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Earnings response coefficient and losses

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Resumo/Abstract

In this paper we investigate the information content of losses and its moderating effect on the relationship between risk and Earnings Response Coefficient (ERC). The information content of losses tends to be lower than profits since the market value of those firms are better explained by liquidation value rather than current earnings news. Through a sample of Brazilian public firms from 2001-2021, we corroborate this notion and find that the risk effect on ERC is also lower for loss-making firms. We attributed these results to the liquidation option explanation for the firm value of loss-making firms, which is corroborated by our robustness analysis. Our results contribute to earnings informativeness literature providing evidence of the informational differences between losses and profits and the role of risk on this relationship. We also contribute to explain the valuation of loss-making firms, which can be substantially different from profitable firms.

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Abstract
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Keywords: ERC; loss; earnings news; risk.

1. Introduction

The identification of profitable and loss-making firms offers a fundamental view on the viability of business activities, since losses cannot be sustained forever (Kettunen, Martikainen & Voulgaris, 2021). The literature has documented losses are likely to be transitory due to mean reversion process originated from early recognition of losses in relation to gains (Basu, 1997; Kothari, 2001) or due to shareholders' liquidation option rather than suffering from indefinite losses (Hayn, 1995). For this reason, earnings news tends to be less relevant for investors when it comes from loss-making firms since liquidation value would better explain the economic value of those firms (Hayn, 1995). We investigate this notion in the Brazilian market and also its consequence for the role of risk on firms' valuation.

The literature has provided evidence that loss-making firms can operate for long periods due to expectation of long-term future benefits, especially in small firms and in firm in the early stages of their life cycle (Klein & Marquardt, 2006), and due to social and economic costs involved with firms' bankruptcy (Cárdenas, 2021). Aiming to mitigate these costs, official institutions implement protectionist policies and survival actions to protect firms, thus entering a vicious cycle (Amato & Fantacci, 2016; Cárdenas, 2021). This type of firms, however, requires specific approaches to assess their value (e.g., liquidation value) and some aspects of the valuation of a profitable firm may not apply to firms that report losses (Darrough & Ye, 2007; Hayn, 1995; Wu, Fargher & Wright, 2010).

In this regard, this paper investigates the information content of losses and its moderating effect on the relationship between risk and Earnings Response Coefficient (ERC) in the Brazilian market. By using a sample of 436 Brazilian public firms from 2001 to 2021 (4,086 firm-year observations), we find evidence that the information content of losses, captured by the ERC, is lower than the information content of profits, which is consistent with the liquidation option explanation (Hayn, 1995). This lower information content of losses may imply that the valuation of these firms relies on their liquidation value rather than earnings news. Studies about the role of accounting information on loss-making firms are particularly relevant in Brazil since it adopts loan programs to provide liquidity to firms, which can prolong loss reporting (Acharya, Eisert, Eufinger & Hirsch, 2019, Caballero, Hoshi & Kashyap, 2008,

Zoller-Rydzek & Keller, 2020). For example, in order to deal with the consequences of Covid-19 pandemic, the Brazilian Development Bank (BNDES) contributed to inject R$ 154.8 billion into Brazilian economy in 2020, which represent 2.1% of the Brazilian GDP of the same year and include loans and guarantees for businesses (Barboza, Ambrozio, Maciel & Ferreira, 2021).

We also find a negative association between risk and ERC, which is consistent with previous literature indicating that the information content of riskier firms is lower (Collins & Kothari, 1989, Ariff, Fah & Ni, 2013, Pimentel, 2015). This result can be explained by the effect of risk on the earnings news impact on stock price according to the dividend-based model of firms' value. Earnings news can affect both the numerator and denominator of the dividend model. We find evidence that, in Brazil, the denominator effect overlaps the numerator effect, which means that risk tends to decrease the association between earnings news and stock returns.

Additionally, our results support the notion that the risk-ERC association is weaker for loss firm years. This evidence contributes to explain how investors assess the impact of the firm risk on earnings informativeness when it comes to loss-making firms. The implications of ERC-based research for financial reporting depend on the role of risk in returns-earnings and properly controlling for differences in risk (Chambers, Freeman & Koch, 2005). However, these understandings may change for firms in which standard valuation models may not be readily applicable (i.e., loss-making firms).

Finally, we conduct a robustness analysis to test whether conditional conservatism could drive our evidence. We use the persistence model of accounting measures conditional on news proposed by Basu (1997) to analyze the association between losses and conditional conservatism. Even though negative earnings news is, on average, higher for loss firm years, we find that these observations have a lower degree of conditional conservatism. This corroborates that the low information content of losses does not come from conservative practices of financial reporting, but rather it comes from liquidation option.

The results documented in this paper contribute to earnings informativeness literature in emerging economies, specifically by providing evidence of the informational differences between losses and profits and the role of risk on this relationship. We also contribute to explain the valuation of loss-making firms, which can be substantially different from profitable firms. To the best of the authors knowledge, no previous study has addressed the same issue in emerging economies, and it is also an open research venue to the international literature.

