The Role of Life Cycle-Wide Earnings in Forecasting and Valuation

ABSTRACT

In this study, we investigate the existence and informational value of life cycle-wide and firm-specific earnings, and examine the extent to which these components are reflected in stock prices. We find that life cycle-wide earnings are significantly more persistent than firm-specific earnings. Investors misprice these earnings by underreacting to the common component and overreacting to the firm-specific component. Consistent with our results reflecting mispricing, we find a predictable drift in future abnormal stock returns in the direction of life cycle earnings. We additionally find that our results are not affected by industry dynamics, which further illustrates the added value of life cycle as a fundamental driver of firm profitability. Finally, we find that analysts do recognize the importance of life cycle information, and, at least partly, incorporate such information in their earnings forecasts. Our study adds to the understanding of a firm's earnings generating process and provides additional evidence on the relevance of life cycle information in forecasting and valuation.

Keywords: Life cycle, earnings persistence, forecasting, valuation

I. INTRODUCTION

Persistence of earnings as an attribute of earnings quality has received great attention in prior literature, with a major focus on its usefulness for equity valuation purposes (Dechow et al. 2010). To the extent that a higher persistence improves the accuracy of valuation outcomes, more persistent earnings hold stronger predictive power over future firm performance and should therefore receive a larger weight in equity valuation. Early studies mainly focused on the persistence and pricing of total earnings and its components as defined by the accounting system, i.e., (subparts of) cash flows and accruals (e.g., Allen et al. 2013; Dechow et al. 2008; Richardson et al. 2005; Sloan 1996). For example, Sloan (1996) suggests that the market focuses on aggregate earnings and fails to incorporate the differential persistence of cash flows and accruals. Reported earnings, however, are a joint product of the accounting system and a firm's fundamental performance (Dechow et al. 2010).

Fewer studies examine the effect of firm fundamentals on the persistence of earnings. Lev (1983) associates persistence with firm fundamentals, such as product type, industry competition, capital intensity, and firm size. Other studies have linked the persistence of earnings to firm strategy, i.e., differentiation versus cost leadership strategy (e.g., Fairfield and Yohn 2001; Nissim and Penman 2001; Soliman 2008). Hui et al. (2016) depart from Sloan (1996) by basing the disaggregation of earnings directly on industry fundamentals. Average industry performance is found to be more persistent than firm-specific deviations from the industry norm. Results show, however, that investors do not seem to account for the differential persistence of industry-wide and firm-specific earnings components and consequently misprice earnings. Such analyses on common industry earnings have contributed to a stream of literature that has primarily focused on industry as an important economic determinant of a firm's earnings generating process and firm growth (e.g., Dechow et al. 1995; Fairfield et al. 2009). Consequently, industry models are now extensively used in forecasting and valuation.

In this study, we depart from this major focus on industry models and focus on organizational life cycle as a driver of a firm's fundamental performance. Specifically, we investigate the existence and informational value of life cycle-wide and firm-specific earnings, and examine the extent to which these components are reflected in stock prices and analyst earnings forecasts.[1] Recent studies show that accounting measures vary in a predictable way by firm life cycle, which shows that next to industry, organizational life cycle is an important determinant of firm performance. For example, the value-relevance of reported accounting measures and the behavior of accruals have been shown to vary predictably by life cycle stage (Anthony and Ramesh 1992; Hribar and Yehuda 2015; Dickinson et al. 2018). Other studies have documented the relevance of life cycle fundamentals for forecasting and valuation (Dickinson 2011; Cantrell and Dickinson 2018; Vorst and Yohn 2018; Vorst and Yohn 2019). Dickinson (2011) shows that there are substantial and persistent differences in average profitability across firm life cycle stages. Vorst and Yohn (2018) further find that mean-reversion models for profitability and growth differ per life cycle stage, and show that life cycle models outperform economy-wide and industry-specific models on accuracy improvements. Their finding that profitability measures revert to a life cycle stage-specific mean suggests that a life cycle-wide earnings component exists.

In this paper we investigate the informational value of this common earnings component, i.e., how sustainable or persistent it is, and the use of life cycle models in forecasting and valuation. Given the relatively sticky nature of the fundamentals underlying firm life cycle, we expect the common earnings component to be more persistent than firm-specific deviations from the life

[1] In this study, informational value refers to the persistence or sustainability of earnings components.

cycle-wide average. Additionally, given prior findings that investors fail to fully incorporate the differential persistence of earnings components into stock prices, we expect the market to underreact to life cycle-wide earnings and overreact to firm-specific earnings.

To further explore the importance of organizational life cycle as a driver of a firm's fundamental performance we follow prior literature (e.g., Sloan 1996; Konstantinidi et al. 2016; Hui et al. 2016) and use the Mishkin (1983) test, in which we regress next year's profitability on current profitability to identify the persistence of both earnings components, and obtain the implicit weights impounded in stock prices by regressing next year's abnormal returns on current profitability. We use return on net operating assets (RNOA) as our profitability measure and define life cycle-wide earnings as the average earnings of all firms in the same life cycle stage and year. Firm-specific earnings represent the difference between a firm's reported earnings and life cycle-wide earnings. We capture firm life cycle with the cash flow based life cycle measure of Dickinson (2011).

We find that life cycle-wide earnings are significantly more persistent than firm-specific deviations from the norm. The market does not fully utilize this differential, as the weights attributed to both components in forecasting next year's earnings are statistically indistinguishable. Consequently, we find that the average investor significantly underprices life cycle-wide earnings and overprices firm-specific earnings. These results are in line with prior research that shows that the average market participant fixates on aggregate earnings, but fails to fully recognize the value of life cycle information for forecasting and valuation. Consistent with these results reflecting investor mispricing, we find that firm life cycle earnings significantly predict future abnormal stock returns. Results from a decile test show a predictable drift in future abnormal returns in the direction of life cycle-wide earnings, and a significant return spread between the highest and lowest decile of life cycle-wide earnings.

Similar to the literature on industry, the organization literature documents that firm life cycle is characterized by a combination of internal and external fundamentals (Miller and Friesen 1984). To the extent that industry and firm life cycle may share some underlying fundamentals, e.g., competitive environment, we rerun our main market analysis and include industry-wide earnings to examine whether life cycle earnings add incremental value over industry earnings. Results show that even after accounting for industry, the adjusted life cycle-wide earnings are significantly more persistent than firm-specific as well as industry earnings, and again underreacted to by the market. This suggests that the common life cycle component is incrementally relevant and is complementary to industry earnings. Interesting to note is that these results do not hold the other way around. When we adjust industry earnings for life cycle earnings, the industry component is no longer more persistent than the firm-specific component, nor is it priced significantly different by the market. Life cycle earnings are still highly persistent and underpriced. This suggests that the fundamentals that originally drive the higher persistence of industry earnings are also captured by life cycle-wide earnings, while life cycle earnings capture additional fundamentals, independent of industry drivers. Together, these results suggest that life cycle is a comparatively more complete construct than industry as a driver of earnings persistence. These findings complement Vorst and Yohn (2018), who conclude that life cycle models outperform industry models in profitability mean-reversion models.

Cantrell and Dickinson (2018) use both firm-specific and industry-wide life cycle information to define leaders and laggards and find that profitability depends on the firm life cycle stage relative to the industry life cycle stage. We examine industry life cycle as a relevant characteristic of a firm's earnings generating process. Results show a marginally higher persistence for the common component, which suggests that industry life cycle is a driver of earnings persistence. Also in this model we find that common earnings are underpriced whereas firm-specific deviations are overpriced. To mitigate the concern that persistence in firm life cycle earnings is largely driven by industry life cycle information, and as such is influenced by industry dynamics, we rerun our main test on subsamples where firm and industry life cycle stages are either aligned or not aligned. Results show that also in the sample of non-aligned firms, the common component is relatively more persistent and underpriced, whereas the firm-specific component remains overpriced. This strengthens our earlier finding that firm life cycle persistence is not dependent on industry dynamics and supports the view that firm life cycle information is an important driver of a firm's fundamental performance.

We next investigate whether our main results hold for more sophisticated market participants such as analysts. Analysts typically consider a wider range of information in forming expectations of future profitability, and may have access to more information than an average investor. To investigate whether analysts consider life cycle in their forecasts, we build on Vorst and Yohn (2018) and examine whether analyst return on equity (ROE) and return on assets (ROA) forecasts are more strongly associated with life cycle model profitability forecasts than forecasts based on aggregate earnings. Results show that the predictions based on life cycle models explain significantly more of the variation in analyst forecasts, which suggests that analysts do incorporate life cycle information in forming their expectations. As such, we conclude that analysts perform better than the average market participant by recognizing the importance of life cycle fundamentals for forecasting and valuation, and as a result, (at least) partially incorporate this information in their profitability forecasts.

