has multiple determinants (Wang et al., 2020), making multivariate analysis essential for its better understanding.

Table 5 presents the Spearman (above the diagonal) and Pearson (below the diagonal) correlation matrices.

Table 5
Correlation matrices

Variables	CFO_{it+1}	CFO_{it}	ACC_{it}	$CAPEX_{it}$	BTD_{it}	$PBTD_{it}$
CFO_{it+1}	1	0,56*	-0,12*	0,25*	0,30*	0,19*
CFO_{it}	0,49*	1	-0,47*	0,25*	0,29*	0,20*
ACC_{it}	-0,07*	-0,38*	1	-0,10*	0,44*	0,31*
$CAPEX_{it}$	0,21*	0,21*	-0,05	1	0,06*	0,09*
BTD_{it}	0,19*	0,25*	0,67*	0,09*	1	0,80*
$PBTD_{it}$	0,15*	0,18*	0,54*	0,08*	0,92*	1

Note: *Indicates statistical significance at 1%.
Source: *research data*.

Table 5 indicates that the correlation between present cash flow (CFO_{it}) and future cash flow (CFO_{it+1}) has a coefficient of 0.49 for Pearson's correlation and 0.56 for Spearman's correlation, which means that present cash flow has a moderate correlation with subsequent cash flow. Regarding the negative correlation between ACC_{it} and CFO_{it+1}, although a positive relationship was expected, the univariate correlation analysis between current accruals and future cash flows can suffer from the so-called "confounding effect" of present cash flows (Dechow & Dichev, 2002). Thus, since present cash flows are not controlled in this type of analysis, their negative effect (negative correlation between present accruals and present cash flows) can contaminate the correlation coefficient between present accruals and future cash flow.

Regarding measures of tax avoidance, it is observed that both are positively correlated with earning components (accruals and cash flows), which may be a preliminary indication that avoidance contributes to the predictive power of these components.

Table 6 presents, in its column 1, the result of the regression of the basic cash flow persistence model (Barth et al., 2001; Lev et al., 2010; Downes et al., 2019). In the other columns, Table 6 presents the models that incorporate tax avoidance into the analysis (Hanlon, 2005; Blaylock et al., 2012), with columns 2 and 4 presenting the models that included the tax base, while columns 3 and 5 present the models that included the tax base.

Table 6
Relationship between tax avoidance and cash flow persistence

	Equation 1	*Equation 2*		*Equation 3*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Intercept	0.0553***	0.0534***	0.0547***	0.0369***	0.0401***
	(4.18)	(3.83)	(4.06)	(2.99)	(3.41)
CFO_{it}	0.5776***	0.6754***	0.5997***	0.7523***	0.6968***
	(10.99)	(10.46)	(10.47)	(14.07)	(15.46)
ACC_{it}	0.1140***	0.2289***	0.1409***	0.2841***	0.2268***
	(4.23)	(4.75)	(4.52)	(5.61)	(5.41)
$CAPEX_{it}$	0.2374***	0.2404***	0.2395***	0.2452***	0.2416***
	(3.60)	(3.72)	(3.67)	(4.13)	(4.05)
BTD_{it}		-0.1428***		-0.1413***	
		(-3.05)		(-2.77)	
$CFO_{it}*BTD_{it}$				1.4469***	

				(8.51)	
$ACC_{it}*BTD_{it}$				0.4318***	
				(3.01)	
$PBTD_{it}$			-0.0343		-0.0588*
			(-1.37)		(-1.89)
$CFO_{it}*PBTD_{it}$					1.2660***
					(6.75)
$ACC_{it}*PBTD_{it}$					0.4238***
					(3.23)
Adjusted R^2	23.58%	23.86%	23.43%	27.16%	26.95%
Maximum VIF	1.31	4.40	2.21	4.67	2.70
DW	1.97	1.97	1.97	1.98	1.98
N	2,034	2,034	2,034	2,034	2,034

Note: t-statistic in parentheses; *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors clustered by firm; R^2 represents the coefficient of determination; VIF represents Variance Inflation Factor; DW represents Durbin-Watson; N represents the number of firm-year observations; to minimize the influence of outliers, all continuous variables were winsorized at 1% at their extremes.
Source: *research data*.