This paper is structured as follows: section 2 introduces the literature and develop research empirical hypothesis; section 3 introduces the research design and variables; section 4 shows and discusses the empirical results; and section 5 summarizes findings and presents the final remarks.

2. Related literature and hypothesis

2.1. Informativeness of loss

According to Hayn (1995, p. 126), "losses are likely to be considered temporary since shareholders can always liquidate the firm rather than suffer from indefinite losses". Specifically, this liquidation, or abandonment, option implies that equity holders can sell their shares at a price commensurate with the market value of the net assets of the firm and that "when a loss is reported, the stock price will not necessarily drop to zero nor decline proportionally to the change in earnings" (Hayn, 1995, p. 127). Consequently, observed losses

are temporary in their nature, because only firms expecting to improve their operations will survive (or continue in the market) and revert the poor performance along the time (Kothari, 2001).

Since accounting recognition criteria has evolved to anticipated losses, but not gains, losses are recognized more often and more quickly by accounting systems and this early recognition approximates recognition of the market value of firms when compared to gains (Ball, Kothari & Robin, 2000; Basu, 1997), reinforcing that accounting losses tend to be transitory (less permanent) and thus induces negative autocorrelation in earnings (Kothari, 2001).

Klein and Marquardt (2006) show that nonaccounting factors, such as real firm performance, market coverage and business cycle, tend to play the dominant role in explaining accounting losses factors, although the authors also document that reported losses are significantly related to accounting conservatism.

Recent empirical evidence analyses a variety of implications of accounting losses, for instance, Kettunen, Martikainen & Voulgaris (2021) shows that employee retention contributes to loss reversal of poor-performance firms and Ghosh and Wang (2019) document that losses are positively associated with CEO turnover and increasing in board activity. Therefore, declining performance calls for strong actions and CEOs have incentives to avoid losses, including by managing earnings (Ghosh & Wang, 2019).

According to Kothari (2001), the liquidation, or abandonment, option is a real option available to investors and managers. Hayn (1995) shows that the firm's value is a function of expected future earnings only when they are above the liquidation value of the firm. Below this threshold, liquidation value of the firm tends to be a better measure of the firm's value than earnings, which dissociates earnings from the firm's value.

Another branch of studies argues that the low information content of losses is not always caused by firms that are facing liquidation or financial distress, but rather a consequence of a knowledge-based economy (Darrough & Ye, 2007; Wu, Fargher & Wright, 2010). In this perspective, a good indicator of the future profitability of these firms is the so-called "hidden assets" (i.e., intangible assets not recognized in the balance sheet), which is a more relevant source of information for firms' valuation. Nevertheless, even under this perspective, current earnings are not a good indicator of future performance and earnings news tend to be less informative or negatively related to future profitability.

Hence, assuming that loss firms are more likely to report earnings below their liquidation value than profit firms, the earnings response coefficient is lower when firms report losses. As a result, by analyzing the earnings response coefficient, Hayn (1995) demonstrates that stock returns are much more strongly linked to current period earnings when only profitable firm-years are analyzed. In contrast, the magnitude of reported losses does not appear to be correlated at all with contemporaneous price movements when the loss cases are analyzed. Moreover, the magnitude of earnings response coefficient should diminish, perhaps considerably, by including loss cases in the samples (Hayn, 1995). Hence the first hypothesis of this paper is that:

H1: The Earnings Response Coefficient is lower for negative earnings (losses) reported

While we expect a lower informative content of losses through the earnings response coefficient, the literature has also provided evidence that loss-making firms can operate for long periods due to expectation of long-term future benefits, especially in small firms and in firm in

the early stages of their life cycle (Klein & Marquardt, 2006), and due to social and economic costs involved with firms' bankruptcy (Cárdenas, 2021). Aiming to mitigate these costs, official institutions implement protectionist policies and survival actions to protect firms, thus entering a vicious cycle and generating the so-called 'zombie firms' (Amato & Fantacci, 2016; Cárdenas, 2021).

2.2. Earnings Response Coefficient, Risk and Loss Effect

The literature evidences that ERC is negatively associated with the firm risk (Collins & Kothari, 1989; Pimentel, 2015). This is consistent with the notion that "since investors look to current earnings as an indicator of future firms' performance and share returns, the riskier these future earnings are, the lower investors' reaction to a given amount of unexpected earnings will be" (Scott, 2012, p. 163).

However, this relation is not so clear as it seems at first glance. Systematic risk can be also associated with earnings news informativeness since it increases the stock returns' sensibility of announcing firms (Savor & Wilson, 2016). Moreover, information risk can increase market reaction to earnings news since it contributes to the price discovery process (Kim & Verrecchia, 1991, Zhang, Cai & Keasey, 2013). Based on these perspectives, earnings news would be more impacting on stock prices of riskier firms since, for these firms, market reaction tends to be higher per unit of earnings surprise (Zhang, Cai & Keasey, 2013).