Next, we also examine the sensitivity of earnings persistence (and pricing) to dropping single life cycle stages, life cycle tenure, profit or loss-making firms, and alternative life cycle proxy specifications. First, while the persistence of life cycle-wide earnings is not driven by one dominant life cycle stage, investors react differently to the common earnings component depending on the life cycle stage of the firm. Second, while the persistence of life cycle-wide earnings is higher when a firm is in the same life cycle stage for more than a year, we still observe that common earnings are relatively more informative about next year's profitability even when life cycle tenure is limited to only one year. We further find that the mispricing of life cycle-wide earnings is driven by firms whose tenure exceeds one year, indicating the absence of a learning effect. Third, even though profit-making firms enjoy a higher persistence, the life cycle-wide component for loss-making firms is still significantly more persistent than firm-specific earnings and thus benefits from a greater informational value. Fourth, the relative persistence of life cycle-wide and firm-specific earnings is robust to our life cycle measure being determined over the last two and three year cash flows, respectively. Finally, the relative persistence is robust to scaling our profitability measure by average assets, as well as to truncating the earnings components per year.

Our study contributes to the literature on earnings persistence as a measure of earnings quality and its role in forecasting and valuation. Prior studies have mainly focused on the persistence and pricing of aggregate earnings and its components as defined by the accounting system (e.g., Sloan 1996; Konstantinidi et al. 2016), or have focused on widely-used industry fundamentals to address earnings persistence (Hui et al. 2016). We extend the research on economic fundamentals and earnings quality (e.g., Owen et al. 2016; Hui et al. 2016) by documenting the importance of firm life cycle as a driver of a firm's fundamental performance.

This study also contributes to the literature on firm life cycle by showing that commonalities shared by firms in the same stage are captured by a common earnings component that impacts earnings persistence in a predictable way. While these results have implications for forecasting and valuation, we show that investors do not recognize the higher persistence of life cycle-wide earnings and as a result, misprice earnings. Analysts appear more efficient and do consider life cycle fundamentals in their forecasts. Finally, we provide evidence that life cycle-wide earnings predict future abnormal stock returns, consistent with investor underreaction. Together, our paper adds to the growing body of evidence on the relevance of firm life cycle in forecasting and valuation.

Our study extends two related studies on the effect of firm life cycle on firm profitability. Dickinson (2011) analyses firm performance per life cycle stage and finds persistent differences in levels and future changes in profitability, as well as differences in the degree of mean reversion across life cycle stages. Vorst and Yohn (2018) further find that mean-reverting models based on life cycle stages improve the accuracy of profitability and growth forecasts. While both studies show that life cycle stage commonalities affect earnings dynamics and suggest that a life cycle-wide earnings component exist, they do not directly identify this common component nor are they informative about its persistence. In our study, we extend previous literature by investigating the existence and informational value of life cycle-wide and firm-specific earnings. Moreover, rather than considering total profitability per life cycle stage, we capture the effect of life cycle fundamentals on earnings in one component. As such, we are able to distinguish between earnings generated by commonalities per life cycle stage and earnings driven by individual firm characteristics.

The remainder of this paper is organized as follows. Section two discusses the role of firm life cycle in the persistence and pricing of earnings. Section three discusses the research design. We present and discuss our results in section four, and use section five to conclude.

II. LIFE CYCLE AND EARNINGS PERSISTENCE

Earnings Persistence

Reported earnings are a joint product of the accounting measurement system and a firm's fundamental performance (Dechow et al. 2010). Accordingly, the persistence of earnings is also driven by these two factors. While there is ample research on the persistence of earnings components as defined by the accounting system, with accruals being the most studied determinant (e.g., Sloan 1996; Nissim and Penman 2001; Richardson et al. 2005), studies on how economic fundamentals influence earnings persistence are relatively scarce. Yet, studying this relationship is important to evaluate persistence as a measure of earnings quality (Dechow et al. 2010). Studies have associated the sustainability of earnings with individual fundamentals, such as product type, industry competition, capital intensity, and firm size (Lev 1983), and differentiation versus cost leadership strategy (e.g., Fairfield and Yohn 2001; Nissim and Penman 2001; Soliman 2008). Hui et al. (2016) capture multiple underlying factors at once by basing the earnings decomposition on industry. They argue that industry fundamentals such as production technology, consumer taste, and regulatory environment are relatively long-lasting. Earnings based on these fundamentals – i.e., industry-wide earnings – should therefore enjoy a higher persistence than firm-specific deviations, which are earnings that dissipate quicker due to competitive forces within an industry.

Firm Life Cycle

Similar to the literature on industry, the organization literature on firm life cycle suggests that each life cycle stage is defined by a typical combination of internal and external characteristics. Miller and Friesen (1984) show that firms in a specific life cycle stage differ from firms in other stages along several dimensions, being external environment, organizational structure, decision-making style, and firm strategy. More specific examples of internal factors that have been shown to vary systematically with life cycle stage include human resource management practices (Milliman et al. 1991), organizational designs needed to aid innovation (Koberg et al. 1996), and management accounting systems (Moores and Yuen 2001), including the application of activity-based costing (Kallunki and Silvola 2008). Examples of external factors that differ across life cycle stages are the importance of stakeholders (Jawahar and McLaughlin 2001), the competitive environment and market structure (Gort and Klepper 1982; Klepper 1996), and firm networks (Hite and Hesterly 2001).[2] Contrary to a firm's industry, which is rather fixed, a firm's life cycle is likely to vary over time. As firms transition between different corporate development phases, they experience predictable changes in these underlying characteristics. In sum, firm life cycle reflects the interdependencies of a firm's fundamentals, and as a single construct captures the interplay of a diverse set of factors.

Firm Life Cycle and Earnings Persistence

Prior studies have documented the importance of a firm's life cycle in its earnings generating process. Hribar and Yehuda (2015) show that the relative role of accruals, i.e., timing adjustment for cash flows or investment in firm growth, varies with life cycle stage. Firm life cycle also

[2] Other characteristics that the accounting and finance literature has documented to vary with firm life cycle include a firm's board composition (Lynall et al. 2003), merger and acquisition activity (Owen and Yawson 2010), dividend policy (DeAngelo et al. 2006; Grullon et al. 2002), diversification (Arikan and Stulz 2016), and the role of life cycle peers in relative performance evaluation (Drake and Martin 2018).

explains variation in the value-relevance of reported accounting measures, such as sales growth, capital investment, earnings and book values, as well as analysts' earnings forecasts (Anthony and Ramesh 1992; Dickinson et al. 2018). Additionally, recent accounting studies show that life cycle is relevant in analyzing, predicting and valuing a firm's financial performance (Dickinson 2011; Cantrell and Dickinson 2018; Vorst and Yohn 2018). Dickinson (2011) shows persistent differences in firm performance across life cycle stages. She further documents differences in the degree of mean-reversion, with profitability for firms in the introduction and decline stages being less persistent compared to firms in the growth and maturity stages. Vorst and Yohn (2018) build on these results and examine the usefulness of life cycle in modeling mean-reversion for profitability and growth forecasts. They find improvements in the accuracy of out-of-sample forecasts for profitability and growth, and additionally show that life cycle models significantly outperform economy-wide and industry-specific models.

The above suggests that firm profitability tends to mean-revert to life cycle stage-specific averages. This indicates the existence of a common component in earnings, which captures the part of firm performance that is driven by shared characteristics of firms in the same life cycle stage. These studies, however, do not shed light on the persistence of the life cycle component itself. Triggered by these findings, we investigate the existence and informational value of life cycle-wide and firm-specific earnings, and examine whether and to what extent it is priced by market participants. Generally, the fundamentals underlying firm life cycle are relatively sticky and are less susceptible to change, which leads us to expect that the earnings generated by these factors are relatively long-lasting. Performance that deviates from the norm may reflect for example one-time events or a firm's competitive edge and is expected to dissipate rather quickly.

We therefore evaluate whether the common earnings component is more persistent than the firm-specific deviations.[3]

We also examine whether market participants are aware of the expected differential persistence of life cycle-wide and firm-specific earnings. For our main analyses, we focus on the average market participant. Prior literature suggests that the market fixates on aggregate earnings and fails to incorporate the varying persistence levels of its components into stock prices (Sloan 1996). Hui et al. (2016) find similar results and document that investors predictably misprice earnings components by significantly underpricing the more persistent industry-wide earnings and overpricing firm-specific earnings. Given these prior findings, we expect the market to underreact to the higher persistence of life cycle-wide earnings and overreact to firm-specific deviations.

III. RESEARCH DESIGN

The main sample includes all observations for which we have matching data in Compustat and CRSP over the period 1987 to 2016 for firms with shares listed on the NYSE, AMEX, and NASDAQ.[4] We exclude financial institutions (sic 6000-6999) and further require non-missing data on firm life cycle, six-digit Global Industry Classification Standard (GICS) code, and our profitability measure RNOA. Following Fairfield et al. (2009), we exclude firm-year observations

[3] Earnings persistence is often used as proxy for earnings quality (EQ) and relies on the premise that "firms with more persistent earnings have a more "sustainable" earnings / cash flow stream that will make it a more useful input into discounted cash flow (DCF)-based equity valuations" (Dechow et al. 2010, p.351). Although many users of financial statement information perceive persistence as a measure of EQ, higher persistence does not always lead to actual increased earnings quality, e.g., if persistence is achieved through earnings management. In this study, individual adjustments up or down should to a great extent cancel out among life cycle-year groups, such that the life cycle-wide earnings component is largely unaffected and at most picks up a small bias if there are relatively more or greater upward adjustments. Here, increased persistence due to earnings management would be mostly captured by, and hence inflate, the firm-specific earnings component. Altogether, persistence through earnings management should not be problematic for the results and inferences of our study, as these now provide a rather conservative view. Specifically, if higher persistence due to earnings management would be fully absent, we expect to observe an even lower persistence coefficient for firm-specific earnings and thus a more pronounced difference between life cycle-wide and firm-specific earnings.

