Note: This draft is from August 2021. For the final manuscript accepted by the **Review of Accounting Studies**, please see: https://link.springer.com/article/10.1007/s11142-022-09749-2

Does Firm Life Cycle Stage Affect Investor Perceptions? Evidence from Earnings Announcement Reactions*

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Abstract

This paper argues that firms in certain life stages may be more subjectively valued by individual investors, leading to an overoptimistic bias in stock prices that is subsequently corrected upon the release of earnings news. Using a cash flow-based life stage classification, introduction and decline stage companies exhibit three-day cumulative abnormal returns (CARs) around earnings announcements that are at least 112 bps lower than firms in growth, maturity, and shake-out stages. Specifically, introduction and decline stage stocks exhibit less positive reactions to positive earnings surprises and more negative reactions to negative earnings surprises relative to companies in other life stages. Lottery stocks' excess returns around earnings announcements (Liu, Wang, Yu, and Zhao 2020) also vary based on firm life stage. Our findings suggest that individual investors' overoptimistic expectations for introduction and decline stage stocks are met with disappointment when value-relevant earnings news is released. This study demonstrates that firm life stage has real implications for stock price reactions to earnings announcements in financial markets.

JEL Classification Codes: G10, G12, G14, M41

Keywords: Earnings announcements, firm life stage, lottery, returns.

Data Availability: The data that support the findings of this study are available from Compustat, CRSP, I/B/E/S, OptionMetrics, and Thomson Reuters 13F. Restrictions apply to the availability of the data, which were used under university license.

* We appreciate helpful comments from Anup Agarwal, Haosi Chen, Travis Davidson, Jon Fulkerson, Fabian Gamm, Barry Hettler, Jennifer Stevens, John Stowe, Tony Via, Xinyan Yan, Yu Hu, and seminar participants at Ohio University, 2020 University of Dayton Summer Finance Workshop, 2020 Financial Management Association Annual Meeting, and 2021 Eastern Finance Association Annual Meeting.

1. INTRODUCTION

Firm life stages are distinct phases in a firm's life cycle marked by differences in strategy, structure, situation, and decision-making methods (Miller and Friesen 1984). The five phases are the Introduction, Growth, Maturity, Shake-out, and Decline stages (Dickinson 2011).[1] A firm in the Introduction stage follows an entrepreneurial strategy and invests heavily in innovation in its struggle to become a viable company. The firm achieves rapid sales growth in the Growth stage and stable cash flows in the Maturity life stage. In the face of greater complexity and the pursuit of efficiency at the expense of innovation, a firm can either diversify and expand product market scope in a Shake-out stage or enter a Decline stage characterized with waning market share and stagnation.[2] To use an analogy, a corporation in the Growth or Maturity stage is likely to be soaring like an eagle, while an Introduction stage firm may be testing its wings for the first time and a Decline stage company might be struggling to stay in flight.

How do investors perceive firms in different life stages? Birru (2018) states that investor misperceptions are less likely for "a stock that has a more concrete valuation, for instance, because it is a mature, dividend-paying firm with a long earnings history…" (p. 186). In contrast, "stocks that have particularly ambiguous valuations will be subject to investor misperceptions of valuation" (Birru 2018, p. 186). Valuation models such as price-to-earnings (P/E), dividend growth, and discounted cash flow (DCF) are more difficult to implement for Introduction and Decline stage firms.[3] Without an objective stock valuation, individual investors are likely more prone to improperly weight the tails of stock return distribution and to be overly optimistic about the probability of good states (Brunnermeier, Gollier, and Parker 2007; Barberis and Huang 2008) for Introduction and Decline stage firms. In the absence of corrective pressure of arbitrageurs/short sellers due to noise trader risk, Introduction and Decline stage

[1] We use Dickinson's (2011) well-established cash flow-based firm life stage classification as described in Section 2.
[2] However, Miller and Friesen (1984) find that the sequence of life stages is not always linear; for instance, a Growth stage firm could subsequently enter the Decline stage but then reverse its course to the Shake-out stage.
[3] Introduction and Decline firms are more likely to report negative EPS and are less likely to pay dividends, making P/E valuation and dividend growth models difficult to implement. The younger age of Introduction and Decline stage firms means less historical data with which to estimate beta for a cost of equity calculation. In addition, operating cash flows are negative for Introduction and Decline stage firms (Dickinson 2011) and operating income volatility is high, which complicates free cash flow forecasting. However, we confirm in later tests that our main results are not driven by dividend policy, firm age, or income volatility alone, but rather the Introduction and Decline stage indicator variables exhibit significant conditional effects after controlling for such variables, suggesting a significant role for firm life stage.

