XV CONGRESSO ANPCONT
4 a 7 de Dezembro 2021
EVENTO VIRTUAL
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Firm Life Cycle and Accrual Quality

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Resumo/Abstract

We examine the role of firms' life cycle stages on accrual quality. We find that firm life cycle is intrinsically related to accrual quality. Specifically, mature firms have the highest quality of accruals, whereas firms in the introduction and decline stages have the lowest quality of accruals. Moreover, we show that accrual quality reduces when firms move to decline stage and different types of accruals (long-term, financing and comprehensive accruals) behave differently over life cycle stages capturing the business fundamentals specific to each life cycle. Our results are robust to a battery of tests including different measures of accruals, two alternative definitions of firm life cycle, SOX implementation or by the existence of transient firms. Our paper contributes to the literature by identifying firm life cycle stage as another relevant factor that impacts accrual quality. Furthermore, our findings contribute to several stakeholders including investors, analysts and auditors.

Modalidade/Type

Artigo Científico / Scientific Paper

Área Temática/Research Area

Contabilidade Financeira e Finanças (CFF) / Financial Accounting and Finance

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Abstract

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Keywords: Accrual Quality; Accruals; Life Cycle; Cash Flow; Accrual Accounting

1. Introduction

A significant body of research has focused on the understanding of the quality of accruals and its determinants, because accruals are an integral part of the financial reporting process. Existing literature has documented the impact of several factors including operating cycle, leverage, internal control deficiencies, audit quality and several other factors on the firms' accrual quality (Dechow and Dichev, 2002; Ashbaugh-Skaife et al. 2008; Srinidhi and Gul 2007; Frankel and Sun, 2018). However, to the best to our knowledge there is a gap in the literature on whether and how a firm's life cycle stage influences its accrual quality. Firm life cycle captures different properties of business conditions (DeAngelo et al. 2006; Dickinson 2011; Vorst and Yohn 2018). For instance, this suggests that when firm's conditions change, timing and matching problems can vary thereby influencing the ability of firms' accruals to map into cash flows. In accounting literature these issues are relevant since accrual accounting is the basis of financial reporting, however the understanding that the quality of accrual system evolves at the same time as firms evolve over life cycle stages could anticipate potential issues that can be avoided by firms related to the measurement of accruals. In this paper, we examine how firm life cycle influences the quality of accruals and extend the prior literature.

We argue that the relation between firm life cycle and the quality of accruals is influenced by the varying extent of uncertainty about cash inflows and outflows surrounding each life cycle. For instance, introduction and decline firms would be expected to face higher uncertainty due to their weak position in the market as compared to growth and mature firms. Bushman, Smith, and Zhang (2008) argue that there is an investment component in accruals that is positively related to growth. Introduction and growth firms would be expected to make larger investments to increase market-share and to deter new entrants, while decline firms and part of shake-out firms would be expected to undertake asset disposals to reorganize their operations. Moreover, Hribar and Collins (2002) argue that nonoperating events (e.g., acquisitions, divestitures and others) affect accruals articulation[1], however, these events are predicted to occur differently in each firm life cycle (Dickinson, 2011) leaving the focus on the maturity of the measurement process of accruals (or the accrual system). Given this, the investment component of accruals is expected to be larger for firms in introduction and growth

[1] Our paper is not focused on earnings management like Hribar and Collins (2002), but the issues related to the measurement of accruals is similar as well as in Larson, Sloan and Giedt (2018). To address potential issue related to earnings management we also used the McNichols (2002) model in our robustness tests.

stages than for mature firms, and much lower for decline firms. Accrual quality of introduction and decline firms is thereby expected to be lower than for growth and mature firms mainly because it is hard to directly link capital expenditures and the consumption of tangible and intangible assets (depreciation and amortization) to revenue generation.

We use a sample of U.S. public companies from 1987 to 2019.[2] In order to measure accrual quality, we follow Dechow and Dichev (2002)[3], hereafter DD (2002), and estimate residuals from the industry-year regressions of working capital accruals on current, past and future cash flows. We use the absolute values as well as standard deviation of the residuals as our two main measures of accrual quality. We measure firm life cycle using the cash flow patterns developed by Dickinson (2011).[4] Our research design allows us to show the relation between firm life cycle and accrual quality as well as the impact on accrual quality when firms move to decline and mature life cycle stages.

We find that firm life cycle stages have a strong impact on the firms' accrual quality. Firms in the introduction and decline stages have a much lower quality of accruals than do firms in the growth and mature stages. To reduce potential endogeneity and provide a causal link between life cycle and accrual quality, we investigate the change in accrual quality when firms move to decline stage or mature stage. We find that accrual quality reduces when firms move to decline stage whereas accrual quality improves when firms move to the mature stage, further strengthening our main result.

We run a battery of robustness tests to strengthen our main results. We use an alternate measure of firm life cycle stage – derived from DeAngelo et al. (2006) as well as an alternative classification of growth stage as in Vorst and Yohn (2018) and find similar results. Further, we split our sample into two sub-samples – pre and post-2002, to incorporate the impact of SOX implementation on our results. The post-SOX period has been characterized by a change in firms' use of accrual-based earnings management as well as the strength of firms' internal controls (Cohen et al., 2008; Ashbaugh-Skaife et al., 2008;), both of which can significantly influence accrual quality. We find that while the post-SOX results are stronger, they are still consistent with our hypothesis that firm life cycle influences accrual quality. In a separate robustness test, we exclude firms with less than 12 observations and show that our results are not driven by transient firms. In additional analyses, we follow Larson et al. (2018) and split total accruals into long-term, working capital and financing components as well as comprehensive accruals as dependent variables to provide a better understanding of the effect of the firm life cycle on accruals. We find that mature firms have lower total accruals than firms in other life cycle stages, long-term accruals financing accruals and comprehensive accruals are higher for introduction and growth firms followed by decline firms and mature firms.

Our paper makes several contributions to the accrual (earnings) quality literature. Firstly, we show that firm life cycle is an important determinant of, and is intrinsically linked to accrual quality, thereby extending prior studies such as Dechow (1994), Dechow and Dichev (2002), Bushman et al. (2016) and Frankel and Sun (2018). Our empirical results also extend prior review papers such as Dechow et al. (2010) and Habib and Hasan (2019) who have not addressed firm life cycle as a determinant of accrual quality. Thirdly, our results suggest that analysts and investors can incorporate the impact of firm life cycle in their analyses, since it

[2] Our sample starts from 1987 because FASB issued the SFAS 95 (Statement of Cash Flows) requiring firms to report cash flows from operating, financing and investing activities and our primary proxy for the firm life cycle stage as well as our main measure for accrual quality uses cash flow information. Also, prior literature (for instance, Hribar & Collins 2002) finds that calculating cash flows indirectly (from Balance Sheet accounts), can lead to noisy and biased estimates.

[3] We also use the model following McNichols (2002) in one of our battery of robustness tests and the results are unchanged.

[4] We also follow the methodology from DeAngelo et al. (2006) based on retained earnings in our robustness tests and the results are qualitatively similar.

can impact the financial reporting process, as well as auditors who can incorporate the firm life cycle of their auditee while planning the audits.

Our paper proceeds as follows: we discuss prior literature and the motivation of our hypothesis in section 2. We discuss the research design as well as sample selection in section 3. We present and discuss our findings in section 4. Section 5 concludes.