Chambers et al. (2005) summarize these two contrasting views of the risk and ERC relationship into the numerator and denominator effects. These terms are a reference to the standard valuation model, in which expected dividends are discounted at risk-adjusted rates, as follows:

$$P_{it}(y_t) = \sum_{\tau=t+1}^{\infty} \frac{E_t(d_{it}|y_t)}{(1+r_i)^{\tau-t}}$$

Where

$P_{it}(y_t)$ = price of firm i at time t, given y_t,

$E_t(d_{it}|y_t)$ = date t expectations of future dividends, given y_t,

y_t = a particular information set,

r_i = the risk-adjusted discount rate for firm i.

The numerator effect of risk on ERC comes from its influence on the impact of dividend revisions on stock price captured by $E_t(d_{it}|y_t)$. On the other hand, the denominator effect comes from the influence of risk on discount rate captured by r_i. Pimentel (2015) previously documented that in Brazil the denominator effect overlaps the numerator effect which explains a negative association between total risk and ERC. However, Hayn (1995) shows that firm risk and reporting of losses are correlated, and that risk and liquidation option hypothesis may compete to explain the association between ERC and firm risk. Specifically, risk is positively related to reporting of losses and negatively related to earnings response coefficient, however, "the higher risk of the losing firms cannot, in itself, explain the low informativeness of losses" (Hayn, 1995, p. 146). In this way, the liquidation hypothesis has an incremental explanation to the low informativeness of losses which is not explained by firm risk. Hence, firm risk and liquidation option derived from reported losses can play a joint effect in explaining the low informativeness of accounting earnings reflected in the low earnings response coefficient.

The literature does not offer theoretical prediction to explain, ex-ante, the portion of low information content that is exclusive to the high risk or to the liquidation option derived from

reported loss. Specifically, since firms with positive earnings do not suffer with liquidation option effects, the magnitude of the relationship between earnings response coefficient and firm risk will be lower than empirically observed in the presence of loss-making firms. Therefore, this paper addresses this issue by analyzing the joint effect of firm risk and losses on earnings response coefficient. Thus, the second hypothesis is:

H2: The relationship between Earnings Response Coefficient and risk decreases after controlling for losses

The implication of the liquidation option hypothesis is that the firm value is better assessed by the liquidation value of net assets rather than the future earnings expectations. As the relationship between the firm risk and ERC is based on the dividend expectation which is, for profitable firms, function of future earnings, for loss-making firms, liquidation value is a better predictor of firm value and earnings news tend to be less value relevant (Hayn, 1995). For that reason, we expect that the relationship between risk and ERC is equal to zero for loss-making firms and lower than zero for profitable firms. Then, the third hypothesis is:

H3: The negative relationship between Earnings Response Coefficient and risk is more pronounced for profitable firm years over loss firm years.

3. Empirical approach

3.1. Sample

Our sample comprises all Brazilian public firms from 2001 to 2021. We collected all data from the Economatica® database. The first dataset comprised 856 firms. After excluding missing data, the final sample comprises 436 firms (4,086 firm-year observations).

3.2. Regression model

Earnings Response Coefficient (ERC) is estimated by a regression model where unexpected earnings (UX) explain unexpected returns (UR). The parameter associated with UX estimates the relationship between earnings news and firm value as follows:

$$UR_{i,t} = \beta_1 + \beta_2 UX_{i,t} + \varepsilon_{i,t} \quad (1)$$

In the Equation 1, *i* and *t* index firm and year, respectively. Following previous research, UX is the unexpected earnings which is measured as the change in earnings from year *t-1* to *t* deflated by the stock price of the firm *i* at the end of the year *t* (Basu, 1997, Pimentel, 2015). UR is the unexpected return on firm *i* from 9 months before year-end *t* to three months after year-end *t*. UR measurement details are provided in the subsection 3.3. Then, β_2 captures the ERC.

In order to test our research hypotheses, we include moderating effects into Equation 1. As ERC is a parameter of the model, the moderating effects allow us to test the determinants of ERC. First, we include the total risk variable (Chambers et al., 2005; Pimentel, 2015) and then a dummy variable of loss reporting as an indicator that liquidation value is higher than expected value of earnings (Hayn, 1995). Following previous literature (Mian & Sankaraguruswamy,

2012, Pimentel, 2015), we also include a set of control variables associated with ERC. Then we estimate the Equation 2:

$$UR_{i,t} = \beta_1 + \beta_2 UX_{i,t} + \beta_3 TRK_{i,t} + \beta_4 UX_{i,t} \times TRK_{i,t} + \beta_5 LOSS_{i,t} + \beta_6 UX_{i,t} \times LOSS_{i,t} + \beta_7 SIZE_{i,t} + \beta_8 UX_{i,t} \times SIZE_{i,t} + \beta_9 MTB_{i,t} + \beta_{10} UX_{i,t} \times MTB_{i,t} + + \beta_{11} EVOL_{i,t} + \beta_{12} UX_{i,t} \times EVOL_{i,t} + \varepsilon_{i,t} \quad (2)$$

In Equation 2, *i* and *t* index firm and year respectively. *UR* and *UX* is calculated as previously mentioned. *LOSS* is a dummy variable equal 1 if the firm *i* reports a loss in the year *t* and zero otherwise. *TRK* is the ranked firm's total risk. Different from Hayn (1995), who uses bond rating as a measure of firm risk, which has empirical limitations as acknowledged by the author, we use a systematic market-based risk measure based on stock beta. The control variables include the firm size (*SIZE*), the market-to-book ratio (*MTB*) and earnings volatility (*EVOL*). All variables included in the Equation 2 interact with UX in order to test their relationship with ERC (i.e., moderating effect).