The results in column 1 of Table 6 were consistent with the expected signs for the CFO_{it} and ACC_{it} coefficients, as both coefficients were positive and significant at the 1% level, demonstrating that both accruals and cash flow from operating activities explain a portion of the subsequent period's cash flow. These results suggest that the companies in the sample, on mean, have good quality earnings and accruals in terms of their ability to predict future cash flows, in line with the findings of Downes et al. (2019) and Nallareddy et al. (2020). Furthermore, the coefficients confirm what has been highlighted in previous literature, that current cash flows have greater power in explaining future cash flows than the accruals component (Downes et al., 2019).

Regarding column 2, the negative coefficient of the BTD_{it} variable suggests that tax avoidance is associated with lower cash flow in the subsequent period, consistent with the findings of Hanlon (2005) and Tang and Firth (2012). This association was not significant for $PBTD_{it}$ (column 3), indicating that temporary differences, which are considered in the calculation of Total BTD_{it}, are more relevant than permanent differences in terms of the direct effect on future cash flows. Considering that the $PBTD_{it}$ variable is more appropriate for measuring tax avoidance, as it is less likely to be contaminated with differences arising from mere misalignment of accounting and tax standards, the lack of significance for $PBTD_{it}$ may indicate that aggressive tax strategies do not have a direct relationship with the cash flow of the subsequent period.

Regarding columns 4 and 5, it can be observed that the interaction coefficients are positive and significant, both for BTD_{it} and for $PBTD_{it}$. More specifically, the positive coefficients of the $CFO_{it}xPBTD_{it}$ and $ACC_{it}xPBTD_{it}$ interactions suggest that tax avoidance increases the predictive capacity of earnings on the cash flow of the subsequent period, contrary to the findings of Hanlon (2005) and Blaylock et al. (2012).

A possible explanation for the contrasting result with the international literature can be found in the tax avoidance metric used. This is because while previous studies used Temporary BTD, this study uses Total BTD and Permanent BTD. Manipulations of taxable earnings that create permanent differences reduce the tax expense of the current period without providing opportunities for reversals in the following period. This type of cash retention, of a permanent nature, results in a more persistent cash flow, justifying the positive coefficients of the interactions.

It should also be noted that the coefficients of $CFO_{it}xBTD_{it}$, $ACC_{it}xBTD_{it}$, $CFO_{it}xPBTD_{it}$, and $ACC_{it}xPBTD_{it}$ (columns 4 and 5 of Table 6) are higher than the results of

Martinez and Bassetti (2016), who found no significance for the relationship between BTD and earnings persistence.

Table 7 presents the results of the regressions that tested the moderating role of the firm life cycle stages. The results in Table 7 indicate that the coefficients of CFO_{it}, ACC_{it}, TA_{it}, and the interactions $CFO_{it}xTA_{it}$ and $ACC_{it}xTA_{it}$ are significant and positive, in line with those in Table 6, corroborating that tax avoidance increases the ability of accruals and present cash flow to explain future cash flow, regardless of the stage of the life cycle in which the company is located.

Regarding the growth stage, Table 7 indicates that the coefficient of the triple interaction $CFO_{it}xPBTD_{it}xGROWTH_{it}$ is positive and significant (0.7681 – column 2). Considering that the $CFO_{it}xPBTD_{it}$ coefficient is also positive, this suggests that in companies in the growth stage, tax avoidance enhances the positive effect of current cash flow on future cash flow. However, this effect is not observed in the relationship between accruals and future cash flow. Similarly, the moderating effect of the growth stage is also not observed for BTD (column 1)..

Table 7

The moderating role of firm life cycle stages in the relationship between tax avoidance and future cash flows.