2. Background and Hypothesis Development

This section presents the related literature on accrual quality and firm life cycle to develop and motivate our hypothesis. We provide the theoretical link to our empirical measures of accrual quality and firm life cycle. Also, we show in our motivation the gap in the accounting literature on how firm life cycle can be seen as a determinant of accrual quality.

2.1 Accrual Quality and Prior literature

Accruals are an important part of financial reporting and their quality is a fundamental attribute studied in the literature (Dechow 1994; Dechow and Dichev 2002; Bushman et al. 2016). The timing and matching problems suffered by accruals can make financial statements less useful. High accrual quality can provide a better accurate measure of firm performance and cash flows and thereby improve the decision-making process for various stakeholders who use the financial statements.

Prior literature on accrual quality shows how firms' fundamentals and characteristics affect the quality of their accruals. For instance, several firm's characteristics such as volatility of operations, size, operating cycle or the incidence of losses affect the quality of accruals reported by the firms (Dechow and Dichev, 2002). In addition, other factors like analysts' forecasts and cash flow predictions (McInnis and Collins 2011), and the auditors' effort measured by audit and non-audit fees also affect accrual quality (Srinidhi and Gul 2006). Dechow, Ge and Schrand (2010) provide a broad examination of earnings quality models, which includes accrual quality models. They classify the studies on earnings quality into two main groups: determinants and consequences. The studies related to the determinants of earnings (accrual) quality provide empirical evidence on the factors that shape earnings (accrual) quality, including Dechow (1994), Dechow and Dichev (2002), Dhaliwal, Naiker and Navissi (2010), Bushman et al (2016), Larson, Sloan and Giedt (2018).

Our paper extends the existing literature on determinants of accrual quality by documenting the impact of a firm's life cycle stage on its accrual quality. We posit that a firm's life cycle stage is an important determinant of its accrual quality because each firm life cycle captures the uncertainty of firms' condition and activities. We measure accrual quality mainly using the model developed by Dechow and Dichev (2002). Accordingly, we measure accrual quality as the ability of accruals to map into cash flow realizations. The residual from this model is the main proxy of accrual quality that we use in absolute value and standard deviation forms. Following prior studies, we use several ways to measure total accruals as well as accrual quality (Sloan, 1996; Dechow and Dichev, 2002; McNichols 2002; Larson et al. 2018).[5]

2.2 Firm Life Cycle as Determinant of Accrual Quality

Firm life cycle captures several dimensions of business conditions and is related to several factors (both internal and external) that affect operating, financing and investing activities. Prior literature documents evidence of the effect of a firm's life cycle stage on several aspects of firm performance and decisions. For example, Dickinson (2011) documents the

[5] The inclusion of depreciation expenses is always an empirical concern from researchers because a long-term accrual can affect current working capital (Sloan, 1996; Dechow and Dichev, 2002; McNichols, 2002; Larson et al. 2018).

impact of a firm's life cycle stage on indicators of firm performance (measured by RNOA). DeAngelo et al. (2006) show the effects of firm life cycle on dividend payout. Koh et al. (2015) document the impact of life cycle stage on decisions relating to corporate distress restructuring. They show that firms' reaction to financial distress differs by its life cycle stage; for instance, distressed firms in the introduction stage reduce their employees whereas distressed firms in the mature stage engage in asset restructuring. Further, Habib and Hasan (2017) find that firm risk-taking is different at different stages of life cycle. They state that risk taking is higher in the introduction and decline stages, but lower in the growth and mature stages. Vorst and Yohn (2018) show the effect of a firm's life cycle stage on the mean reversion in profitability as well as on growth forecasts for the firm. Hribar and Yehuda (2015) document that the accrual anomaly can be explained up to a certain extent by the firm life cycle. However, to the best of our knowledge, no paper has yet identified the impact of a firm's life cycle stage on the quality of its accruals.[6] Through our paper, we attempt to bridge this gap in the literature.

The association between firm life cycle and accrual quality can be driven by, (among others) two main factors that differ over life cycle stages[7]: estimation errors and timing problems. The first factor of firm life cycle on accrual quality comes from the estimation error (or the ease of estimation) of future cash flows. Introduction and decline firms, in particular, do not possess the same customer base as do mature firms. Moreover, they also do not have the technical expertise that mature firms have developed over the years. (Dickinson 2011). In addition, firms in the introduction or decline stage also face higher business uncertainty. These factors can make estimation of cash flows especially difficult (and uncertain) and increase estimation errors. This can lower the accrual quality of such firms as compared to firms in the mature or growth stages.

The second factor (timing problems) derives in part from the firm's investment or disinvestment component that transits through accruals. A firm's investment component is expected to be positively associated with its growth (Bushman, Smith and Zhang, 2008). Firms in the introduction and growth stages will be expected to make larger long-term investments (as a proportion of their assets) as compared to firms in the mature stage. Such long-term investments usually generate cash flows in the future, but these investments are expensed to the income statement immediately. In other words, the consumption of the assets (such as depreciation) does not match the timing of cash generation (from sales). And given the large investment (disinvestment) component in introduction (decline) firms, this timing problems can be more pronounced. This can further worsen the association of these accruals with future cash flows. The opposite is also true in this case. When firms face financial or market constraints, their ability to use their assets can change and they can be forced to dispose their assets, for instance for firms in decline and some in shake-out stages. Such disposals are a one-time event, which can be combined with one-time write-offs and other charges on the income statement, which can further worsen the association between accruals and cash flows.

Consequently, we predict that firms' life cycle stages can influence the quality of accruals. Moreover, we posit that, *ceteris paribus*, accrual quality for mature firms will usually be much higher due to low uncertainty about cash flow realizations than for firms in introduction or decline stages. Thus, the hypothesis of this study is the following:

H1: Accrual quality changes over firms' life cycle stages.

[6] Neither Habib and Hasan (2019) nor Dechow et al. (2010) have discussed any prior study on the association between firm life cycle stage and accrual quality.

[7] We base our main firm life cycle measure based on cash flow patterns (Dickinson, 2011). However, as a robustness test, we also use the retained earnings-based proxy of firm life cycle (DeAngelo et al. 2006).

In the second hypothesis of this paper, we hypothesize that when firms move to another life cycle, the accrual quality is affected depending on the life cycle stage that firms reached. Specifically, we posit that when firms move to decline stage the accrual quality is strongly affected in a negative way, whereas when firms move to mature stage, they experience an improvement in accrual quality.

H2: Accrual Quality is negatively impacted when firms move to decline stage and positively impacted when firms move to mature stage.

3. Research Design and Sample Selection

3.1 Sample Selection

Our sample consists of non-financial U.S. public companies available in the Compustat database from 1987 to 2019. We exclude financial firms due to the specific characteristics of the financial reporting process in the financial industry which can be different from the rest of the firms;[8] moreover, financial firms would not be expected to report information required to calculate working capital accruals. In addition, following previous studies (Dechow and Dichev, 2002; Dickinson, 2011; Cantrell and Dickinson, 2018), we delete firms with either total revenues or total assets or average net operating assets or shareholders' equity or market value lower than $1 million.[9] We also require at least 8 years of data available for any firm to be included in our sample.[10]

Table 1: Sample Selection

Description	**Number**
Starting number of observations	413,476
(-) Duplicate observations	-37,566
(-) Sales less than $1 mil	-39,515
(-) Assets less than $1 mil	-2,220
(-) Avg NOA less than $1 mil	-8,883
(-) Market Value less than $1 mil	-2,726
(-) Stock price less than $5	-70,836
(-) Firms with less than 7 observations	-47,347
(-) Financial Industry	-76,196
(-) Missing observations for lagged CFO (1987)	-29,090
(-) Unmatched obs with IBES data[11]	-59,751
(=) Final Sample	**39,346**

[8] We define financial firms as those firms with SIC code between 6000 and 7000.