Our first hypothesis is that losses and ERC are negatively related which is captured by the β_6 parameter in Equation 2 and 3. The interaction between *UX* and *TRK* (β_4) measures the relationship between *TRK* and ERC, which is related to our second hypothesis. The second hypothesis is that this relationship changes after control for the liquidation option explanation, which is captured by the inclusion of the *LOSS* variable and its interaction with *UX*. Hence, we estimate two models (with and without *LOSS* control) and compare the β_4 coefficient of each regression.

Our third hypothesis is that the ERC and *TRK* relationship is only presented in profitable firms. We separate our sample for profitable and loss firms and estimate the Equation 2 (without the *LOSS* variable) for each sample. Then, in order to test the significance of the difference between these two samples, we also estimate the Equation 3, which interacts *UX*, *TRK* and *LOSS* as follows:

$$UR_{i,t} = \beta_1 + \beta_2 UX_{i,t} + \beta_3 TRK_{i,t} + \beta_4 UX_{i,t} \times TRK_{i,t} + \beta_5 LOSS_{i,t} + \beta_6 UX_{i,t} \times LOSS_{i,t} + \beta_7 UX_{i,t} \times TRK_{i,t} \times LOSS_{i,t} + \beta_8 SIZE_{i,t} + \beta_9 UX_{i,t} \times SIZE_{i,t} + \beta_{10} MTB_{i,t} + \beta_{11} UX_{i,t} \times MTB_{i,t} + + \beta_{12} EVOL_{i,t} + \beta_{13} UX_{i,t} \times EVOL_{i,t} + \varepsilon_{i,t} \quad (3)$$

In the Equation 3, *LOSS* moderates the relationship between ERC and *TRK*. This moderating effect is captured by the β_7 parameter. A negative β_7 indicates that the relationship between *TRK* and ERC is less pronounced in firms that report losses.

Table 1 reports the definition of the variables necessary for estimating the regression models.

Table 1 – Variable definitions

Variable	Description	Formula
UR	Unexpected Return	$R_{it} - E(R)_{it}$

R	Stock Return	$\frac{Stock\ Price_{it} - Stock\ Price_{it-1}}{Stock\ Price_{it-1}}$
E(R)	Expected Stock Return	$\alpha_{it} + \beta_{it} R_{mt}$
UX	Unexpected Earnings. Where EPS = Earnings per share	$\frac{EPS_{it} - EPS_{it-1}}{StockPrice_{it-1}}$
TRK	Ranked value of the Total Risk	$\frac{RiskRank_{it} - 1}{N - 1}$
Risk Rank	Rank of the variance of monthly returns of the previous 48 months	$Rank(Variance(R))$
LOSS	Loss reporting indicator	LOSS equal 1 if $EPS_{it} < 0$ and zero otherwise.
SIZE	Ranked value of the Market Value of Equity (MVE)	$\frac{Rank(MVE_{it}) - 1}{N - 1}$
MTB	Market-to-book ratio	$\frac{MVE}{Book\ Value\ of\ Equity}$
EVOL	Earnings volatility calculated as the variance of previous four annual earnings	$Variance(Earnings)$

3.3. Measuring Unexpected Returns

Unexpected returns are measured as the difference between the expected annual stock return and the real stock return. The expected return is estimated through the market model, as follow:

$$R_{it} = \alpha_{it} + \beta_{it} R_{mt} + \varepsilon_{it} \quad (4)$$

In Equation 4, the expected stock return is the predicted stock return using the market return (R_m) and the estimated α and β. Thus, ε represents the difference between the expected stock return and the real stock return (R_i), i.e., the unexpected return. Then, Equation 4, the market model, fall into the following components:

R_{it} = Stock Return

$E(R)_{it} = \alpha_{it} + \beta_{it} R_{mt}$ = Expected Stock Return

ε_{it} = Unexpected Stock Return (UR)

We estimate Equation 4 using monthly returns of the 48 months previous April of the year *t*, accepting, at least, 24 monthly returns to estimate the parameters α and β. The parameters

of the Equation 4 vary across year and firm, which means that each UR variable in our sample was calculated through a specific parameter α and β.

4. Results

4.1. Descriptive Analysis

Table 2 reports the descriptive analysis of all variables used in our study by loss and profitable firm years observations. Loss firm years represent 26% of all observations in our sample.