[4] We start our sample in 1987 as this is the first year for which we have (limited) cash flow data available in Compustat. Broader coverage only starts one year later, in 1988.

where sales revenue or average net operating assets are less than $10 million. We further exclude firm-years with an absolute RNOA greater than 1, resulting in 89,356 firm-year observations which we use to calculate our life cycle-wide and firm-specific earnings components. After matching Compustat with return data, we obtain a final sample of 70,386 firm-year observations for our main analysis.

We measure firm life cycle using Dickinson's (2011) cash flow based proxy. Based on systematic patterns in firms' operating, investing, and financing cash flows, firms are classified into one of the five life cycle stages, being *Introduction*, *Growth*, *Maturity*, *Shakeout*, and *Decline*.[5] As cash flow patterns do not move in a pre-defined way, the measure allows firms to transition across different life cycle stages nonsequentially and along individual time paths, which is in line with life cycle theory (Miller and Friesen 1984).

To investigate the persistence of earnings driven by life cycle fundamentals, we partition earnings into life cycle-wide and firm-specific components. Life cycle-wide earnings capture the common component of earnings for all firms in the same life cycle stage, while firm-specific earnings represent individual firms' deviations from the life cycle-wide average. We define our profitability measure *EARN* as operating income after depreciation (Compustat OIADP) scaled by average net operating assets. Net operating assets is equal to the sum of common stock (Compustat CEQ), preferred stock (Compustat PSTK), long- and short-term debt (Compustat DLTT and DLC),

[5] The following classification table is used to classify firm-year observations to the specific life cycle stages (retrieved from Dickinson 2011, p. 1974):

	Life Cycle Stages							
	Introduction	Growth	Mature	Shakeout			Decline	
Cash Flow Type	1.	2.	3.	4.	5.	6.	7.	8.
Operating Activities	-	+	+	-	+	+	-	-
Investing Activities	-	-	-	-	+	+	+	+
Financing Activities	+	+	-	-	+	-	+	-

and minority interest (Compustat MIB), minus cash and short-term investments (Compustat CHE). Following the approach used in prior literature on industry earnings (e.g., Hui et al. 2016) *EARN* is then decomposed as follows: assuming *N* firms in life cycle stage *j*, the life cycle-wide earnings component of life cycle stage *j* in year *t* is defined as

$$LCEARN_{j,t} = 1/N \sum_{i=1}^{N} EARN_{i,j,t} \quad (1)$$

where *LCEARN* depicts the value-weighted average earnings of firms in the same life cycle stage and year. Firm-specific earnings of firm *i* in life cycle stage *j* and year *t* is defined as

$$FirmEARN_{i,j,t} = EARN_{i,j,t} - LCEARN_{j,t} \quad (2)$$

where *FirmEARN* is the difference between a firm's reported earnings *(EARN)* and the life cycle-wide earnings *(LCEARN)*. All earnings variables are truncated at the 0.5% and 99.5% level.

Market Pricing

To test the joint hypothesis that life cycle-wide earnings are relatively more persistent and that the market fails to incorporate the differential persistence levels, we follow prior literature (e.g., Sloan 1996; Konstantinidi et al. 2016; Hui et al. 2016) and use the Mishkin (1983) test. We first estimate the following ordinary least square (OLS) regression to test whether the common component is more persistent than the firm-specific earnings:

$$EARN_{t+1} = a_0 + a_1 LCEARN_t + a_2 FirmEARN_t + \varepsilon_{1t+1} \quad (3a)$$

where $EARN_{t+1}$ equals next-year earnings, and $LCEARN_t$ and $FirmEARN_t$ represent the life cycle-wide and firm-specific earnings as defined earlier. We expect a relatively stronger association between life cycle-wide earnings and future earnings, such that $a_1 > a_2$. Next, to obtain the implicit weights impounded in stock prices, we estimate the following Mishkin non-linear generalized least square pricing regression model:[6]

$$CAR_{t+1} = Multiple \times (EARN_{t+1} - \alpha_0 - \alpha_1 LCEARN_t - \alpha_2 FirmEARN_t) + \varepsilon_{2t+1} \quad (3b)$$

where CAR_{t+1} is next year's abnormal return, defined as the size-adjusted 12-month buy-and-hold stock return starting the fourth month after the end of fiscal year *t*, and *Multiple* equals the earnings response coefficient. If the market fails to fully incorporate life cycle information into stock prices and focus on aggregate earnings instead, we expect $\alpha_1 = \alpha_2$. Additionally, we expect investors to underreact to life cycle-wide earnings and overreact to firm-specific earnings, such that $a_1 > \alpha_1$ and $a_2 < \alpha_2$.

Life Cycle-Wide Earnings and Future Abnormal Returns

If the market fails to incorporate differential persistence levels and thus misprices earnings, we would also expect higher future abnormal stock returns as life cycle-wide earnings increase. To examine this, we create decile portfolios of current life cycle-wide earnings and examine future abnormal returns (CAR_{t+1}) for each decile. We impose two additional sample restrictions before partitioning LCEARN. To avoid a look-ahead bias regarding the distribution of life cycle-wide earnings, we only select firms with a fiscal year-end in December. We additionally require the closing stock price to be above $1 to mitigate noise due to for example infrequent trading or bid-ask spread bounces. Our final sample for the future abnormal returns test consists of 48,058 firm-years.

[6] We perform the Mishkin test using non-linear least square estimation via the *nlsur* command in Stata.

IV. RESULTS

Descriptive Statistics

Table 1 reports the descriptive statistics based on the market pricing sample, with summary statistics reported in Panel A and correlation tables presented in Panel B. Comparable to Vorst and Yohn (2018), mean $EARN_t$ (i.e., RNOA) is 12.91% versus a mean *ROE* of only 6.20%, which shows that the return on operating activities is considerably greater than the returns on investing and financing activities. Compared to the common components $LCEARN_t$, $IndEARN_t$, *and* $INDLCEARN_t$, we observe larger standard deviations for all corresponding firm-specific earnings. This is consistent with prior literature and our prediction that firm-specific deviations are more volatile than common earnings components that are driven by rather stable fundamentals. In our market pricing sample, the majority consists of firms in the growth or the mature stage (34.0% and 44.5%, respectively), whereas firms in the decline stage form the smallest group with only 3.3%. The average length of time that a firm stays in the same life cycle stage is 2.24 years.

Panel B presents the Pearson (top) and Spearman (bottom) correlations. The correlation between $LCEARN_t$ and $IndEARN_t$ is quite low (Pearson 9.7% and Spearman 10.5%), which implies that these common components capture to a large extent different fundamentals. The correlations of $LCEARN_t$ and $IndEARN_t$ with $INDLCEARN_t$ are slightly higher, as this variable is jointly determined by life cycle and industry.

[INSERT TABLE 1 HERE]

Main Results

Mishkin Test

Table 2 reports the results from the Mishkin (1983) test, which jointly examines the persistence and pricing of life cycle-wide and firm-specific earnings. Column (1) presents the results of the forecasting equation (model 3a). The coefficient for life cycle-wide earnings *($LCEARN_t$)* equals 0.993 and is significantly larger than the estimated coefficient of 0.755 for firm-specific earnings *($FirmEARN_t$)* ($p<0.001$). This implies that life cycle-wide earnings are relatively more persistent. Consistent with our expectations, these results provide evidence that within-life cycle stage commonalities in firm fundamentals drive a firm's earnings generating process such that the informational value can be captured by a common earnings component. Given the significant difference in persistence, earnings that are disaggregated based on life cycle fundamentals can be a useful input for equity valuation.

Column (2) shows the implicit weights placed on life cycle-wide and firm-specific earnings in stock prices. The estimated coefficients for $LCEARN_t$ (0.768) and $FirmEARN_t$ (0.821) are statistically indistinguishable ($p=0.344$), which is in line with prior research that the average investor does not see through the differential persistence levels of earnings components, but instead fixates on aggregate earnings. Furthermore, the chi-2 tests compare the persistence coefficients (column 1) with the implicit market weights (column 2) and show that investors significantly underprice life cycle-wide earnings (i.e. $0.768<0.993$; chi-2=15.66, $p<0.001$) and overprice firm-specific earnings (i.e., $0.821>0.755$; chi-2=17.88, $p<0.001$). Altogether, these results confirm our prediction that the average investor fails to incorporate life cycle information into stock prices.