	Equation 4					
	GROWTH		*MATUR*		*DECLI*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	BTD	*PBTD*	*BTD*	*PBTD*	*BTD*	*PBTD*
Intercept	0.0369***	0.0391***	0.0363***	0.0391***	0.0361***	0.0397***
	(2.75)	(3.10)	(2.78)	(3.28)	(2.67)	(3.00)
CFO_{it}	0.7246***	0.6843***	0.7288***	0.6764***	0.7829***	0.7252***
	(12.33)	(12.71)	(6.78)	(8.16)	(14.96)	(15.37)
ACC_{it}	0.2796***	0.2361***	0.2070***	0.1436***	0.3312***	0.2715***
	(4.73)	(4.71)	(2.68)	(2.67)	(6.11)	(5.85)
$CAPEX_{it}$	0.2320***	0.2276***	0.2413***	0.2332***	0.2454***	0.2444***
	(3.66)	(3.60)	(3.90)	(3.87)	(4.18)	(4.12)
TA_{it}	-0.1219**	-0.0584*	-0.1114	-0.0107	-0.1676***	-0.0798**
	(-2.50)	(-1.92)	(-1.28)	(-0.23)	(-3.19)	(-2.32)
$CFO_{it}*TA_{it}$	1.3078***	1.0515***	1.5408***	1.6334***	1.4663***	1.2183***
	(4.82)	(3.98)	(5.68)	(5.63)	(8.07)	(5.49)
$ACC_{it}*TA_{it}$	0.4068***	0.3770***	0.3320*	0.3450**	0.5330***	0.5140***
	(2.89)	(2.85)	(1.81)	(1.98)	(2.79)	(3.20)
LC_{it}	-0.0051	-0.0054	0.0068	0.0062	0.0042	0.0029
	(-0.73)	(-0.79)	(1.04)	(0.99)	(0.53)	(0.36)
$LC_{it}*CFO_{it}$	0.1067	0.0554	0.0359	0.0563	-0.2031	-0.1655
	(0.94)	(0.57)	(0.31)	(0.60)	(-0.93)	(-0.90)
$LC_{it}*ACC_{it}$	0.0336	-0.0186	0.1916*	0.2068***	-0.2619**	-0.2526***
	(0.31)	(-0.21)	(1.83)	(2.61)	(-2.39)	(-3.06)
$TA_{it}*LC_{it}$	-0.0645	0.0421	-0.0054	-0.0384	0.1605	0.1264*
	(-0.49)	(0.72)	(-0.06)	(-0.59)	(1.59)	(1.81)
$CFO_{it}*TA_{it}*LC_{it}$	0.4369	0.7681*	-0.7735	-1.1553**	0.0368	0.6185
	(0.91)	(1.81)	(-1.54)	(-2.53)	(0.09)	(1.07)
$ACC_{it}*TA_{it}*LC_{it}$	0.3207	0.5461	0.2210	0.1414	-0.4481*	-0.4974**
	(0.55)	(1.27)	(0.75)	(0.52)	(-1.76)	(-2.36)
Adjusted R^2	26.07%	26.11%	26.40%	26.69%	26.23%	26.42%
Maximum VIF	6.69	3.87	9.68	5.60	8.41	5.03
DW	1.98	1.98	1.98	1.99	1.97	1.97
N	2,034	2,034	2,034	2,034	2,034	2,034

Notes: t-statistic in parentheses; *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively; LC represents the stage of the firm life cycle: GROWTH (growth), MATUR (maturity), or DECLI (decline), as appropriate; TA represents tax avoidance: BTD or PBTD, as appropriate; robust standard errors clustered by firm; R^2 represents the coefficient of determination; VIF represents Variance Inflation Factor; DW

represents Durbin Watson; N represents the number of firm-year observations; to minimize the influence of outliers, all continuous variables were truncated at 1% at their extremes.
Source: *research data*.