Table 2 - Descriptive analysis

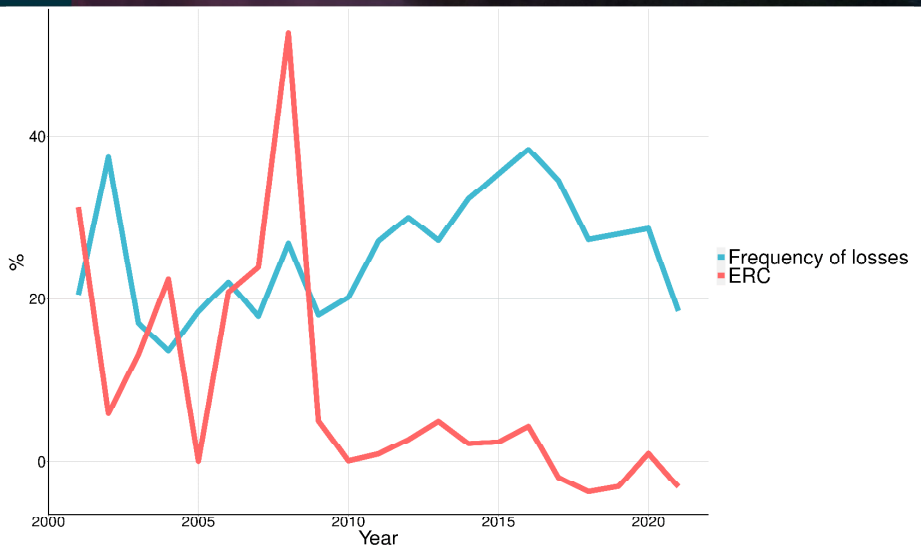
Variable	Loss firm years			Profitable firm years		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
UR	-0.27	-0.19	1.02	-0.01	-0.04	0.69
UX	-0.15	-0.10	2.61	0.22	0.02	1.11
TRK	0.68	0.74	0.25	0.43	0.41	0.27
SIZE	0.30	0.23	0.25	0.57	0.59	0.27
MTB	0.33	0.21	0.31	0.56	0.57	0.26
EVOL	6.09	0.33	41.57	1.50	0.05	33.55

UR: Unexpected Returns winsorized at 1%; UX: Unexpected Earnings winsorized at 1%; TRK: Total firm risk; LOSS: Loss dummy; Size: Firm Size; MTB: Market-to-book; EVOL: Earnings Volatility

UR and UX are strongly affected by outliers which creates high standard deviations and distort means substantially. For that reason, we conduct a winsorization at 1% of both variables. TRK mean is significantly higher for loss firm years (p-value < 0.05), which is consistent with the notion that total risk and reporting losses are correlated. In terms of rank, the mean and median of TRK are in the lower (upper) half of the rank distribution of total risk for loss (profitable) firm years.

Figure 1 shows a time-series analysis of the reporting of loss in Brazil from 2001 to 2021. We calculate the relative frequency of losses by year and compare with the ERC of each year measured by cross-sectional regressions of Equation 1.

Figure 1 – Relative frequency of losses and cross-sectional ERCs



In the overall sample, loss firm-years represent about 26% of all observations, which is a relevant part of the Brazilian public companies. However, this proportion varies significantly across time. In 2002, 37% of earnings observations in our sample were negative. In 2016, loss firms represented 38% of the total number of observations. The relative frequency of losses moves across time in the opposite direction of the respective ERC. From 2001 to 2002, when the frequency of losses reached the second highest level in our sample (37%), ERC fell from 31% to 6%. From 2008 to 2016, when the frequency of losses reached the highest level in our sample (38%), ERC also presented a downtrend. Despite the increase in the frequency of losses in 2008, ERC is extremely high in this year. The atypical movement in ERC during this year may be related to the 2008 financial crisis. Financial crises are usually related to higher investor sentiment (Chiu, Chung, Ho & Wu, 2018), and when market sentiment is more pronounced investors tend to respond more intensely to earnings news (Mian & Sankaraguruswamy, 2012)

We also conduct an analysis of the persistence of loss reporting within firms. Table 3 reports a summary of the main results of this analysis. Each row presents the number of firms according to the respective level of persistence of losses and the average risk of each group of firms. The first row (All) presents the number of firms that reported loss in all periods that these firms were included in our sample while the last row (None) presents the number of firms that reported profits in all periods that these firms were included in our sample.

Table 3 - Persistence of losses within firms and average risk

Persistence of losses	Absolute number of firms	Relative number of firms	Average TRK
All	35	8%	0,86
More than 75%	60	14%	0,79
More than 50%	106	24%	0,76
More than 25%	175	40%	0,68
None	172	39%	0,35

Our sample comprises 436 firms. 8% of these firms reported losses in all periods and 61% (100-39) reported losses, at least, in one reported earnings. The average risk of the firms increases with the persistence of losses. Firms that only reported profits have an average TRK significantly lower (0.35) than firms that only reported losses (0.86).