[9] In a separate robustness test, we also exclude firm-year observations where the stock price is less than $5. Existing literature (e.g. Zhang, 2006; Jegadeesh & Titman, 2001) usually excludes such observations, to ensure that the main effects are not driven primarily by small and illiquid stocks or by bid-ask bounce. We include this data filter, although our results are unchanged by the inclusion or exclusion of such firms.

[10] This is to ensure that our results are not driven by transient firms (Dechow and Dichev 2002). However, including or excluding such firms or expanding our filter to minimum 12 years of data does not change our findings.

[11] Our results do not change whether we include analyst coverage as an additional control variable or not. That is, the exclusion or inclusion of the observations with missing coverage data does not influence our results.

3.2 Research Design

To examine the influence of firms' life cycle stages on accrual quality, we begin with the base model of accrual quality developed by Dechow and Dichev (2002). Accordingly, we run the following regression for each industry-year combination:

$$WC_{n,it} = \beta_0 + \beta_1 CFO_{it-1} + \beta_2 CFO_{it} + \beta_3 CFO_{it+1} + \varepsilon_{it} \quad (1)$$

Where:

WC_{it} = working capital accruals for firm *i* in year *t;* CFO_{it} = cash flow from operations for firm *i* in year *t;* ε_{it} = residual term, which is the proxy of accrual quality

We use two alternative definitions of working capital accruals following prior studies (Dechow 1994; Dechow and Dichev 2002; Larson et al. 2018). Our first definition of working capital accruals is based on Balance Sheet accounts, and is calculated as $\frac{(\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD)}{Average\ Assets}$, where CA = current assets; CL = current liabilities and STD = current portion of long-term debt. For ease of reference, we refer to this measure as WC1. Our second definition of working capital accruals is based on cash flow accounts and is calculated as $\frac{-(RECCH + INVCH + APALCH + TXACH + AOLOCH)}{Average\ Assets}$ where RECCH = change in accounts receivable; INVCH = change in inventory; APALCH = change in accounts payable; and TXACH = change in taxes payable and AOLOCH = change in other assets. For ease of reference, we refer to this measure as WC2. We then estimate the residuals for each industry-year combination from the regression equation 1 and calculate our two main measures of accrual quality (AQ).[12] The first measure is the standard deviation of the residuals (called Std_resid), based on the current year's and prior 4 years' residuals, and the second measure is the absolute value of the current year's residuals (referred to as ABS_resid). After calculating our two proxies for accrual quality (AQ), we run regression model (2) given below, to study the impact of firm life cycle stage on AQ.:

$$\begin{aligned} AQ_{,it} = \beta_0 + \beta_1 INTRO_{it} + \beta_2 GRO_{it} + \beta_3 MAT_{it} + \beta_4 DECL_{it} + \beta_5 SIZE_{it} + \beta_6 LEV_{it} \\ + \beta_7 ROA_{it} + \beta_8 MTB_{it} + \beta_9 OPCYCLE_{it} + \beta_{10} COV_{it} + \beta_{11} LOSS_{it} \\ + \beta_{12} BIG4_{it} + INDUSTRY + YEAR + \varepsilon_{it} \end{aligned} \quad (2)$$

where: AQ refers to the two measures of accrual quality described above.

INTRO, GRO, MAT and *DECL* are indicator variables capturing the introduction, growth, mature and decline life cycle stages respectively.[13] These are derived from the cash flow patterns following Dickinson (2011).[14]

Accordingly, we assign each firm-year to a life cycle stage based on its cash flows from operations, investing and financing activities as given in the table below:

Cash Flow Type	Life Cycle Stages							
	Introduction	Growth	Mature	Shake-out			Decline	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Operating	–	+	+	–	+	+	–	–
Investing	–	–	–	–	+	+	+	+
Financing	–	+	–	–	+	–	+	–

In a robustness analysis, we also follow Vorst and Yohn (2018), and classify stage (g) in the table above as a growth stage, and re-run our main tests using this revised definition. In addition, to strengthen our results, we use the life cycle proxy developed by DeAngelo et al.

[12] In a robustness test, we use McNichols (2002) approach and include ΔRevenue and Gross PPE as additional controls in equation (1) to estimate residuals. The results do not change substantially.

[13] Please see Appendix 1 for variable definitions

[14] We use the Shake-out stage as our base (benchmark) life cycle stage following Dickinson (2011).

(2006) based on the levels of retained earnings scaled by total assets. Accordingly, we first calculate the ratio of retained earnings to total assets for each firm-year. We then divide them into quartiles, with firms in the lower quartile belonging to the introduction/young group, while firms in the upper quartile considered in the mature/older firms group.[15]

We use several firm characteristics as control variables. *SIZE* is calculated as the natural log of total assets at the end of the fiscal year. *LEV* stands for leverage and is measured as total debt divided by total assets. We control for leverage because it captures the differential financial status of firms; in addition, debt levels affect financing accruals and total accruals as well. *OPROA* is calculated as Income before Extraordinary Items scaled by average value of total assets. The level of OPROA can be correlated to both, a firm's life cycle stage as well as its accrual quality. Market-to-book ratio (*MTB*) is calculated as the market value of equity divided by book value of equity. Since *MTB* has been used as a proxy for growth opportunities, and firm life cycle can be associated with growth opportunities, it is essential to use *MTB* as a control variable. *LOSS* is an indicator variable equal to 1 if the firm reported loss in that year, and 0 otherwise. Loss firms could show different properties on accruals and could be associated with particular life cycle stages (especially introduction or decline stages). *OPCYCLE* is the operating cycle of a firm. Dechow and Dichev (2002) and Frankel and Sun (2018) argue that accrual quality and operating cycle are intrinsically linked. COV is the unique number of analysts following the firm. BIG4 is a dummy variable, equal to 1 if the firm is audited by a BIG 4 auditor, and 0 otherwise. We include the dummy variable to control for any endogenous impact caused by the auditor quality on both, accrual quality and firm life cycle (firms in the mature stage may choose BIG 4 auditors which could also influence their accrual quality). In addition, we include industry and year fixed effects. We use the two-digit SIC code as the industry definition. We cluster the standard-errors at firm-level. All continuous variables are winsorized at 1% on each tail. Please, refer to Appendix A for variable definitions.

4. Results

4.1 Descriptive Statistics and Correlation Matrix

In this section, we present the descriptive statistics as well as correlations relating to the key variables used in our study. Table 2 summarizes key characteristics of our sample, along with each life cycle stage measured based on Dickinson (2011) cash flow approach. Panel A provides summary statistics for the entire sample, whereas Panels B-F provide the summary statistics for introduction, growth, maturity, shake-out and decline stages respectively.