Taken together, these findings allow us not to reject hypothesis H_1 and indicate that, for companies in the growth stage, tax avoidance contributes in a differentiated way to the persistence of cash flows. This can be explained based on the argument of Wang et al. (2020), who contend that aggressive behavior in tax matters is motivated by the need to retain cash within the company. Indeed, by engaging in tax planning activities, the firm gains greater control over its tax expense—typically substantial—and can use this control to enhance the persistence of cash flows.

Moreover, companies in the growth stage have a greater need for cash to finance investments (Dickinson, 2011), which justifies this additional effect of tax avoidance at this stage of the life cycle. It is worth noting that this effect is not significant when Total BTD is used, which also incorporates temporary differences in its calculation. This suggests that the mere misalignment between accounting and tax rules does not explain an additional effect of book-tax differences on the persistence of cash flows for companies in the growth stage.

Regarding the maturity stage, Table 7 shows that the coefficient of the triple interaction $CFO_{it}xPBTD_{it}xMATUR_{it}$ is negative and significant (−1.1553 – column 4). Considering that the coefficient of $CFO_{it}xPBTD_{it}$ is positive, it can be observed that the maturity stage mitigates the effect of tax avoidance on the persistence of cash flows. Thus, it can be concluded that, for more tax-aggressive companies, the persistence of cash flows is adversely affected by being in the maturity stage of the life cycle.

According to Dickinson (2011), the maturity stage is characterized by positive operating cash flow, due to the achievement of maximum operational efficiency; negative investing cash flow, due to new investments required to offset the obsolescence of initial investments; and negative financing cash flow, due to a shift in focus toward debt reduction. By definition, mature companies have already exhausted the expected net present value of their projects and therefore have fewer investment opportunities.

Under these conditions, mature companies either begin to reduce their long-term debt or invest more than necessary in suboptimal projects. In this sense, the results in column 4 are consistent with situations in which project maturity generates sufficient operating cash flow to meet the cash needs arising from negative investment and financing flows, so that the additional cash generated through tax planning becomes less relevant for predicting future cash flow.

Once again, it should be emphasized that this effect was not observed for Total BTD, possibly because it is contaminated by temporary differences, which are associated with mere misalignment between accounting standards and tax legislation. Nevertheless, we conclude that H_2 is not rejected, given that the maturity stage was found to be associated with a smaller effect of tax avoidance on cash flow persistence.

Regarding the decline stage, Table 7 shows that, unlike what occurred in the other two stages, the coefficient of the triple interaction $CFO_{it}xPBTD_{it}xDECLI_{it}$ was not significant (column 6), indicating that, for companies in the decline stage, Permanent BTD does not play any moderating role in the relationship between current-period cash flow and subsequent-period cash flow. However, the coefficient of the triple interaction $ACC_{it}xTA_{it}xDECLI_{it}$ was negative and significant for both measures of tax avoidance (columns 5 and 6).

In the decline stage, companies face various uncertainties regarding the continuity of their operations, which may directly impact accounting estimates. Additionally, companies in decline are characterized by positive investment cash flow, as they are more likely to liquidate assets to meet debt obligations and finance their operations (Dickinson, 2011). Taken together, these two factors reduce the predictive potential of accruals (Almeida & Kale, 2024), which can be observed in the negative and significant coefficient of $LC_{it}xACC_{it}$. In this context, tax

avoidance is less relevant for cash retention compared to companies in the growth stage. Thus, it is observed that the decline stage mitigates the positive effect of tax avoidance on the ability of current accruals to explain future cash flows. Therefore, it is concluded that hypothesis H_3 cannot be rejected.

Among the life cycle stages that impact the relationship between tax avoidance and cash flow persistence, it is noteworthy that the earnings component most affected was current cash flow rather than accruals. Of the three significant results of stage moderation, two relate to the predictive power of cash flows and only one to accruals. This result is consistent with Dickinson (2011), who argues that different firm life cycle stages may differently affect cash flow patterns due to the strategic activities undertaken by companies. Thus, when analyzing the influence of firm life cycle stages on the relationship between tax avoidance and cash flow persistence, it is observed that the cash flow component plays a more relevant role than accruals.