4.2. Regression results

Table 4 reports the first regression models that aim to test the confounding effect of the liquidation option explanation on the relationship between firm risk and ERC. Whether LOSS is not correlated with TRK and ERC at the same time, the inclusion of UX × LOSS should not affect the coefficient of the term UX × TRK.

Table 4 – Total risk and ERC relationship controlled for losses

Variable	No control for losses		Controlling for losses	
	Estimate	p-value	Estimate	p-value
UX	0.1720	0.0064***	0.1743	0.0126**
TRK	-0.6079	0.0000***	-0.5981	0.0000***
UX × TRK	**-0.1703**	**0.0299****	**-0.1370**	**0.0641***
LOSS	-	-	-0.1549	0.0002***
UX × LOSS	-	-	-0.0451	0.2381
SIZE	-0.8829	0.0000***	-0.9981	0.0000***
UX × SIZE	0.2083	0.0708*	0.1698	0.1460
MTB	0.2531	0.0243**	0.2492	0.0227**
UX × MTB	-0.0416	0.6874	-0.0401	0.6746
EVOL	0.0021	0.0000***	0.0019	0.0000***
UX × EVOL	-0.0003	0.0000***	-0.0003	0.0000***
Firm effect	Yes		Yes	
Year effect	Yes		Yes	
Obs.	4086		4086	

Note: Dependent variable is the unexpected returns; UX: Unexpected earnings; TRK: Total risk; Loss: Losses indicator dummy; Size: Rank of the market value of equity; MTB: Rank of market-to-book ratio; EVOL: Earnings volatility. UX and UR are winsorized at 1%. Standard Errors are clustered by firms.

Before controlling for losses, the coefficient of UX × TRK is equal to -0.1703 (p-value<0.05). This means that the increase in TRK from the bottom (lowest risk observation) to the top (greatest risk observation) is associated with a decrease in ERC of around 0.1703. However, after controlling for UX × LOSS, the effect of TRK on ERC drops to -0.1370 and is not statistically different from zero (p-valor>0.05). This confirms our second research hypothesis. Among all interactions of the control variables with UX, only EVOL exhibits a coefficient statistically significant (-0.0003) and similar in both equations of Table 4.

Table 5 reports the complete specification of our regression model, which is based on the notion that losses and profits have different coefficients for ERC and for the effect of TRK on ERC. Then, we run a three regression: (1) subsample of loss firm years (2) subsample of profitable firm years and (3) all sample observations but differentiating the TRK impact on ERC between loss and profitable subsamples.

Table 5 – Risk effect on ERC by losses versus profits

Variable	Loss firm years		Profitable firm years		Losses moderating effect	
	Coef.	p-value	Coef.	p-value	Coef.	p-value
UX	-0.0171	0.7547	0.4389	0.0004***	0.6659	0.0000***
TRK	-1.0437	0.0001***	-0.4661	0.0001***	-0.3732	0.0003***
UX × TRK	**0.0787**	**0.2951**	**-0.5400**	**0.0003*** **	**-0.7511**	**0.0000*** **
LOSS	-	-	-	-	0.1532	0.1319
UX × LOSS	-	-	-	-	-0.7352	0.0000***
UX × TRK × LOSS	**-**	**-**	**-**	**-**	**0.8563**	**0.0000*** **
SIZE	-0.5612	0.1873	-1.3533	0.0002***	-1.0365	0.0000***
UX × SIZE	0.0107	0.9441	0.1882	0.1686	0.1259	0.2345
MTB	0.2490	0.0965*	0.4403	0.0241**	0.2758	0.0109**
UX × MTB	-0.1095	0.1953	0.2481	0.0426**	-0.0487	0.5935
EVOL	0.0005	0.4239	0.0138	0.2673	0.0020	0.0000***
UX × EVOL	-0.0005	0.0001***	-0.0029	0.2828	-0.0003	0.0000***
Firm effect	Yes		Yes		Yes	
Year effect	Yes		Yes		Yes	
Obs.	1082		3004		4086	

Note: Dependent variable is the unexpected returns; UX: Unexpected earnings; TRK: Total risk; Loss: Losses indicator dummy; Size: Rank of the market value of equity; MTB: Rank of market-to-book ratio; EVOL: Earnings volatility. UX and UR are winsorized at 1%. Standard Errors are clustered by firms.

In the third model, UX × LOSS tests the ERC difference between the reporting of losses over profits, i.e., it tests the first hypothesis. Loss firm years present an ERC that is, on average, 0.7352 lower than profitable firm years (p-value<0.05). ERC in the subsample of loss firm years is not statistically different from zero (p-value>0.05) and ERC in the profitable subsample is -0.5400 (p-value<0.05). All these results confirm the liquidation option explanation of Hayn (1995), in which losses have less information content than profits.