As we can see in Panel A, the average working capital accruals are positive, implying that firms are showing growth on average. However, firms in the introduction and growth stages have the largest working capital accruals, whereas mature and shake-out stage firms have the lowest magnitude of working capital accruals. We note that our two proxies of AQ – AB_WC and SD_WC – are the highest for introduction and decline stage firms (0.058 and 0.047 for introduction firms and 0.062 and 0.051for decline stage firms). Whereas, mature and growth stage firms have the lowest absolute values and standard deviation of residuals in our sample (0.033 and 0.030 for growth firms and 0.026 and 0.027for mature stage firms). This is in line with our hypothesis presented in section 2. Introduction and decline stage firms, on average, have higher residuals, indicating a lower quality of accruals, as compared to firms in the mature and growth stages.

The remaining variables in our study follow similar trends as in Dickinson (2011). For instance, Cash flow from operations (CFO) is positive on average for the full sample. As for firm size, firms in the introduction and decline stages are the smallest in the sample ($157 million for introduction firms and $200 mil for decline firms), whereas firms in the growth and

[15] The results that life cycle influences the quality of accruals are similar.

mature stage are the largest in the sample ($720 million for growth firms and $1.02 billion for mature stage firms). Moreover, while the average ROA for our sample is 3.9%, firms in the introduction (Panel B) and decline stage (Panel F) suffer losses on average, as documented by the negative average ROA for these firms (-7.60% for introduction firms and -10.50% for decline firms). Firms in the growth (Panel C), mature (Panel D) and shake-out (Panel E) stages enjoy positive ROA. This is also documented by a higher probability of a firm facing loss when in introduction or decline stage. Analyst coverage also follows a similar trend. Fewer analysts follow firms in the introduction (about 6 – 7 on average) and decline stage (about 7 on average) than who follow mature (between 10 and 11 on average) and growth stage (between 9 and 10 on average) firms. The length of the operating cycle also follows a similar pattern. Firms in the introduction and decline stage have the longest operating cycle. Introduction stage firms on average display operating cycles that are 189 days long and decline stage firms display operating cycles that are 209 days long. Mature stage firms, on the other hand, have operating cycles that are 121 days long, on average. This substantial variation could be caused by such firms requiring higher credit from their suppliers and requiring longer time to sell their products.

Table 2: Descriptive Statistics

Variable	N	Mean	Std Dev	p25	Median	p75
Panel A: Full Sample						
WC1	105,350	0.011	0.062	-0.017	0.005	0.033
WC2	47,857	0.045	0.106	-0.006	0.023	0.077
ABS_resid	79,954	0.032	0.035	0.009	0.020	0.041
Std_resid	48,933	0.029	0.022	0.015	0.023	0.038
CFO	111,925	0.092	0.099	0.049	0.091	0.142
SIZE	122,570	6.555	2.058	5.076	6.488	7.977
LEV	122,077	0.264	0.220	0.076	0.245	0.386
ROA	114,555	0.039	0.101	0.013	0.045	0.085
MTB	103,683	2.960	3.701	1.325	2.065	3.444
OPCYCLE	91,793	131.922	139.244	72.340	109.254	160.943
COV	63,454	9.722	8.628	3.000	7.000	14.000
LOSS	128,187	0.184	0.388	0.000	0.000	0.000
BIG4	128,187	0.849	0.358	1.000	1.000	1.000
Panel B: Introduction Stage						
WC1	7,013	0.069	0.102	0.000	0.061	0.142
WC2	4,633	0.138	0.166	0.022	0.104	0.229
ABS_resid	4,503	0.058	0.051	0.019	0.043	0.083
Std_resid	1,577	0.047	0.029	0.027	0.041	0.060
CFO	8,309	-0.093	0.091	-0.139	-0.059	-0.021
SIZE	9,283	5.061	1.753	3.821	4.949	6.148
LEV	9,249	0.277	0.256	0.047	0.233	0.426
ROA	8,308	-0.076	0.168	-0.169	-0.022	0.042
MTB	7,327	3.708	4.971	1.304	2.343	4.546
OPCYCLE	6,039	189.516	243.539	99.811	150.429	219.869
COV	4,274	6.713	6.041	3.000	5.000	9.000
LOSS	9,284	0.566	0.496	0.000	1.000	1.000
BIG4	9,284	0.862	0.344	1.000	1.000	1.000
Panel C: Growth Stage						
WC1	35,366	0.018	0.059	-0.011	0.011	0.043
WC2	16,395	0.054	0.099	0.001	0.032	0.089
ABS_resid	27,508	0.033	0.035	0.009	0.022	0.043

Std_resid	15,287	0.030	0.021	0.015	0.024	0.038
CFO	38,192	0.101	0.071	0.051	0.085	0.135
SIZE	40,106	6.579	1.961	5.168	6.483	7.927
LEV	39,981	0.285	0.216	0.104	0.280	0.412
ROA	38,207	0.045	0.081	0.015	0.042	0.081
MTB	34,555	3.030	3.446	1.421	2.160	3.531
OPCYCLE	29,948	124.679	125.650	69.627	104.420	155.016
COV	21,744	9.665	8.339	4.000	7.000	13.000
LOSS	40,113	0.175	0.380	0.000	0.000	0.000
BIG4	40,113	0.896	0.305	1.000	1.000	1.000
Panel D: Mature Stage						
WC1	50,913	0.000	0.046	-0.019	0.000	0.019
WC2	21,962	0.021	0.080	-0.012	0.013	0.049
ABS_resid	40,856	0.026	0.028	0.007	0.017	0.034
Std_resid	27,833	0.027	0.020	0.014	0.022	0.034
CFO	53,961	0.127	0.071	0.078	0.113	0.161
SIZE	56,054	6.929	2.041	5.486	6.924	8.354
LEV	55,879	0.253	0.212	0.080	0.231	0.362
ROA	53,981	0.061	0.073	0.026	0.054	0.095
MTB	47,173	2.873	3.597	1.326	2.051	3.366
OPCYCLE	45,399	120.697	92.033	69.462	103.944	150.179
COV	30,202	10.363	9.059	3.000	8.000	15.000
LOSS	56,057	0.112	0.315	0.000	0.000	0.000
BIG4	56,057	0.894	0.307	1.000	1.000	1.000
Panel E: Shake-out Stage						
WC1	9,718	0.000	0.071	-0.032	-0.001	0.029
WC2	3,428	0.023	0.097	-0.021	0.011	0.057
ABS_resid	5,583	0.042	0.043	0.012	0.029	0.058
Std_resid	3,558	0.036	0.024	0.019	0.030	0.048
CFO	8,510	0.075	0.082	0.028	0.066	0.113
SIZE	14,025	6.256	2.029	4.802	6.131	7.658
LEV	13,890	0.248	0.220	0.045	0.224	0.379
ROA	11,107	0.036	0.097	0.004	0.038	0.080
MTB	11,994	2.525	3.393	1.147	1.740	2.885
OPCYCLE	8,456	158.903	214.301	83.208	124.667	181.527
COV	5,702	9.502	8.915	3.000	6.000	13.000
LOSS	19,630	0.150	0.357	0.000	0.000	0.000
BIG4	19,630	0.616	0.486	0.000	1.000	1.000
Panel F: Decline Stage						
WC1	2,340	0.016	0.092	-0.030	0.011	0.065
WC2	1,439	0.055	0.128	-0.014	0.031	0.111
ABS_resid	1,504	0.062	0.057	0.019	0.043	0.089
Std_resid	678	0.051	0.031	0.027	0.044	0.069
CFO	2,953	-0.105	0.094	-0.158	-0.070	-0.029
SIZE	3,102	5.300	1.835	4.031	5.143	6.392
LEV	3,078	0.231	0.271	0.002	0.128	0.374
ROA	2,952	-0.102	0.171	-0.209	-0.064	0.017
MTB	2,634	3.494	5.257	1.152	2.007	4.199

OPCYCLE	1,951	209.088	259.096	103.362	158.260	237.491
COV	1,532	7.125	6.348	3.000	5.000	10.000
LOSS	3,103	0.681	0.466	0.000	1.000	1.000
BIG4	3,103	0.848	0.359	1.000	1.000	1.000

Note: All variable definitions are available on Appendix A.