[INSERT TABLE 2 HERE]

Life Cycle-Wide Earnings and Future Abnormal Returns

Results of the Mishkin test show, amongst others, that investors underreact to life cycle-wide earnings. Seeing this as mispricing, we would additionally expect a positive correlation between future abnormal stock returns and life cycle-wide earnings. Table 3 reports the average future abnormal return per decile portfolio. Conform expectations, we observe a positive trend in returns as life cycle earnings increase. Furthermore, we find a spread in average CAR_{t+1} of 8.77% between the lowest and highest earnings deciles that is statistically significant at the 1% level, with decile [1] reporting the lowest future abnormal return (-0.028) and decile [10] reporting the highest portfolio return (0.059). As future abnormal returns seem to move parallel to life cycle-wide earnings, results of this test strengthen our conclusion that the underreaction to $LCEARN_t$ in the Mishkin test reflects investor mispricing.

[INSERT TABLE 3 HERE]

Additional Analyses

Industry adjustments

Thus far, we have shown that the informational value for future earnings is relatively greater for common earnings driven by life cycle fundamentals. In this section, we examine whether firm life cycle adds value over and above industry earnings. Prior research has similarly shown that industry fundamentals also hold valuable information for future performance (Hui et al. 2016). Whereas industry and firm life cycle both capture a combination of internal and external fundamentals, a firm's industry is rather fixed while life cycle is transitory by nature. It is unclear to what extent these two classifications capture overlapping underlying characteristics, such as a firm's competitive environment, that possibly drive earnings in like manner.[7]

We extend our main market analysis (models 3a and 3b) and adjust life cycle-wide earnings for industry earnings to examine the life cycle earnings' incremental value. We define industry earnings *(IndEARN)* in the same way as life cycle-wide earnings, such that industry-wide earnings

[7] For example, even though we cluster the competitive environment in a different way – within-life cycle and within-industry, respectively – its effect on earnings persistence may still be comparable for certain life cycle stage-industry combinations.

reflect the value-weighted average earnings of firms in the same industry and year. We then subtract *IndEARN* from *LCEARN* to obtain the adjusted life cycle-wide earnings *(Adj_LCEARN)*, and estimate the following forecasting (4a) and return (4b) equations using the Mishkin approach:[8]

$$EARN_{t+1} = \alpha_0 + \alpha_1 IndEARN_t + \alpha_2 Adj\_LCEARN_t + \alpha_3 FirmEARN_{t(LC)} + \varepsilon_{1t+1} \quad (4a)$$

$$CAR_{t+1} = Multiple \times \left(EARN_{t+1} - \alpha_0 - \alpha_1 IndEARN_t - \alpha_2 Adj\_LCEARN_t - \alpha_3 FirmEARN_{t(LC)}\right) + \varepsilon_{2t+1} \quad (4b)$$

Results are reported in Table 4, Panel A. As can be seen in column (1), the coefficients for *IndEarn* (0.934) and *Adj_LCEARN* (0.994) are both significantly larger than for firm-specific earnings (0.757). In addition, we observe a significant difference between the two common components, with a higher coefficient for *Adj_LCEARN*. This suggests that even after accounting for industry by taking out the 'shared' common earnings, the adjusted life cycle-wide earnings are significantly more persistent than firm-specific as well as industry-wide earnings. When we look at the implicit weights in stock prices (column 2), we find that investors significantly underreact to both common components, *IndEarn* (coeff. 0.613) and *Adj_LCEARN* (coeff. 0.790), and overreact to firm-specific earnings (coeff. 0.828) (all chi-2: $p<0.001$). In sum, these results suggest that life cycle-wide earnings hold incremental value over and above industry earnings.

We also examine an alternative specification where we adjust the common industry component for life cycle earnings. Results are shown in Panel B of Table 4. Whereas life cycle-wide earnings are still highly persistent (coeff. 0.929), the adjusted industry component (coeff. 0.683) is surprisingly no longer more persistent than firm-specific earnings (coeff. 0.754).

[8] All earnings variables are truncated at the 0.5% and 99.5% level.

Moreover, while *LCEARN* and $FirmEARN_{(Ind)}$ are significantly underpriced and overpriced, respectively, *Adj_IndEARN* is not priced significantly different by the market (chi-2 p=0.3635).

Taken together, these results suggest that the underlying fundamentals that drive the relatively high persistence of industry-wide earnings are 'shared' with life cycle earnings. Moreover, life cycle-wide earnings capture additional factors that are – independent of industry drivers – also associated with greater earnings persistence. Altogether, this additional test suggests that firm life cycle is a comparatively more complete construct than industry as a determinant of earnings persistence. Our findings complement those of Vorst and Yohn (2018), who conclude that life cycle models outperform industry models in profitability mean-reversion models.

[INSERT TABLE 4 HERE]

Industry Life Cycle

To this point, we have mainly focused on firm life cycle as a driver of firm performance. In a recent study, Cantrell and Dickinson (2018) compare firm life cycle with the life cycle of the entire industry to define industry leaders and laggards. They find that a firm's relative position has implications for future firm profitability and market mispricing. Specifically, they find that firms with a less advanced life cycle than the industry (i.e., laggards) are associated with larger improvements in future operating performance and greater risk-adjusted returns. Triggered by these findings that firms' earnings dynamics are affected by the life cycle of their industry, we start by examining whether industry life cycle is an important determinant of a firm's earnings persistence. If so, we then need to investigate to what extent our main results are driven by (non)alignment with the industry life cycle.

First, we use the total operating, investing, and financing cash flows per industry (six-digit GICS) and year to define industry life cycle stages. We then decompose reported (firm-level) earnings into an industry life cycle-wide component (*INDLCEARN)* and a firm-specific component (*$FirmEARN_{INDLC}$)*, where *INDLCEARN* is the average value-weighted earnings per industry life cycle stage and year and *$FirmEARN_{INDLC}$* reflects a firm's deviation from this average. The earnings variables are truncated at the 0.5% and 99.5% level. We use the Mishkin approach to test for the persistence and pricing of industry life cycle earnings and run an adapted version of models (3a) and (3b). Results are presented in Table 5, Panel A. The persistence coefficient for *INDLCEARN* (0.811) is significantly greater than for *FirmEARN* (0.777) at the 10% level. Furthermore, we find that *INDLCEARN* is significantly underpriced (chi-2: 15.11, $p<0.001$) and *FirmEARN* overpriced (chi-2: 7.60, $p=0.0058$) by the market. As the common earnings component is marginally more persistent, results suggest that industry life cycle earnings serve as a determinant of the earnings generating process, albeit less powerful compared to firm life cycle.

Knowing that industry life cycle relies on the same underlying fundamentals as firm life cycle and also drives firm performance, a potential concern is that the persistence of firm life cycle-wide earnings (i.e., our main result) is largely driven by industry life cycle information, and as such is still affected by industry dynamics. To mitigate this concern, we rerun our main market analysis on partitioned samples, where firm- and industry life cycle stages are or are not aligned. If our main results are mainly driven by industry life cycle, we should not observe a relatively higher persistence of firm life cycle-wide earnings for those firms whose life cycle stage is not aligned with that from the industry. Results are reported in Panel B of Table 5. We find that even for non-aligned firms (columns 3 and 4), the common earnings component is significantly more persistent than the firm-specific deviation (coeff. 0.956 and 0.744, respectively). Moreover, we find that mispricing occurs in a similar way as in the pooled sample. Specifically, (firm) life cycle-wide earnings are underpriced (chi-2: 5.73, $p=0.0167$) and firm-specific earnings are overpriced (chi-2: 9.42, p=0.0021). Based on this, we conclude that our main results are not driven by (non)alignment with the industry life cycle stage. In sum, these results strengthen our earlier finding that firm life cycle drives fundamental performance complementary to industry dynamics and further support the view that firm life cycle is an important determinant of a firm's earnings generating process.

[INSERT TABLE 5 HERE]

Analysts Forecasts and Life Cycle Model Predictions

Our main analyses focus on the average market participant and to what extent life cycle-wide and firm-specific earnings are reflected in stock prices. In this section, we investigate the use of differential persistence levels by more sophisticated market participants such as analysts. It is not clear whether the results that we obtain for the market analysis also hold for analysts. In forming expectations about future firm performance, analysts typically consider a wider range of information and may have access to more information than an average investor, which enables them to make better informed decisions. However, it is ex ante less clear to what extent analysts are aware of the value relevance of life cycle information. A major focus on industry analyses in prior research has given analysts a decent understanding of industry-level information (Hutton et al. 2012), which has resulted in extensive use of industry models in forecasting and valuation. Correspondingly, analysts are now frequently assigned to follow firms in specific industries and as such become industry specialists (e.g., Kadan et al. 2012; Hutton et al. 2012). It has not yet been documented whether analysts are alternatively assigned to groups of firms based on firm life cycle stages and hence, specialize themselves in for example growth or mature firms. Nonetheless, given that they are more thoroughly informed than the average investor it is reasonable to expect that analysts are aware of certain life cycle dynamics and incorporate these in their profitability forecasts. In support of this expectation, Vorst and Yohn (2018) document that analysts partially incorporate the information from modeling mean reversion as a function of firm life cycle in their forecasts.