The coefficient associated with UX × TRK is not statistically significant in loss firm years subsample and negative in profitable firm years subsample. This difference is captured in the coefficient associated with UX × TRK × LOSS, which captures the marginal effect of losses on UX × TRK association. In other words, in profitable firm years, TRK association with ERC is negative (-0.7511) and statistically different from the TRK and ERC association in loss firm years. The difference between loss versus profit firm years regarding TRK and ERC association is captured by the coefficient of UX × TRK × LOSS, which is equal to 0.8563 (p-value<0.05). To assess the TRK and ERC association in loss firm years, we conduct a test F of the sum of the mentioned coefficients (-0.7511 + 0.8563). The F-test result indicated that for loss firm years the relationship between ERC and TRK is not different from zero (p-value>0.05). All these results are consistent with the third research hypothesis.

4.3. Discussion

Our study explores two relevant explanations for a low ERC in the Brazilian market: firm risk and losses. Both variables are negatively correlated with ERC in our study. When it comes to total risk, there are two explanations for the total risk and ERC relationship that

Chambers et al. (2005) named 'numerator' and 'denominator effect'. On one hand, total risk may be negatively related to ERC because it influences discount rates used in the denominator of the dividend valuation model. On the other hand, total risk may increase the impact of earnings news on dividend revision. In this case, total risk would be positively associated with ERC because dividends are the numerator of the dividend valuation model.

Unlike the US market, where the numerator effect overlaps the denomination effect (positive association) (Chambers et al., 2005), in Brazil, consistent with Pimentel (2015), we find that total risk and ERC are negatively related. This result implies that the numerator effect is weaker than the denominator effect in the Brazilian setting. A weaker numerator effect can be explained by market inefficiency and/or low earnings informativeness. Brazil has weaker investor protection than more developed countries (e.g., United States, Canada, France and Germany), which is associated with less earnings informativeness (Cahan, Liu & Sun, 2008; DeFond, Hung & Trezevant, 2007; Kamarudin Ariff & Jaafar, 2020). Also, market inefficiency may affect how investors respond to earnings news, which is explained by behavioral bias and varies across cultures (Mian & Sankaraguruswamy, 2012; Pevzner et al., 2015).

We also find that ERC and total risk relationship changes after controlling for losses. Hayn (1995) argues that ERC is lower in losing firms since for those firms, liquidation value represents the stock price better than earnings expectations. However, losing firms have more volatile earnings streams and tend to be riskier (Hayn, 1995). Therefore, we show that the liquidation option hypothesis must be controlled in order to assess the risk-ERC association that comes from the dividend model. After controlling for losses, the risk-ERC relationship drops about 33%. Thus, the liquidation option represents a confounding effect for the denominator effect mentioned in the previous paragraph.

Our results support that losses have less information content than profits which is consistent with Hayn (1995). This result supports that when liquidation value is lower than the value of expected earnings, Brazilian investors react less to earnings news. An alternative explanation for the low information content of losses is the impact of conditional conservatism on ERC. Thus, this evidence is particularly relevant for literature because the average level of conditional conservatism is low in Brazil due to its institutional and economic characteristics (Ball, Kothari & Robin, 2000, Ball, Robin & Sadka, 2008). However, even in a market with a low degree of conditional conservatism, the information content of losses is still low which is consistent with the liquidation option hypothesis.

We find that differentiating losses than profits in the ERC model is not just a necessary control variable, but also that ERC-risk relationship is different for losses over profit. For losses firms, the ERC-risk relationship is not different from zero and in profitable firms the ERC-risk relationship is negative. This evidence also corroborates Hayn (1995) liquidation option explanation. Risk is related to the information content of earnings based on the dividend model perspective. For firms whose liquidation value is higher than future earnings expectations, risk is not negatively associated with the information content of earnings.

This result shed light on valuation aspects of loss-making firms. The so-called zombie firms, companies that lack profit for extended periods, have attracted increasing attention in both academic and policy circles (Banerjee & Hofmann, 2018). In Brazil (as well as several other countries), it is common to use public loan programs and allocate substantial resources to provide liquidity to firms during crises (e.g., COVID-19 pandemic) (Zoller-Rydzek & Keller, 2020). These policy instruments may maintain firms reporting losses for extended periods. Zombie firms have a set of particularities that justify the academic interest. We show that one of these particularities, the difference in the information content of earnings, is present in Brazil

and that investors consider other factors to evaluate loss-making firms rather than earnings news.

4.4. Robustness analysis - Conditional conservatism and losses

Basu (1997) finds that negative earnings news has less information content than positive earnings news. He argues that accounting systems tend to recognize bad news timelier than good news which introduces a higher degree of transitoriness into negative earnings news. The focus of our analysis is the reporting of losses, which does not necessarily imply a higher degree of conservatism. However, in our sample, earnings news is negative on average for loss firm years and positive on average for profitable firm years (Table 2). Whether loss-making firms exhibit a higher degree of conditional conservatism, then the transitory components introduced by conservative practice could drive our results. Thus, we include an analysis of the association between conditional conservatism and losses.