In Table 3, we present the Correlation Matrix for the entire sample. As we can see, the two measures of accruals (WC1 and WC2) are positively and significantly correlated with each other. This shows that the two measures can be used in parallel as two accrual measures since they capture similar aspects. We also notice that Cash Flow from Operations are negatively correlated with the two measures of accruals. This is consistent with prior studies that show that the negative correlation is a sign of accrual quality (Dechow and Dichev, 2002; Bushman et al. 2016). Size and leverage are negatively correlated with working capital accruals (-0.229** for size and -0.139** for leverage), implying that larger firms as well as more leveraged firms exhibit lower magnitude of working capital accruals. Firm size is positively correlated with Cash Flow from Operations (0.148***). This makes sense; larger firms would usually be expected to have higher cash flows. Analyst coverage is positively correlated with firm size. This is also documented in Table 2, where we provided evidence of higher analyst following for mature and growth stage firms, which are also among the largest firms in our sample. Firm size is also positively correlated with ROA (0.023***). This implies that larger firms experience higher profits. This is consistent with the evidence in Table 2 where we found higher ROA for mature and growth stage firms, which are usually larger than introduction and decline stage firms.

Table 3: Correlation Matrix

	WC1	WC2	ABS_ resid	Std_ resid	CFOt	Size	LEV	ROA	MTB	Op Cycle	COV	LOSS	BIG4
WC1	1.00	**0.40**	**0.04**	**0.06**	**-0.28**	**-0.13**	**-0.02**	**0.18**	**0.05**	**0.11**	**-0.07**	**-0.14**	**-0.03**
WC2	**0.46**	1.00	**0.09**	**0.07**	**-0.06**	**-0.12**	**-0.14**	**0.27**	**0.18**	**0.04**	-0.00	**-0.17**	**-0.02**
ABS_ resid	**0.07**	**0.12**	1.00	**0.45**	**-0.07**	**-0.21**	**-0.11**	-0.00	0.01	**0.18**	**-0.10**	**0.12**	**-0.02**
Std_ resid	**0.03**	**0.06**	**0.52**	1.00	**-0.09**	**-0.33**	**-0.17**	**-0.03**	**-0.01**	**0.26**	**-0.14**	**0.15**	**-0.05**
CFOt	**-0.31**	**-0.14**	**-0.12**	**-0.12**	1.00	**0.04**	**-0.23**	**0.61**	**0.38**	**-0.12**	**0.20**	**-0.30**	**0.01**
Size	**-0.11**	**-0.12**	**-0.21**	**-0.31**	**0.06**	1.00	**0.37**	**-0.04**	**0.09**	**-0.15**	**0.59**	**-0.07**	**0.26**
LEV	0.00	**-0.11**	**-0.07**	**-0.13**	**-0.19**	**0.31**	1.00	**-0.31**	**-0.09**	**-0.18**	**0.06**	**0.03**	**0.17**
ROA	**0.18**	**0.24**	**-0.07**	**-0.10**	**0.61**	-0.00	**-0.22**	1.00	**0.47**	**0.03**	**0.14**	**-0.54**	**-0.03**
MTB	**0.03**	**0.11**	**0.02**	0.01	**0.23**	**0.05**	-0.01	**0.23**	1.00	**0.04**	**0.29**	**-0.15**	**0.03**
Op Cycle	**0.06**	**0.03**	**0.13**	**0.16**	**-0.14**	**-0.09**	**-0.09**	**-0.03**	**0.02**	1.00	**-0.05**	**0.08**	**-0.04**
COV	**-0.06**	-0.01	**-0.09**	**-0.12**	**0.23**	**0.56**	**0.02**	**0.12**	**0.19**	0.00	1.00	**-0.02**	**0.19**
LOSS	**-0.15**	**-0.17**	**0.14**	**0.16**	**-0.31**	**-0.07**	**0.05**	**-0.62**	**-0.05**	**0.08**	**-0.02**	1.00	-0.00
BIG4	**-0.02**	-0.01	**-0.02**	**-0.05**	0.00	**0.25**	**0.16**	**-0.03**	**0.02**	**-0.03**	**0.16**	-0.00	1.00

Note: This table shows the Pearson (below the diagonal) and Spearman (above the diagonal) correlations of the variables used in our models. All variable definitions are presented in Appendix A. All continuous variables are winsorized at 1% and 99%.

4.2 Main Regressions

In this section, we present our main results in Tables 4 and 5. In Table 4 Panel A, we estimate the base model from Dechow and Dichev (2002) whereby we regress working capital accruals on past, present and future cash flows, for the entire sample and thereby for each life cycle stage. Showing the regressions for each life cycle allows us to show how the association between accruals and cash flows can change across life cycle stages. As mentioned earlier, we calculate working capitals using Dechow (1994) (we call this measure WC1).

In Table 4 Panel A, the coefficients of the base model in Column 1 are in line with the original paper of Dechow and Dichev (2002). Current working capital accruals show a negative association with current cash flows (coeff. = -0.399***) and a positive association with past (coeff. = 0.171***) and future cash flows (coeff. = 0.170***). Columns 2 through 6 present the results of the same regression model as in Column 1, but separately for each life cycle stage. As we move from Columns 2 through 6, we notice variation in the association between current year cash flows and accruals. The association between cash flows and working capital accruals is the least negative for the introduction stage firms (coeff. = -0.303***) and decline stage firms (coeff. = -0.255***), whereas it is the most negative for firms in the mature (-0.399***) and shake-out (-0.430***) stages. One possible explanation for this variation is that Introduction and decline stage firms face significant uncertainty as well as undertake larger long-term investments (divestments for decline firms), both of which could make their accruals less correlated with current year cash flows.

Table 4: Accrual Quality Model and Firm Life Cycle.