To examine whether analysts incorporate life cycle information in their expectations about future profitability, we follow prior literature (Fairfield et al. 2009; Vorst and Yohn 2018) and examine the association between analyst profitability forecasts and predicted values obtained from the aggregate earnings model, as well as the life cycle model. If analysts recognize the added value of life cycle information in their analyses, we expect their ROE and ROA forecasts to be more strongly related to life cycle model predictions. We estimate the following regression models:

$$FORECAST_{i,t} = \beta_0 + \beta_1 PRED\_AGG_{i,t} + \varepsilon_{i,t} \quad (5a)$$

$$FORECAST_{i,t} = \beta_0 + \beta_1 PRED\_LC_{i,t} + \varepsilon_{i,t} \quad (5b)$$

where *FORECAST* is either the I/B/E/S first or April consensus (mean) forecast for ROE or ROA, respectively. The first forecast captures the first estimate in I/B/E/S for year *t* that is issued after announcing year t-1 earnings. The April forecasts include all consensus forecasts for year *t* issued in April. We include these as by that time, all earnings from year t-1 will have been announced. *PRED_AGG* and *PRED_LC* are the ROE or ROA forecasts obtained from the aggregate earnings model and the life cycle model, respectively.[9] ROE is defined as income before extraordinary items available for common stockholders (Compustat IBCOM) scaled by average common equity (Compustat CEQ). ROA is calculated as income before extraordinary items (Compustat IB) scaled by average assets (Compustat AT). To obtain the ROE model forecasts we estimate the following

[9] For the analyses involving analyst forecasts we use ROE and ROA as profitability measures rather than RNOA, as the availability of analyst RNOA forecasts is relatively limited.

prediction models per year using a rolling regression window on a holdout sample from the previous 10 years:

$$ROE_{i,t} = \beta_0 + \beta_1 ROE_{i,t-1} + \varepsilon_{i,t} \quad (6a)$$

$$ROE_{i,t} = \beta_0 + \beta_1 LCROE_{i,t-1} + \beta_2 FirmROE_{i,t-1} + \varepsilon_{i,t} \quad (6b)$$

where in model (6b), ROE_{t-1} is decomposed into a value-weighted life cycle-wide ROE component ($LCROE_{t-1}$) and a firm-specific component ($FirmROE_{t-1}$). We multiply the coefficients from models (6a) and (6b) with the respective lagged earnings variables to finally obtain the current year ROE forecasts (*PRED_AGG* and *PRED_LC*), which we associate with analyst forecasts as shown in models (5a) and (5b). To obtain the ROA model forecasts we follow the same procedure and replace ROE with ROA. Similar as for the market pricing sample, all earnings variables are truncated at the 0.5% and 99.5% level. We calculate the above-mentioned model predictions on a sample of 103,228 firm-year observations after applying the following data restrictions: we require non-missing values for firm life cycle, six-digit GICS code, ROE, and ROA. Financial institutions are excluded (sic 6000-6999). We exclude observations where sales revenue or average assets are less than $10 million, as well as observations for which the book value of common equity is less than $1 million. We further leave out firm-years with an absolute ROE or ROA greater than 1. Finally, to examine the relative association between the analyst forecasts and our aggregate and life cycle model predictions, we use a Vuong test to compare the R-squares of models (5a) and (5b). Given that we expect analysts to incorporate at least some life cycle information in their forecasts, we expect a significantly larger R-squared for the life cycle model than for the aggregate earnings model.

Results are presented in Table 6. Using a sample of 20,325 firm-year observations for the regression with analyst *first* ROE forecasts as dependent variable, we observe that predicted values from the aggregate and the life cycle (LC) model explain 37.76% and 38.74% of the variation in analyst ROE forecasts. The Vuong test analyzes differences in R-squares and shows that the explanatory power of the life cycle model is significantly greater than the aggregate earnings model (z=4.3239, p<0.001). We find similar results for the *April* ROE forecasts, with significantly different R-squares of 40.34% and 41.56% for the aggregate and LC model, respectively. For our second profitability measure, ROA, we also find that the LC model explains significantly more of the variation in both *first* and *April* analyst ROA forecasts. With a sample size of 14,613 (11,323) firm-years for the *first (April)* forecasts, we obtain R-squares of 47.45% (49.83%) for the aggregate and 48.04% (50.60%) for the LC model. The respective Vuong test statistics equal z=2.6751 (p=0.0075) for the sample using *first* ROA forecasts and z=3.1494 (p=0.0016) for the sample using *April* ROA forecasts. Together, these results suggest that analysts do – at least partly – incorporate life cycle information in forming expectations about future firm profitability, as all predicted values from LC models explain a greater part of the variation in analyst ROE and ROA forecasts than predicted values from the aggregate earnings model.

[INSERT TABLE 6 HERE]

Robustness Tests

Sensitivity to Dropping Single Life Cycle Stages

In our main market analysis, we examine the persistence and pricing of life cycle-wide and firm-specific earnings for the pooled sample including all five life cycle stages. The largest part of this sample consists of growth firms (34%) and mature firms (44.5%). To investigate the extent to which our results are driven by a single life cycle stage, we rerun the analysis on subsamples that exclude (one of) these two largest groups. Results are reported in Table 7. Columns (1) and (2) present results of the Mishkin test based on a sample excluding growth firms, while columns (3) and (4) exclude mature firms. Columns (5) and (6) exclude both growth and mature firms. For all three subsamples, we find persistence coefficients (columns 1, 3, and 5) that are similar to those obtained in the main analysis. Life cycle-wide earnings ($LCEARN_t$) are significantly more persistent than firm-specific earnings ($FirmEARN_t$) in all subsamples, which shows that our main (persistence) results are not driven by one dominant life cycle stage.

With respect to the return equations (columns 2, 4, and 6), we find that the underpricing of life cycle-wide earnings in Table 2 is driven by mature firms. While we continue to find that $LCEARN_t$ is significantly underpriced in the subsample that excludes growth firms (chi-2=16.97, p<0.001), we no longer observe a significant difference for $LCEARN_t$ between the persistence coefficient and the assigned market weight in the two subsamples where mature firms are excluded (chi-2=0.43, p=0.5104; and chi=0.17, p=0.6757, respectively). In line with the main results in Table 2, firm-specific earnings ($FirmEARN_t$) remain significantly overpriced by investors.

Collectively, these results suggest that while the persistence of life cycle-wide earnings is not driven by one particular life cycle stage, investors react differently to the common earnings component depending on the life cycle stage of the firm. For ‘less stable’ firms (i.e., firms in the intro, growth, shake-out, or decline stage), investors seem to attach greater (and accurate) weights to life cycle-wide earnings, while for stable mature firms investors seem to ignore the relevance of life-cycle wide earnings. Although speculative, one explanation could be that investors are better able to incorporate life cycle information when it is more salient that such information is relevant, i.e., for firms that differ substantially from the average stable firm.

[INSERT TABLE 7 HERE]

Life Cycle Tenure

In the second robustness test, we examine whether our results hold for different lengths of life cycle stage tenure. Prior literature has indicated that firms can pass through life cycle stages in different sequences and stay in one stage for various lengths of time (Miller and Friesen 1984; Quinn and Cameron 1983). This means that firms can move back and forth across the different stages (Dickinson 2011). Generally, we expect the persistence of life cycle-wide earnings to increase with the length of life cycle tenure (i.e., the number of years that a firm stays in the same life cycle stage consecutively). One concern, however, is that the higher informational value of life cycle-wide earnings for future firm profitability is less for firms that stay in one specific stage for only a short period of time.

We therefore run our forecasting and pricing regressions (model 3a and 3b) on partitioned samples, one which is restricted to include firms for which life cycle tenure is limited to one year (33,779 firm-years) and a second sample of firms that have been in the same life cycle stage for at least two years (34,384 firm-years). Results are reported in Table 8. As expected, the persistence of life cycle-wide earnings is higher for firms that are in the same life cycle stage for more than a year.[10] Yet, even for firms whose presence in a certain stage is limited to one year, life cycle-wide earnings are more persistent than firm-specific earnings.[11] This suggests that even for firms that are in a life cycle stage for a short period of time, life cycle wide earnings are more persistent than firm-specific earnings, consistent with these firms exhibiting systematic switching patterns across the stages (Dickinson 2011). Columns (2) and (4) show the implicit weights placed on life cycle-wide and firm-specific earnings in share prices. We find that the underpricing of life cycle-wide

[10] In a separate chi-2 test (untabulated), where we compare the forecasting coefficients of the two subsamples, we find that the difference in persistence of $LCEARN_t$ is significant at the 1% level.
[11] Persistence results are robust to an alternative split where we compare firms with a life cycle tenure up to two years with firms who are in the same life cycle stage for already more than two years.

earnings in Table 2 is driven by firms whose life cycle tenure exceeds one year, while firm-specific earnings remain consistently overpriced in both subsamples. To the extent that mature firms are more stable and thus more likely to remain in the same life cycle stage for a longer period of time, these results are consistent with the earlier result that mature firms drive the underpricing of life cycle-wide earnings. However, these results also indicate the absence of a learning effect as the pricing of life cycle-wide earnings does not improve once life cycle tenure increases.