5. Conclusion and recommendations for future studies

This research investigated the moderating role of the growth, maturity, and decline life cycle stages in the relationship between tax avoidance and cash flow persistence. Regarding tax avoidance, two metrics were analyzed: Permanent BTD and Total BTD. Regarding cash flow persistence, the effects of accrual components and present cash flows on future cash flows were analyzed. The sample analyzed consisted of 2,034 observations of Brazilian companies listed on the B3, from 2011 to 2019.

Initially, the results showed that tax avoidance is associated with greater earnings persistence, contradicting previous studies by Hanlon (2005) and Blaylock et al. (2012). The divergence is explained by the fact that, in this study, tax avoidance was assessed primarily by the permanent differences between accounting earning and taxable earning, while previous studies based their analyses on temporary differences. The results demonstrate that cash retention provided by permanent tax-saving strategies has beneficial effects on the persistence of cash flows and, by extension, on the quality of accounting information. Conversely, strategies that result only in temporary differences do not have a lasting cash retention effect, which impairs persistence.

The results also demonstrated that the stages of the life cycle moderate the relationship between tax avoidance and the persistence of cash flows. Specifically, the research hypotheses were confirmed, that the growth stage enhances the positive effect of tax avoidance on the persistence of cash flows, while the maturity and decline stages mitigate this effect.

Two implications arise from these results. First, it is observed that only Permanent BTD showed significant results for the growth and maturity stages, and only in relation to the predictive power of current cash flows, but not of accruals. In the decline stage, Permanent BTD showed a significant effect only in relation to the predictive power of accruals. Total BTD showed significance only in the decline stage, and only in relation to the predictive power of accruals. Taken together, these results reinforce that permanent tax strategies are superior to temporary ones in terms of cash retention capacity.

Second, it is observed that the stages of the firm life cycle modify the way tax strategies affect the persistence of cash flows, and this moderating effect is sensitive to different proxies of tax avoidance, as different results were identified when analyzing Total BTD and Permanent BTD. Thus, future research should consider the organizational characteristic of the life cycle when investigating these topics, as well as the sensitivity to the use of tax avoidance measures.

The results also support practical implications for investors and regulators. Investors can incorporate PBTD into their valuation models, specifically to assess companies in the growth stage. Regulatory bodies, in turn, should be aware that persistent practices of aggressive

taxation have different effects on the financial health of companies at different stages of their life cycle, aiding the development of specific public policies for each stage.

Despite the conceptual and methodological care taken, this research is not without limitations. The first stems from the fact that BTD also captures earnings management (Fonseca & Costa, 2017; Martinez, 2017). However, this is a common difficulty in all studies that use BTD as a metric of tax avoidance (Santos et al., 2024). In this study, the limitation was mitigated by the presence of accruals in the regressions, which served as a control, albeit limited, for earnings management.

Another limitation relates to the time elapsed since the last data collection period (2019). Despite the data lag, there have been no substantial changes in Brazilian income tax legislation or in the international accounting standards applicable in Brazil since 2019. In other words, no event is foreseen that could have substantially altered the behavior of companies since 2019, at least not to the point of invalidating the conclusions of this study.

In comparison with previous studies, this research contributes by highlighting that temporary and permanent tax reduction strategies present distinct results in terms of their ability to influence future cash flows. Specifically, while previous research documented that temporary differences harm earning persistence, this study demonstrated that permanent differences favor cash flow persistence, with this influence being greater in the growth stage and lesser in the maturity and decline stages.

Future research could investigate the moderating role of firm lifecycle stages in different proxies for the quality of accounting information, in order to identify whether the life-cycle argument can also explain variations in the effects of tax avoidance on these other proxies.

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