Panel A: Results of DD (2002) regression, for total sample and by firm life cycle

	(1) Full	(2) INTRO	(3) GRO	(4) MAT	(5) SHAKE	(6) DECL
CFO_{t-1}	0.171***	0.144***	0.127***	0.197***	0.196***	0.077***
	(0.004)	(0.013)	(0.006)	(0.006)	(0.015)	(0.028)
CFO_t	-0.399***	-0.303***	-0.356***	-0.399***	-0.43***	-0.255***
	(0.006)	(0.022)	(0.009)	(0.007)	(0.02)	(0.04)
CFO_{t+1}	0.170***	0.184***	0.14***	0.159***	0.185***	0.177***
	(0.004)	(0.013)	(0.007)	(0.005)	(0.016)	(0.025)
Intercept	0.016***	0.048***	0.027***	0.01***	-0.004***	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.004)
Observations	84,657	4,680	28,894	43,579	5,937	1,557
Adj. R-squared	0.228	0.292	0.211	0.231	0.209	0.141
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Main regressions of Firm Life Cycle on Accrual Quality

	(1) ABS_resid	(2) ABS_resid	(3) Std_Resid	(4) Std_Resid
INTRO	0.011***	0.009***	0.009***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
GRO	-0.009***	-0.008***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.000)	(0.001)
MAT	-0.015***	-0.014***	-0.007***	-0.006***
	(0.001)	(0.001)	(0.000)	(0.001)
DECL	0.016***	0.016***	0.013***	0.010***
	(0.002)	(0.002)	(0.001)	(0.002)
Size		-0.002***		-0.002***
		(0.000)		(0.000)
LEV		-0.002		-0.000
		(0.001)		(0.002)
ROA		0.034***		-0.005
		(0.005)		(0.004)
MTB		0.000***		0.000**
		(0.000)		(0.000)
Op Cycle		0.000***		0.000***
		(0.000)		(0.000)
COV		-0.000***		-0.000
		(0.000)		(0.000)
LOSS		0.012***		0.005***
		(0.001)		(0.001)
BIG4		-0.001		-0.001
		(0.001)		(0.001)
Intercept	0.041***	0.050***	0.034***	0.050***
	(0.001)	(0.002)	(0.000)	(0.002)

Observations	79,954	39,346	48,933	26,337
Adj. R-squared	0.133	0.160	0.170	0.220
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Panel A presents the results of the Dechow & Dichev (2002) model for the entire sample as well as by each life cycle stage. Column 1 reports the results for the entire sample, whereas models 2-6 report the results for firms in the Introduction, Growth, mature, Shake-out and Decline stages, respectively. Panel B presents the results of regression equation (2), where AQ measures on LC stage indicator variables along with the control variables. Columns 1 and 2 report the results for the absolute value of residuals, whereas columns 3 and 4 report the results for standard deviation of residuals. All variables are defined in Appendix 1. Standard errors reported in the parentheses are clustered at the firm level. ***, *** and * refer to the significance of the coefficient at the 99%, 95% and 90% confidence levels, respectively.

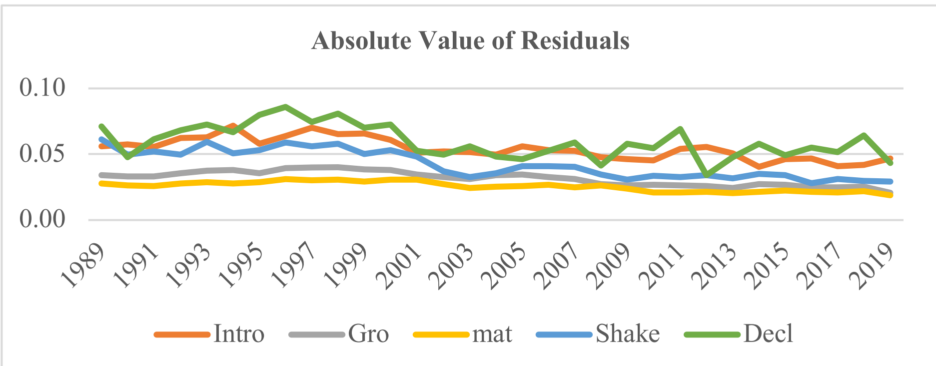
Table 4 Panel B presents the regression results for our two primary proxies of accrual quality by life cycle stage. As explained in equation (2), we regress the two proxies of AQ on the life cycle stages and control variables. In each of these regressions, we have used shake-out stage firms as the base, and thus their effect is captured in the intercept.

In Table 4 panel B, the introduction and decline stage firms have the highest absolute residuals (INTRO = 0.009*** and DECL = 0,016***, respectively) and standard deviation of residuals (INTRO = 0.006*** and DECL = 0.010***, respectively), whereas firms in the mature and growth stages have the lowest absolute residuals (GRO = -0.008*** and MAT = -0.014***) and standard deviation of residuals (GRO = -0.004*** and MAT = -0.006***, respectively). This implies that firms in the introduction and decline stage exhibit the lowest quality of accruals, since a larger proportion of working capital accruals are unexplained by past, present and future cash flows. The uncertainty related to introduction and decline firms increases the estimation error in the accrual system, and the larger investment component lead to higher timing problems. Firms in the mature stage, on the other hand, have the highest quality of accruals.

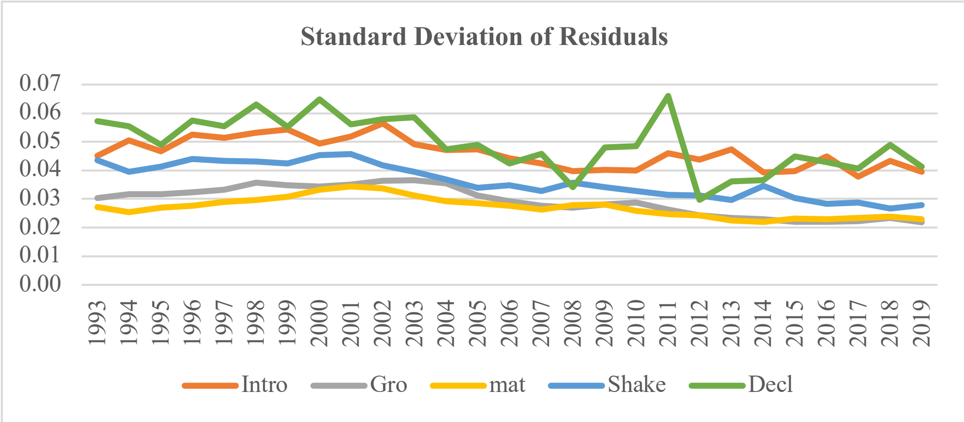
Figure 1 shows the average values of absolute and standard deviation of residuals (our two AQ proxies) for each year by life cycle stage. Panel A presents the absolute values of residuals and Panel B presents the standard deviations. The patterns in the two graphs are consistent with our findings in Table 4. Introduction and decline stage firms exhibit the highest levels of absolute values and standard deviations of residuals, as compared with firms in the mature and growth stage. The evidence in the graphs also extends Bushman et al. (2016) by showing the differential patterns across life cycle stages over years for the two proxies of AQ.

Figure 1: Accrual Quality trend over Firm Life Cycle Stages and Years

Panel A: Absolute Value of residuals



Panel B: Standard Deviation of residuals



In the next test (of Hypothesis 2), we assess the impact of a firm's movement within LC stages on the accrual quality. One might argue that our results are based on association and may not infer causality. This test focuses on the movement of firms across life cycle stages in order to document the causal link between LC stage and AQ. Since decline stage firms exhibit the lowest quality of accruals, firms moving to the decline stage in the current year would exhibit a decrease in the quality of accruals (that is, an increase in the absolute value and standard deviation of the residuals). Similarly, since mature stage firms exhibit the highest quality of accruals, firms moving to the mature stage would exhibit an improvement in accrual quality. The results of this test are presented in Table 5. Panel A includes a dummy variable, MOVE_DECL, which equals 1 if a firm moved to the decline stage from any other life cycle stage in that particular year, and 0 otherwise. As we can see, the coefficient on MOVE_DECL is positive and statistically significant for both absolute residuals (coeff. = 0.022***) as well as on standard deviation of residuals (coeff. = 0.014 ***), which implies a reduction in AQ for firms that move to the decline stage. Similarly, Panel B of Table 5 shows that firms moving to the mature stage exhibit an improvement in the quality of their accruals as evidenced by a reduction in the absolute value of residuals (coeff. = -0.004***)

Table 5: Accrual Quality and Firms Movements over Life Cycle Stages.