We adopt the persistence model of accounting measures conditional on news proposed by Basu (1997) to test the association between conditional conservatism and losses because this model is focused on the transitoriness consequence of conservative practices. The model test whether negative earning news is less persistent (more transitory) than positive earnings and it is established as follows:

$$\begin{aligned} UX_{i,t} = \ & \beta_1 + \beta_2 UX_{i,t-1} + \beta_3 NEG_{i,t} + \beta_4 UX_{i,t-1} \times NEG_{i,t} + \beta_5 LOSS_{i,t} \\ & + \beta_6 UX_{i,t-1} \times LOSS_{i,t} + \beta_7 NEG_{i,t} \times LOSS_{i,t} \\ & + \beta_8 UX_{i,t-1} \times NEG_{i,t} \times LOSS_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

Equation 5 measures the level of transitoriness of earnings news (UX) through an autoregressive analysis in which UX is the dependent variable and lagged UX is an independent variable. The model differentiates positive from negative UX through a dummy variable (NEG) equal 1 whether UX is negative and zero otherwise. When β_4 is negative, negative UX has a higher tendency of reversion which is attributed to conservative practices. We include a dummy variable (LOSS) into the model that indicates loss firm years in order to test the association of losses and conditional conservatism. We also run a second model with two control variables related to conservatism: size and market-to-book. Both variables are defined in Table 1. Table 6 reports the results.

Table 6 – Conditional conservatism and losses

Variable	Dependent variable: UX			
	Coef.	p-value	Coef.	p-value
UX	0.0051	0.0000***	0.1449	0.0003***
NEG	0.2326	0.0000***	0.9736	0.0000***
UX × NEG	-0.0418	0.0000***	-0.4195	0.0000***
LOSS	-1.1661	0.0000***	-0.9647	0.0000***
UX × LOSS	0.0012	0.8308	-0.0758	0.0000***
NEG × LOSS	0.5939	0.0011***	0.2539	0.1457
UX × NEG × LOSS	**0.0198**	**0.0306****	**0.1640**	**0.0000*****
SIZE			-1.2688	0.0161**
UX × SIZE			-0.5253	0.0006***

NEG × SIZE		-0.4942	0.0193**
UX × NEG × SIZE		1.4828	0.0000***
MTB		0.4654	0.0366**
UX × MTB		0.0865	0.0912*
NEG × MTB		-0.8359	0.0000***
UX × NEG × MTB		-0.1054	0.0023***
Firm effect	Yes	Yes	
Year effect	Yes	Yes	
Obs.	3549	3549	

Note: UX: Unexpected earnings; Neg: Dummy variable equal 1 whether UX is negative and zero otherwise; Loss: Dummy variable equal 1 for loss firm years and zero otherwise; Size: Rank of the market value of equity; MTB: Rank of market-to-book ratio; UX are winsorized at 1%. Standard Errors are clustered by firms.

The coefficient that captures the differential tendency of reversion of earnings news (β_4) indicates that negative earnings news is less persistent than positive earnings news (β_4 = -0.0418; p-value<0.05) which is consistent with Basu (1997) and corroborates that financial reporting is conservative on average. β_8 indicates the association between conditional conservatism and losses. A positive (negative) value of β_8 suggests that losses and conservatism have a negative (positive) association. Thus, our results indicate that loss observations are less conservative than profitable ones (β_8 = 0.0198 (1) 0.1640 (2); p-value < 0.05). This result does not support the notion that loss-making firms tend to be more conservative which suggests that our results regarding the low information of losses do not come from conditional conservatism.

5. Conclusion

Our study aims to address the differences between earnings response coefficient of losses versus profits and the role of risk on this relationship. The standard dividend-based valuation model implies a strong correlation between earnings news and stock prices. However, earnings news tends to be less value-relevant when firms report losses because investors may rely on the liquidation value of net assets to value firms rather than future earnings expectations.

In this sense, we find that loss-making firms exhibit a lower earnings response coefficient than profitable firms. We also find that the association between total risk and earnings response coefficient is different for loss firm years versus profit firm years. This is consistent with the notion that investors value loss-making firms through liquidation value. Moreover, this implies that studies that address earnings news impact on the Brazilian stock market and the role of risk on it must control for losses and profits in order to adequately measure ERC, its determinants and consequences.

Our results contribute to ERC literature providing evidence of the effect of risk on earnings news association with stock returns and also the differences of losses and profits. We also contribute to literature regarding the valuation aspects of loss-making firms. Our evidence may be relevant for the participants of Brazilian stock market showing some of the particularities regarding losses informativeness.

Nevertheless, our results have some important limitations. We are using loss reporting as an indicator that liquidation value is higher than expected earnings. Hayn (1995) conducted an analysis with an estimative of the likelihood of liquidation, which is unobservable, and find similar results of using the loss variable. Our results do not conduct a similar analysis because the absence of data. However, we include a set of control variables that Hayn (1995) did not

take into account and our results are still consistent with the liquidation option explanation. Our study has not the objective of assuring any causal link. Instead, we intend to provide evidence of the liquidation option explanation for the observed low informativeness of losses, which can be attributed to more the one explanation that we try to eliminate through controls and using different types of association tests.

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