[INSERT TABLE 8 HERE]

Positive versus Negative Earnings; and Alternative Life Cycle Specifications

In our main analyses, we investigate earnings persistence over the pooled sample. In the third robustness test, we look at the sensitivity of earnings persistence to profitable or loss-making firms. Prior literature shows that the earnings of loss-making firms are less persistent and informative about future performance (Hayn 1995). To examine the informational value of life cycle earnings in both cases, we extend our forecasting equation (model 3a) and include an interaction variable for loss-making firms *(NEG_t)*:

$$EARN_{t+1} = a_0 + a_1 LCEARN_t + a_2 LCEARN_t * NEG_t + a_3 FirmEARN_t + a_4 FirmEARN_t * NEG_t + a_5 NEG_t + \varepsilon_{t+1} \qquad (7)$$

Where NEG_t equals one if a firm has negative earnings in year *t*. Results are shown in Table 9, Panel A. Even though the persistence of both earnings components is lower when firms are unprofitable, we continue to find that common life cycle earnings are significantly more informative about next year's performance than firm-specific earnings (F-test 51.10, p<0.001). In sum, results of the first two robustness tests show that incorporating life cycle information in forecasting and valuation is applicable in a multitude of settings, including loss-making firms and firms with a short life cycle tenure.

As a fourth robustness test, we re-estimate our forecasting equation (model 3a) and include life cycle-wide earnings based on two alternative life cycle specifications. Specifically, we continue to use the cash flow based proxy from Dickinson (2011), but now classify firms into one of the five stages using the last two and three-year cash flows, respectively. Table 9, Panel B, shows that our main result is robust to these two alternative specifications, as we find similar persistence coefficients for both earnings components compared to our main forecasting regression in Table 2.

[INSERT TABLE 9 HERE]

Other

Furthermore, for our market tests we use return on net operating assets (RNOA) as underlying profitability measure for *EARN*. We alternatively define earnings as operating income after depreciation (Compustat OIADP) scaled by average net assets (Compustat AT). We then base life cycle- and firm-specific earnings on this alternative measure, and rerun the forecasting equation. As data on net assets are available in greater numbers than net operating assets, we obtain a larger sample of 90,165 firm-years. Results (untabulated) show that also with the alternative earnings specification, life cycle-wide earnings are significantly more persistent than firm-specific earnings (F-test 464.78, $p<0.001$).

Finally, we also examine the persistence of *LCEARN* and *FirmEARN* using earnings variables that are truncated at the 0.5% and 99.5% level per fiscal year instead of over the pooled sample. Results (untabulated) show that our results are robust to this alternative specification.

V. CONCLUSION

Reported earnings are jointly determined by the accounting system and a firm's fundamental performance. Relatively few studies have examined the effect of firm fundamentals on earnings persistence. Yet, to reasonably evaluate persistence as a measure of earnings quality, more research is required on the relation between fundamental performance and earnings persistence (Dechow et al. 2010). In this paper, we investigate the relative persistence of life cycle-wide and firm-specific earnings, and examine how it is priced by market participants.

Prior literature has shown that firm life cycle is an important driver of the earnings generating process (e.g., Dickinson 2011; Hribar and Yehuda 2015; Dickinson et al. 2018; Vorst and Yohn 2018). Firms in the same life cycle stage share a typical set of internal and external characteristics. To test how within-life cycle commonalities affect earnings persistence, we partition reported earnings into a common earnings component, which captures the average earnings of all firms per life cycle stage and year, and firm-specific deviations from the average.

In line with our expectations, we find that life cycle-wide earnings are significantly more persistent and hence, more informative about next year's performance than firm-specific earnings. Stock prices show similar implicit weights on both components, which indicates that the average investor does not appear to recognize the differential persistence levels. We consequently find that investors underprice life cycle-wide earnings and overprice firm-specific earnings. As we also find a predictable drift in future abnormal returns in the direction of life cycle earnings, we conclude that our main results reflect investor mispricing. Subsequent tests reveal that the effect of firm life cycle is not driven by industry dynamics, showing that life cycle fundamentals are incrementally informative about future firm performance. Furthermore, results are different for more sophisticated market participants such as analysts. We find that analysts at least partly incorporate life cycle information in their forecasts. Finally, we show that life cycle information is relevant beyond the pooled sample and that results are robust to alternative specifications of our life cycle and earnings measure.

Overall, our study contributes to the literature on earnings persistence as a measure of earnings quality by documenting the importance of firm life cycle as a driver of fundamental firm performance. We show that shared characteristics per firm life cycle stage drive the earnings generating process, such that these dynamics can be captured by a common earnings component and have a predictable effect on earnings persistence. As a result, our findings have implications for forecasting and valuation. To shed more light on the usefulness of life cycle fundamentals in forecasting and valuation, future research could further examine the extent to which incorporating differential persistence levels based on firm life cycle dynamics is beneficial in different settings or markets, e.g., the merger market.

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TABLE 1

Descriptive Statistics

Panel A: Summary Statistics

Variable	N	Mean	Std. Dev.	P25	Median	P75
CAR_{t+1}	70,386	0.017	0.733	-0.316	-0.060	0.202
$Earn_{t+1}$	70,386	0.114	0.219	0.040	0.117	0.206
$Earn_t$	70,285	0.129	0.197	0.049	0.123	0.214
$LCEARN_t$	70,386	0.123	0.059	0.101	0.130	0.162
$FirmEARN_{t\ (LC)}$	70,386	0.006	0.185	-0.081	-0.005	0.087
$IndEARN_t$	69,561	0.159	0.070	0.114	0.152	0.196
$FirmEARN_{t\ (GIND)}$	69,561	-0.030	0.194	-0.111	-0.022	0.058
$INDLCEARN_t$	69,789	0.140	0.031	0.119	0.137	0.164
$FirmEARN_{t\ (INDLC)}$	69,789	-0.010	0.195	-0.093	-0.016	0.076
$INDLC\_LCalign_t$	70,386	0.452	0.498	0.000	0.000	1.000
$LCtenure_t$	70,386	2.235	2.122	1.000	1.000	3.000
NEG_t	70,386	0.161	0.368	0.000	0.000	0.000
ROE_t	67,292	0.062	0.202	0.008	0.093	0.159
ROA_t	67,292	0.031	0.095	0.004	0.041	0.079
Intro_stage	70,386	0.099	0.298	0.000	0.000	0.000
Growth_stage	70,386	0.340	0.474	0.000	0.000	1.000
Mature_stage	70,386	0.445	0.497	0.000	0.000	1.000
Shake_stage	70,386	0.084	0.277	0.000	0.000	0.000
Decline_stage	70,386	0.033	0.178	0.000	0.000	0.000

Panel B: Correlations

Variable	CAR_{t+1}	$Earn_{t+1}$	$Earn_t$	$LCEARN_t$	$IndEARN_t$	$INDLCEARN_t$
CAR_{t+1}	**1.000**	0.158	-0.009	0.018	0.012	0.015
$Earn_{t+1}$	0.299	**1.000**	0.710	0.328	0.099	0.057
$Earn_t$	0.068	0.747	**1.000**	0.376	0.161	0.071
$LCEARN_t$	0.099	0.290	0.307	**1.000**	0.097	0.268
$IndEARN_t$	0.013	0.142	0.194	0.105	**1.000**	0.348
$INDLCEARN_t$	0.046	0.058	0.074	0.293	0.359	**1.000**

This table presents the descriptive statistics of the main variables. Panel A provides summary statistics and panel B shows the correlations among a subset of variables. The market sample consists of 70,386 firm-year observations over the period 1987-2016 and includes all firms with available data in Compustat and CRSP with shares listed on the NYSE, AMEX, and NASDAQ. The analyst sample requires additional non-missing data from I/B/E/S, which leads to decreased sample sizes for our analyst tests. CAR_{t+1} is the next year's abnormal return, defined as the size-adjusted 12-month buy-and-hold stock return starting the fourth month after the end of fiscal year *t*. $EARN_t$ and $EARN_{t+1}$ are current and next year's earnings, defined as operating income after depreciation (OIADP) scaled by average net operating assets. Net operating assets is equal to the sum of common stock (CEQ), preferred stock (PSTK), long- and short-term debt (DLTT and DLC), and minority interest (MIB), minus cash and short-term investments (CHE). $LCEARN_t$ is the average value-weighted earnings per life cycle stage and year. $IndEARN_t$ is the average value-weighted earnings per industry and year. $INDLCEARN_t$ is the average value-weighted earnings per industry life cycle stage and year. $FirmEARN_t$ are the differences between a firm's reported earnings $EARN_t$ and the respective common earnings components $LCEARN_t$, $IndEARN_t$, or $INDLCEARN_t$. $INDLC\_LCalign_t$ is an indicator variable equal to one if the firm- and industry- life cycle stage are the same, zero otherwise. *$LCtenure_t$* reflects the number of consecutive years that a firm is in the same life cycle stage in year *t*. *NEG_t* is an indicator variable equal to one of the firm reports an operating loss (OIADP<0), zero otherwise. *ROE_t* is a firm's return on equity, measured as income before extraordinary items available for common stockholders (IBCOM) scaled by average common equity (CEQ). *ROA_t*, a firm's return on assets is defined as income before extraordinary items (IB) scaled by average assets (AT). *Intro_stage*, *Growth_stage*, *Mature_stage*, *Shake_stage*, *Decline_stage* provide information on the distribution of firms in the five different life cycle stages. Continuous non-return measures are truncated at the 0.5% and the 99.5% level.