Panel A: Move to decline stage

	(1) ABS_resid	(2) Std_Resid
MOVE_DECL	0.022***	0.014***
	(0.002)	(0.002)
Size	-0.003***	-0.003***
	(0.000)	(0.000)
LEV	0.000	0.000
	(0.001)	(0.002)
ROA	0.017***	-0.012***
	(0.005)	(0.004)
MTB	0.000***	0.000**
	(0.000)	(0.000)
Op Cycle	0.000***	0.000***
	(0.000)	(0.000)
COV	-0.000***	-0.000
	(0.000)	(0.000)
LOSS	0.013***	0.006***
	(0.001)	(0.001)
BIG4	-0.001	-0.001
	(0.001)	(0.001)
Intercept	0.045***	0.047***
	(0.001)	(0.002)
Observations	39,346	26,337

R-squared	0.136	0.208
Industry FE	Yes	Yes
Year FE	Yes	Yes

Panel B: Move to mature stage

	(1) ABS_resid	(2) Std_Resid
MOVE_MAT	-0.004***	-0.000
	(0.000)	(0.000)
Size	-0.003***	-0.003***
	(0.000)	(0.000)
LEV	-0.000	0.000
	(0.002)	(0.002)
ROA	0.012***	-0.015***
	(0.005)	(0.004)
MTB	0.000***	0.000**
	(0.000)	(0.000)
Op Cycle	0.000***	0.000***
	(0.000)	(0.000)
COV	-0.000***	-0.000
	(0.000)	(0.000)
LOSS	0.014***	0.006***
	(0.001)	(0.001)
BIG4	-0.001	-0.001
	(0.001)	(0.001)
Intercept	0.047***	0.047***
	(0.001)	(0.002)
Observations	39,346	26,337
R-squared	0.132	0.204
Industry FE	Yes	Yes
Year FE	Yes	Yes

Note: All variables are presented in Appendix A. All continuous variables are winsorized at 1% and 99%. Standard errors reported in the parentheses are clustered at the firm level. ***, *** and * refer to the significance of the coefficient at the 99%, 95% and 90% confidence levels, respectively.

In summary, our results provide evidence that a firm's life cycle stage is an important determinant of the quality of accruals. In the next sub-section, we present results of robustness tests and additional analyses, intended to strengthen our findings.

4.3 Robustness tests

In this sub-section, we discuss the main results of robustness tests conducted to provide strength to our findings, as well as some additional analyses about other aspects of the relation between life cycle and accrual quality. The tables are unreported due to maximum length of 20 pages, however, all tables are available upon request.

4.3.1 Alternative definition of accruals and models

Existing studies use several measures of working capital accruals. Our main tests (Table 4), used accruals based on the Balance Sheet approach in Dechow (1994) and Sloan (1996). In this robustness test, we calculate working capital accruals following DD (2002) (that is, using cash flow statement accounts). The results of this test are presented in Table 6 Panel A. As we can see, the results are qualitatively similar to those in Table 4. Introduction and decline stage firms continue to exhibit the lowest quality of accruals in terms of absolute values and standard deviation of residuals (intro = 0.019*** and 0.009***; decline = 0.014*** and 0.008***), whereas mature stage firms exhibit the highest quality of accruals (-0.002* and -0.001*).[16]

[16] The only difference is that the AQ of growth stage firms is not statistically distinguishable from that of the shake-out stage firms. However, the coefficients are similar to those in table 4.

In the second robustness test, we change the methodology of calculating the residuals, while keeping the accruals definition the same as before (Dechow, 1994). We follow McNichols (2002) and include two additional variables: change in revenues less change in receivables and PPE, both scaled by average assets, in the DD (2002) model to estimate the residuals. The results are presented in Table 6 Panel B. Changing the methodology of calculating the residuals does not alter our results. Introduction and decline stage firms continue to exhibit the lowest quality of accruals, whereas mature and growth stage firms exhibit the highest quality of accruals.

Section 4.3.2 Sub-sample analysis

In this test, we split our sample into two sub-samples – one up to 2002 and the other post-2002. One might argue that our results are driven by the implementation of SOX during our sample period, which could have influenced the accrual quality of firms (Cohen et al. 2008; Ashbaugh-Skaife et al. 2008; Bushman et al. 2016).[17] To resolve that possibility, we re-run our regression on a sub-sample of observations up to 2002 and another after 2002. The results are presented in Table 7 panel A. We find that the influence of a firm's life cycle stage on accrual quality is persistent regardless of whether the period falls prior to or post-2002. We find that in the pre-SOX period, the accrual quality of introduction stage firms is statistically similar to that of shake-out firms. Decline stage firms exhibit the lowest quality accruals whereas growth and mature stage firms exhibit the highest quality of accruals, both pre- and post-SOX. These results strengthen our findings and reinforce the impact of a firm's life cycle stage on accrual quality.

In the next sub-sample analysis, we exclude firms with less than 12 observations in our sample and re-run the main test (Table 4). We do this to reduce the effect of transient firms driving our results. Although we have already restricted our sample to firms with a minimum of 8 observations, one might argue that 8 years does not remove transient firms completely. The results of this test are presented in Table 7 Panel B. We find that even after removing firms with less than 12 observations, our results are qualitatively unchanged. Mature and growth firms still exhibit the highest quality of accruals whereas introduction and decline firms exhibit the lowest quality of accruals.

In the next sub-sample analysis, we exclude firms with operating cycles longer than 365 days. Dechow and Dichev (2002) show that operating cycle length is an important factor influencing the quality of a firm's accruals. Moreover, Table 2 shows that introduction and decline firms exhibit longer operating cycles on average. Given this, one might argue that our results may be driven by firms with very long operating cycles within intro and decline firms. Although we include operating cycle length as a control variable, in this test, we exclude firms with operating cycles longer than 365 days and re-run our main model (equation 2). The results presented in Table 7 panel C show that accrual quality is still the lowest for introduction (coeff. = 0.008*** and 0.005*** in columns 1 and 2) and decline firms (coeff. = 0.016*** and 0.010*** in columns 1 and 2), whereas accrual quality is the highest for firms in mature firms (coeff. = -0.013*** and -0.005***) and growth stage firms (coeff. = -0.007*** and -0.003***). This shows that our results are not driven by the length of operation cycles, but by the firm's LC stage.

Section 4.3.3 Alternative definitions of firm life cycle stages

In this robustness test, we use alternative definitions of the life cycle stage. In the first test, we follow Vorst and Yohn (2018) to reclassify firms with negative operating cash flows and positive investing and financing cash flows as growth firms, instead of decline firms as done in Dickinson (2011). We use this revised definition and re-run our main regression

[17] Bushman et al. (2016) as well as Cohen et al. (2008) show the impact of SOX implementation on accrual quality and earnings management respectively.

equation (equation 2). The results of this test are presented in Table 8 Panel A. As we can see, even with the revised definition of growth and decline firms, our results are consistent with our earlier findings. Mature and growth firms continue to exhibit the highest quality of accruals, which means lower absolute values and lower standard deviations of residuals (-0.007*** and -0.004*** for growth firms), whereas firms in the introduction and decline stage exhibit the lowest quality of accruals (0.026*** and 0.013*** for decline firms).