stocks will reflect an upward bias before earnings announcements. This overoptimistic bias will likely be corrected after earnings are released as uncertainty is resolved, optimistic investors are disappointed, and "stock prices move closer to their fundamental values as investors 'sell on the news.'" (Berkman et al., 2009, p. 377).[4] Therefore, one would expect downward pressure on stock prices for Introduction and Decline stage firms at earnings announcements.

Using I/B/E/S earnings announcement data from 1996 to 2018, we report that announcement reactions are significantly lower among Introduction and Decline stage firms relative to firms in other life stages. Abnormal announcement day returns are calculated using Daniel, Grinblatt, Titman, and Wermers' (1997) methodology (henceforth DGTW return). Firm life stages are classified based on cash flows during the prior fiscal year. (Results are quantitatively similar using the current fiscal year.) We present the DGTW returns each day for the five days prior to five days after the earnings announcement in Figure 1A.[5] One can see a clear negative reaction on Day 0 to earnings announcements for firms in the Introduction and Decline stages, while the response is mildly positive on Day 0 for companies in the Growth, Maturity, and Shake-out stages. Figure 1B presents the cumulative abnormal returns around the earnings announcement. The figure suggests a pre-announcement run-up and sharp post-announcement reversal among Introduction and Decline stage firms, while companies in other life stages have a sustained mildly positive response to earnings news. In Panel A of Table 1, the mean three-day cumulative abnormal return, CAR(–1,+1), is –0.97% for Introduction stage firms and –1.01% for Decline stage firms. In contrast, the average CAR(–1,+1) is 0.18%, 0.31%, and 0.15% for firms in the Growth, Maturity, and Shake-out stages, respectively. Therefore, Introduction and Decline stage firms exhibit earnings announcement reactions that are at least 112 basis points lower than Growth, Maturity, and Shake-out stage firms.

Could a greater proportion of negative earnings surprises among Introduction and Decline stage companies explain this pattern? Given that prior literature documents an asymmetric response to negative

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[4] This argument is consistent with Campbell, Hilscher, and Szilagyi (2008) who argue that market inefficiency could be partially corrected upon the release of value-relevant cash flow information, such as earnings announcements (La Porta, Lakonishok, Shleifer, and Vishny 1997).

[5] Day 0 is the trading day following overnight earnings announcements (89% of sample) and Day 0 is same trading day if announcements happen during the active trading hours (9:30 AM to 4:00 PM).

earnings surprises (Skinner and Sloan 2002; Williams 2015), we differentiate between reactions to positive or negative earnings surprises. We divide the sample by life stage and by standardized unexpected earnings (SUE) into positive earnings surprises (SUE ≥ 0) and negative earnings surprises (SUE < 0) and report the cumulative abnormal returns in Figures 2A and 2B, respectively. [6] Positive earnings announcement reactions are the least positive for Introduction and Decline stage firms relative to companies in other life stages. In fact, the mean CAR(–1,+1) is at least 70 bps lower for Introduction and Decline stage companies relative to firms in other life stages. Among negative earnings surprises, Introduction and Decline stage firms exhibit negative reactions that are at least 99 bps lower than companies in other life stages.

Our regression results corroborate Figure 1, Figure 2, and Table 1. In Fama-MacBeth regressions with controls for standardized unexpected earnings (SUE) and net losses, the cumulative abnormal returns from Day –1 to Day 1 are 108 basis points (bps) lower (t = –11.91) for Introduction stage companies and 87 bps lower (t = –8.47) for Decline stage firms. For positive earnings surprise announcements, the CAR(–1,+1) is on average 64 bps lower (t = –6.79) for Introduction stage firms and 80 bps lower (t = –7.33) for Decline stage firms, respectively, as compared with those of other life stages. For negative earnings surprises, Introduction and Decline stage firms exhibit an 83 bps (t = –8.23) and 51 bps (t = –4.39) lower cumulative abnormal returns relative to companies in other life stages.