TABLE 2

Differential Persistence and Pricing of Life Cycle-wide and Firm-Specific Earnings

	(1)	(2)	
	Forecasting equation	Return Equation	
Variable	$Earn_{t+1}$	CAR_{t+1}	*Chi-2*
Multiple		1.120***	
		(35.35)	
Intercept	-0.013***	-0.001	
	(-6.82)	(-0.10)	
$LCEARN_t$	0.993***	0.768***	15.66
	(77.32)	(13.87)	*($p < 0.001$)*
$FirmEARN_t$	0.755***	0.821***	17.88
	(123.38)	(55.44)	*($p < 0.001$)*
Observations	70,386	70,386	
R-squared	0.5120	0.0552	
$LCEARN_t = FirmEARN_t$	312.92	0.9	
	($p<0.001$)	*($p=0.3435$)*	

This table reports the results of our main market analysis testing the persistence and pricing of life cycle-wide and firm-specific earnings. The sample includes all firm-year observations with matching data in Compustat and CRSP over the period 1987 to 2016 for firms with shares listed on the NYSE, AMEX, and NASDAQ. Earnings variables are truncated at the 0.5% and 99.5% level. Z-statistics and p-values are based on standard errors clustered at firm level. Z-statistics are reported in parentheses below the coefficients. *** indicate statistical significance at the 1% level (two-tailed). Variable definitions can be found in Table 1.

TABLE 3

Future Stock Returns per Decile Portfolio of Life Cycle-wide Earnings

LCEARN Deciles	N	$LCEARN_t$	CAR_{t+1}
1	4,883	-0.008	-0.028
2	4,889	0.075	0.017
3	4,378	0.101	0.025
4	4,962	0.111	-0.007
5	4,911	0.121	-0.003
6	4,842	0.135	-0.010
7	4,840	0.146	0.050
8	4,724	0.165	0.054
9	5,038	0.181	0.016
10	4,591	0.200	0.059
Total N	48,058		
D10 - D1			**0.0877***** **(4.49)**

This table reports the average future abnormal return per decile portfolio. We use current life cycle-wide earnings to create the decile portfolios. The sample size of 48,058 firm-years is smaller than the samples for our other market analyses, as we impose two additional sample restrictions before partitioning $LCEARN_t$: we require a December fiscal year-end and a closing stock price greater than $1. The earnings variable is truncated at the 0.5% and 99.5% level. Variable definitions can be found in Table 1.

TABLE 4

Industry-adjusted Life Cycle Earnings and Life Cycle-adjusted Industry Earnings

Panel A: Life Cycle-wide Earnings adjusted for Industry-wide Earnings

Variable	(1) Forecasting equation $Earn_{t+1}$	(2) Return Equation CAR_{t+1}	*Chi-2*
Multiple		1.124***	
		(34.96)	
Intercept	-0.003	0.025***	
	(-1.27)	(2.83)	
$IndEARN_t$	0.934***	0.613***	26.52
	(58.74)	(10.19)	*($p < 0.001$)*
Adj_LCEARN_t	0.994***	0.790***	12.56
	(76.34)	(13.99)	*($p < 0.001$)*
$FirmEARN_{t\ (LC)}$	0.757***	0.828***	19.82
	(121.22)	(54.20)	*($p < 0.001$)*
Observations	69,746	69,746	
R-squared	0.5090	0.0552	
$IndEARN_t = Adj\_LCEARN_t$	30.71	15.78	
	($p<0.001$)	*($p<0.001$)*	

Panel B: Industry-wide Earnings adjusted for Life Cycle-wide Earnings

Variable	(1) Forecasting equation $Earn_{t+1}$	(2) Return Equation CAR_{t+1}	*Chi-2*
Multiple		1.126***	
		(34.76)	
Intercept	-0.002	0.027***	
	(-0.79)	(2.97)	
$LCEARN_t$	0.929***	0.605***	26.95
	(57.89)	(10.03)	*($p < 0.001$)*
$Adj\_IndEARN_t$	0.683***	0.642***	0.83
	(57.90)	(14.58)	*($p=0.3635$)*
$FirmEARN_{t\ (Ind)}$	0.754***	0.833***	21.94
	(120.11)	(51.17)	*($p < 0.001$)*
Observations	69,720	69,720	
R-squared	0.5064	0.0550	
$LCEARN_t = Adj\_IndEARN_t$	326.47	0.44	
	($p<0.001$)	*($p=0.5090$)*	

This table reports results of the market analysis including industry earnings. The samples include all firm-year observations with non-missing data in Compustat and CRSP over the period 1987 to 2016 for firms with shares listed on the NYSE, AMEX, and NASDAQ. Panel A reports the results of the forecasting and return regressions, and tests for the persistence and pricing of industry-wide earnings, adjusted life cycle-wide earnings, and firm-specific earnings[(LC)]. Adj_LCEARN_t is defined as ($LCEARN_t$ - $IndEARN_t$). Panel B reports the results of the forecasting and return equation with life cycle-wide earnings, adjusted industry earnings, and firm-specific earnings[(IND)] as independent variables. $Adj\_IndEARN_t$ is defined as ($IndEARN_t$ - $LCEARN_t$). Variable definitions for $IndEARN_t$, $LCEARN_t$, and the respective firm-specific deviations can be found in Table 1. All earnings variables are truncated at the 0.5% and 99.5% level. Z-statistics and p-values are based on standard errors clustered at firm level. Z-statistics are reported in parentheses below the coefficients. *** indicate statistical significance at the 1% level (two-tailed).

TABLE 5

Industry Life Cycle: Persistence, Pricing, and (Non-)Alignment

Panel A: Industry Life Cycle-wide and Firm-specific Earnings

	(1)	(2)	
	Forecasting equation	Return Equation	
Variable	$Earn_{t+1}$	CAR_{t+1}	*Chi-2*
Multiple		1.110***	
		(35.38)	
Intercept	0.010***	0.037***	
	(3.29)	(3.33)	
$INDLCEARN_t$	0.811***	0.506***	15.11
	(41.02)	(6.68)	*($p < 0.001$)*
$FirmEARN_t$	0.777***	0.821***	7.60
	(132.72)	(53.78)	*($p=0.0058$)*
Observations	70,137	70,137	
R-squared	0.5051	0.0542	
$INDLCEARN_t$ = $FirmEARN_t$	2.94	16.55	
	($p=0.0864$)	*($p<0.001$)*	

Panel B: (Non-)Alignment with Industry Life Cycle

	LC - INDLC Align			**LC - INDLC Non-Align**		
	(1)	(2)		(3)	(4)	
	Forecasting eq.	Return Eq.		Forecasting eq.	Return Eq.	
Variable	$Earn_{t+1}$	CAR_{t+1}	*Chi-2*	$Earn_{t+1}$	CAR_{t+1}	*Chi-2*
Multiple		1.176***			1.091***	
		(26.11)			(26.72)	
Intercept	-0.026***	0.032		-0.010***	-0.007	
	(-5.94)	(1.60)		(-5.10)	(-0.75)	
$LCEARN_t$	1.089***	0.579***	14.64	0.956***	0.785***	5.73
	(40.11)	(4.49)	*($p < 0.001$)*	(59.95)	(11.29)	*($p=0.0167$)*
$FirmEARN_t$	0.775***	0.831***	6.34	0.744***	0.810***	9.42
	(89.95)	(38.60)	*($p = 0.0118$)*	(93.66)	(39.19)	*($p=0.0021$)*
Observations	31,804	31,804		38,582	38,582	
R-squared	0.5186	0.0585		0.4895	0.0537	
$LCEARN_t$ = $FirmEARN_t$	133.18	4.06		153.75	0.12	
	($p<0.001$)	*($p=0.0439$)*		*($p<0.001$)*	*($p=0.7282$)*	

This table reports the results of the market analysis including industry life cycle earnings. The sample includes all firm-year observations with matching data in Compustat and CRSP over the period 1987 to 2016 for firms with shares listed on the NYSE, AMEX, and NASDAQ. Panel A reports the results for the pooled sample, testing the persistence and pricing of industry life cycle-wide and firm-specific earnings. Panel B examines the persistence and pricing of firm life cycle earnings conditional on firm life cycle and industry life cycle being aligned or not aligned. All earnings variables are truncated at the 0.5% and 99.5% level. Z-statistics and p-values are based on standard errors clustered at firm level. Z-statistics are reported in parentheses below the coefficients. *** indicate statistical significance at the 1% level (two-tailed). Variable definitions can be found in Table 1.