In addition to the above test, we use the life cycle stage measure from DeAngelo et al. (2006) based on the proportion of Retained Earnings (RE) to Total Assets (TA). We present our main result (Table 4) using the alternative proxy from DeAngelo et al. (2006). Following DeAngelo et al. (2006), we generate two indicator variables – *HLCDA* which equals 1 if the firm is identified as a mature stage firm (quartile 4 of the RE/TA distribution) and 0 otherwise; and *LLCDA* which equals 1 if the firm is identified as an introduction stage firm (quartile 1 of the RE/TA distribution) and 0 otherwise. We then re-run our main regression equation (equation 2) using these two indicator variables in place of the original four LC Stage variables. The results are presented in Table 8 Panel B. The results are in line with our original results. The firms in the mature stage (HLCDA dummy firms) continue to report a better quality of accruals (coeff. = -0.006*** and -0.004*** in columns 1 and 2 respectively) whereas firms in the introduction / decline stage (LLCDA dummy firms) report a lower quality of accruals (coeff. = 0.002*** and 0.004*** in columns 1 and 2 respectively).

Section 4.3.4: How life cycle stage shapes accruals

This analysis is based on the underlying assumption that firm life cycle shapes accruals of firms. However, most prior studies use residuals as the dependent variable. Consequently, we have no evidence on how different types of accruals are influenced by a firm's life cycle stage. We use several proxies of total accruals – working capital accruals as defined in Dechow (1994), Dechow and Dichev (2002) and Larson et al. (2018), as well as comprehensive accruals, long-term accruals and financing accruals as defined in Larson et al. (2018). The results are presented in Table 9. We find that introduction and decline firms have a larger magnitude of accruals than firms in other life cycle stages. This strengthens our earlier findings on lower accrual quality for introduction and decline firms, as compared to mature and growth stage firms. We find the same pattern whether we define total working capital accruals following Larson et al. (2018) (Column 1) or following Dechow and Dichev (2002) (Column 2)

In Columns 3, 4 and 5, we find that the different types of accruals are also influenced by the firm's life cycle stage. For instance, long-term accruals and comprehensive accruals are significantly positive for introduction firms, whereas these are much lower for mature firms. Decline firms show a statistically significant and positive coefficient on long-term accruals (0.04***) as well as comprehensive accruals (0.057***), but much lower than for introduction firms (0.097*** and 0.092*** respectively). This is expected, as decline firms would not be expected to make large long-term investments, given the decline they face in profitability. The results in column 4 for financing accruals are also in line with our expectation. Introduction firms exhibit a large negative coefficient followed by growth and decline firms. As stated in Larson et al. (2018), a negative coefficient implies debt-related borrowing by firms. Introduction and growth firms would be expected to depend on debt more than mature firms. Decline firms face financial constraints to access external credit, which is seen in a much lower negative coefficient on decline firms (-0.037***) for the financing accruals. Overall, these findings explain our earlier results, and capture another effect of firm life cycle stage on the quality of its accruals. We show that firm life cycle stage not only influence the estimation errors (as seen in absolute and standard deviation of residuals) but also the long-term and financing accruals.

5. Conclusion

In this paper, we examine how firm life cycle stage influences the quality of its accruals. We hypothesize that life cycle stage influences the quality of accruals and find that introduction and decline firms exhibit lower quality of accruals as compared to mature and growth firms. We also provide new evidence on how different types of accruals behave differently over life cycle stages. We find that introduction and growth firms exhibit higher long-term and comprehensive accruals, and a much lower financing accruals. Mature firms, on the other hand, show the opposite pattern – they exhibit a much lower magnitude of long-term accruals and comprehensive accruals implying a stable cash flow generation.

Our results are robust to alternative definitions of life cycle stage (DeAngelo et al. 2006 as well as a variation of the Dickinson (2011) based on Vorst and Yohn 2018), to alternate measures of accruals and residuals, as well as to any SOX related effects. We further show that our results are also not influenced by the existence of transient firms.

Our paper contributes to the accrual quality literature by documenting life cycle stage as an important factor influencing the quality of accruals. This paper also contributes to prior literature on life cycle stages by documenting how firm life cycle stage can influence different types of accruals. Furthermore, our paper also contributes to analysts and investors, since incorporating the link between life cycle stage and accrual quality can improve their investment and decisions. Our results documenting the impact of life cycle stage on accrual quality can also be used by auditors in their audit planning stage, since accruals can be a major area of focus for auditors.

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APPENDIX A: VARIABLE DEFINITIONS

Variable Name	Description
MAIN VARIABLES	
INTRO	Firm life cycle stage – Introduction stage following Dickinson (2011)
GRO	Firm life cycle stage – Growth stage following Dickinson (2011)
MAT	Firm life cycle stage – Maturity stage following Dickinson (2011)
SHAKE	Firm life cycle stage – Shakeout stage following Dickinson (2011)
DECL	Firm life cycle stage – Decline stage following Dickinson (2011)
HLCDA	An indicator variable, equal to 1 if the firm is classified as a mature firm, that is, in the upper quartile of the RE / AT distribution, following DeAngelo et al. (2006).
LLCDA	An indicator variable, equal to 1 if the firm is classified as an introduction / decline firm, that is, in the lower quartile of the RE / AT distribution, following DeAngelo et al. (2006).
Std_resid	Standard Deviation of the residuals, estimated from the Dechow & Dichev (2002) regressions of working capital accruals on past, current and future cash flows
ABS_resid	Absolute value of residuals, estimated from the Dechow & Dichev (2002) regressions of working capital accruals on past, current and future cash flows
WC1	Working Capital Accruals, calculated as follows: $\frac{(\Delta CA-\Delta Cash)-(\Delta CL-\Delta STD)}{Average\ Assets}$, where CA = current assets; CL = current liabilities and STD = current portion of long-term debt
WC2	Working Capital Accruals, calculated as follows: $-(RECCH+INVCH+APALCH+TXACH+AOLOCH)$
CONTROL VARIABLES	
SIZE	Natural logarithm of total assets at the end of the fiscal year
ROA	Income before Extraordinary Items divided by average assets for the year
LEV	Total Debt divided by Total assets
MTB	Market value of equity divided by book value of equity
BIG4	Indicator variable, equal to 1 if the firm is audited by a BIG4 auditor, and 0 otherwise
LOSS	Indicator variable equal to 1 if income before extraordinary items is negative, and 0 otherwise
OPCYCLE	A firm's operating cycle, calculated as 360/(Sales/Average AR)+360/(COGS/Average Inventory)
LTACC	Long Term Accruals, calculated following Larson et al. (2018), as follows: $OPACC-WCACC$, where $OPACC=(\Delta AT-\Delta CHE-\Delta IVAEQ-\Delta IVAO)-(\Delta LT-\Delta DLC-\Delta DLTT)$
COV	The number of unique analysts following a firm in a given fiscal year