TABLE 6

Analyst Forecasts & Life Cycle Model Predictions

Relation between Analyst ROE (ROA) Forecasts & Model ROE (ROA) Predictions

	Aggregate model	**LC model**	**Aggregate model**	**LC model**
Variable	*First Analyst Forecast*		*April Analyst Forecast*	
Intercept	0.0781***	0.0515***	0.0774***	0.0487***
Pred_ROE	0.9338***	0.9318***	0.9518***	0.9584***
Observations	20,325	20,325	16,895	16,895
R-squared	37.76%	38.74%	40.34%	41.56%
Vuong Test: diff. in R^2	z=4.3239		z=4.9188	
Full/LC model	p<0.001		p<0.001	

	Aggregate model	**LC model**	**Aggregate model**	**LC model**
Variable	*First Analyst Forecast*		*April Analyst Forecast*	
Intercept	0.0421***	0.0270***	0.0415***	0.0261***
Pred_ROA	1.0557***	1.0450***	1.0640***	1.0580***
Observations	14,613	14,613	11,323	11,323
R-squared	47.45%	48.04%	49.83%	50.60%
Vuong Test: diff. in R^2	z=2.6751		z=3.1494	
Full/LC model	p=0.0075		p=0.0016	

This table reports the results of our analyst test examining the use of life cycle information in creating expectations about future firm performance. The sample includes all firm-year observations with matching data in Compustat and I/B/E/S. More specifically, the table reports the results of regressions examining the relation between analyst ROE (ROA) forecasts and model ROE (ROA) predictions. *First Analyst Forecast* and *April Analyst Forecast* are either the first or April consensus (mean) forecast for ROE or ROA, respectively. The first forecast captures the first estimate in I/B/E/S for year t that is issued after announcing year t-1 earnings. The April forecasts include all consensus forecasts for year t issued in April. Pred*_ROE* and *Pred_ROA* are the ROE or ROA forecasts obtained from the aggregate earnings model or the life cycle model, respectively. The coefficients underlying the predicted values are estimated per year using a rolling regression window on a holdout sample from the previous 10 years, and are multiplied with the respective lagged earnings variables to obtain the current year forecasts (*PRED_ROE* and *PRED_ROA*). All analyst and model-based variables are truncated at the 0.5% and 99.5% level. Standard errors are clustered at firm level. *** indicate statistical significance at the 1% level (two-tailed).

TABLE 7

Sensitivity to Dropping Single Life Cycle Stages

	EXCL. GROWTH			EXCL. MATURE			EXCL. GROWTH & MATURE		
	Forec. Eq.	**Return Eq.**		**Forec. Eq.**	**Return Eq.**		**Forec. Eq.**	**Return Eq.**	
	(1)	(2)		(3)	(4)		(5)	(6)	
Variable	**$Earn_{t+1}$**	**CAR_{t+1}**	***Chi-2***	**$Earn_{t+1}$**	**CAR_{t+1}**	***Chi-2***	**$Earn_{t+1}$**	**CAR_{t+1}**	***Chi-2***
Multiple		1.159***			1.047***			1.050***	
		(27.94)			(29.90)			(19.79)	
Intercept	-0.007***	0.002		-0.014***	-0.017*		-0.015***	-0.007	
	(-3.56)	(0.17)		(-6.45)	(-1.71)		(-6.73)	(-0.69)	
$LCEARN_t$	0.984***	0.739***	16.97	0.954***	1.015***	0.43	0.995***	1.049***	0.17
	(73.40)	(12.73)	*($p < 0.001$)*	(46.75)	(11.22)	*($p= 0.5104$)*	(34.45)	(8.49)	*($p= 0.6757$)*
$FirmEARN_t$	0.782***	0.868***	22.97	0.720***	0.766***	3.85	0.738***	0.842***	8.95
	(111.44)	(51.17)	*($p < 0.001$)*	(88.00)	(33.88)	*($p= 0.0498$)*	(62.98)	(25.03)	*($p= 0.0028$)*
Observations	46,457	46,457		39,090	39,090		15,161	15,161	
R-squared	0.5583	0.0568		0.4589	0.0507		0.4512	0.0498	
$LCEARN_t$ = $FirmEARN_t$	193.65	4.67		113.63	7.49		70.60	2.81	
	($p<0.001$)	*($p=0.0308$)*		*($p<0.001$)*	*($p=0.0062$)*		*($p<0.001$)*	*($p=0.0939$)*	

This table reports the results of the market analysis examining the sensitivity of our main results to dropping single life cycle stages. The sample includes all firm-year observations with matching data in Compustat and CRSP over the period 1987 to 2016 for firms with shares listed on the NYSE, AMEX, and NASDAQ. Columns (1) and (2) present the results of the forecasting and return equation, respectively, for a subsample excluding growth firms. Columns (3) and (4) exclude mature firms, and columns (5) and (6) exclude both growth and mature firms from the sample. Earnings variables are truncated at the 0.5% and 99.5% level. Z-statistics and p-values are based on standard errors clustered at firm level. Z-statistics are reported in parentheses below the coefficients. * and *** indicate statistical significance at the 10% and 1% levels, respectively (two-tailed). Variable definitions can be found in Table 1.

TABLE 8

Life Cycle Tenure

	LC Tenure = 1			LC Tenure > 1		
	Forec. Eq.	**Return Eq.**		**Forec. eq.**	**Return Eq.**	
	(1)	(2)		(3)	(4)	
Variable	**$Earn_{t+1}$**	**CAR_{t+1}**	***Chi-2***	**$Earn_{t+1}$**	**CAR_{t+1}**	***Chi-2***
Multiple		1.138***			1.081***	
		(29.64)			(20.73)	
Intercept	-0.004	-0.016*		-0.025***	0.023	
	(-1.46)	(-1.68)		(-8.75)	(1.57)	
$LCEARN_t$	0.907***	0.840***	0.88	1.094***	0.635***	19.1
	(51.79)	(11.84)	*(p= 0.3492)*	(56.80)	(6.19)	*(p < 0.001)*
$FirmEARN_t$	0.736***	0.833***	19.00	0.770***	0.816***	3.84
	(86.23)	(38.44)	*(p < 0.001)*	(93.04)	(35.73)	*(p=0.0500)*
Observations	33,779	33,779		34,384	34,384	
R-squared	0.4576	0.06		0.5591	0.048	
$LCEARN_t$ = $FirmEARN_t$	93.78	0.01		237.02	3.14	
	(p<0.001)	*(p=0.9271)*		*(p<0.001)*	*(p=0.0763)*	

This table reports the results of the market analysis conditional on firms switching (LC Tenure = 1) or not switching (LC Tenure > 1) life cycle stages from the previous to the current period. The sample includes all firm-year observations with matching data in Compustat and CRSP over the period 1987 to 2016 for firms with shares listed on the NYSE, AMEX, and NASDAQ. All earnings variables are truncated at the 0.5% and 99.5% level. Z-statistics and p-values are based on standard errors clustered at firm level. Z-statistics are reported in parentheses below the coefficients. * and *** indicate statistical significance at the 10% and 1% levels, respectively (two-tailed). Variable definitions can be found in Table 1.

TABLE 9

Positive versus Negative Earnings; and Alternative Life Cycle Specifications

Panel A: Positive versus Negative Earnings

Variable	Depvar: $Earn_{t+1}$ coeff.	t-stat
Intercept	-0.017***	(-8.61)
$LCEARN_t$	1.024***	(74.09)
$LCEARN_t$* *NEG*	-0.101***	(-2.95)
$FirmEARN_t$	0.769***	(103.80)
$FirmEARN_t$* *NEG*	-0.074***	(-3.65)
NEG	-0.006	(-1.19)
Observations	70,386	
Adj. R-squared	0.512	
(tot)$LCEARN_t$ = (tot)$FirmEARN_t$	51.10	
	(p<0.001)	

Panel B: Life Cycle determined over Last 2- and 3-year Cash Flows

Variable	**A2_LC** $Earn_{t+1}$	**A3_LC** $Earn_{t+1}$
Intercept	-0.0126***	-0.007***
	(-6.96)	(-4.01)
$LCEARN_t$	0.997***	0.976***
	(77.48)	(74.11)
$FirmEARN_t$	0.757***	0.766***
	(123.20)	(117.50)
Observations	68,232	61,993
Adj. R-squared	0.5180	0.5190
$LCEARN_t$ = $FirmEARN_t$	313.20	227.39
	(p<0.001)	(p<0.001)

This table reports the results of forecasting regressions examining the persistence of life cycle-wide and firm-specific earnings conditional on profit- or loss-making firms, and based on alternative life cycle specifications. The samples include all firm-year observations with non-missing data in Compustat and CRSP over the period 1987 to 2016 for firms with shares listed on the NYSE, AMEX, and NASDAQ. Panel A examines the impact of loss-making firms on the persistence of life cycle-wide and firm-specific earnings by including an indicator variable for loss-making firms *(NEG_t)*. Panel B examines the persistence of life cycle-wide and firm-specific earnings using a life cycle measure based on the last two and three-year cash flows, respectively. All continuous earnings variables are truncated at the 0.5% and 99.5% level. T-statistics and p-values are based on standard errors clustered at firm level. T-statistics are reported in parentheses below the coefficients. *** indicate statistical significance at the 1% level (two-tailed). Variable definitions can be found in Table 1.