The main results are robust to controlling for firm age, dividend policy, and optionality. One might wonder why we do not simply use firm age to proxy for firm life stage. Surprisingly, Miller and Friesen (1984) and Dickinson (2011) document that firms do not move sequentially through firm life stages. According to Dickinson (2011), "firms in the decline stage are likely to include young firms that succumb to initially high mortality rates" (p. 1975) and therefore firm age has an inverted U-shape across life stages. When we control for firm age in a regression framework, our main findings hold, implying that firm life stage and firm age are distinct. Similarly, our main results hold after accounting for dividend policy and option listing, suggesting that Introduction and Decline stage firms have lower earnings announcements

[6] SUE is defined as earnings per share minus the median analyst forecast divided by the stock price of the prior day.

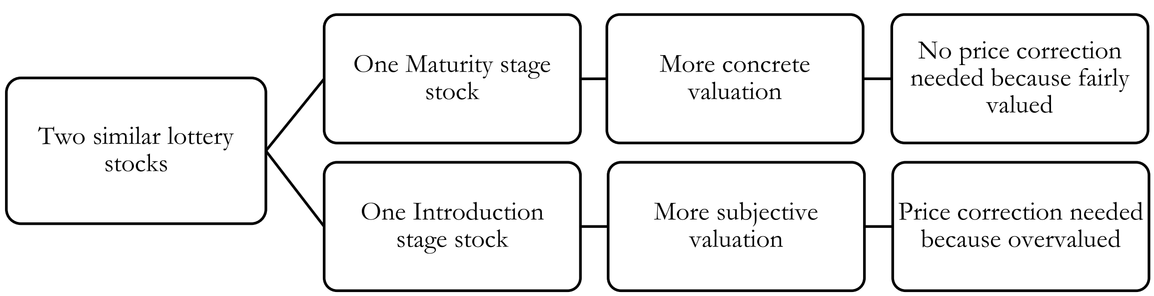
reactions relative to other firm life stages regardless of the decision to pay dividends or whether the firm has listed options.

We next consider underlying mechanisms that might drive the differences in announcement reactions based on firm life stage. First, perhaps due to high information uncertainty or arbitrage risk inherent in Introduction and Decline stage firms, investors underreact to earnings news (Bernard and Thomas 1989, 1990; Mendenhall 2004; Zhang 2006). This underreaction channel would explain the less positive response to positive earnings surprises but not the more negative response to negative earnings surprises for Introduction and Decline stage firms relative to companies in other firm life stages. Second, it is possible that Introduction and Decline firms are likely to earn unconditionally lower returns relative to other firms in general so that their unconditionally lower returns around earnings announcements are not surprising. Perhaps firm life stage is related to an asset pricing anomaly that is simply stronger on earnings announcement days (Engelberg, McLean, and Pontiff 2018). We explore this possibility in the Table A.1 of the Appendix. We find that Introduction and Decline stage stocks do not significantly underperform on non-earnings announcement days. Therefore, it is unlikely that our findings are driven by chronic underperformance of firms in certain life stages on any given day. Third, investors could be drawn to Introduction or Decline stage firms due to overoptimistic expectations for subjectively valued companies (i.e. improperly weighting the probability of a favorable outcome). For instance, investors may be attracted to stock in an Introduction stage technology company in hopes that it will grow to become the next Amazon.[7] Retail traders might buy a struggling Decline stage stock in hopes that the company will turn itself around (such were hopes of investors in Hertz in June 2021).[8] When earnings news is released, the hard numbers fail to substantiate such optimism, leading to lower earnings announcement reactions for Introduction and Decline stage firms. Our evidence is most consistent with this line of reasoning.

[7] Green and Hwang (2012) find that retail investors' demand for IPOs is related to their skewness preference. Although Introduction stage firms are post-IPO, individual investors' high expectations at the IPO could set up these Introduction stage firms for later disappointment.

[8] Henderson, R. "Retail investors bet on bankrupt U.S. companies again." June 9, 2021. *Financial Times*.

This line of reasoning is related to, yet distinct from, a lottery stock argument. Lottery stocks tend to have higher idiosyncratic volatility, higher prior maximum returns (MAX), higher idiosyncratic skewness, and lower stock prices. Retail traders are drawn to lottery stocks (Han and Kumar 2013; Bali, Hirshleifer, Peng, and Tang 2019),[9] particularly before earnings announcements. Liu, Wang, Yu, and Zhao (2020) find that lottery-like stocks are associated with higher returns prior to earnings announcements, followed by a sharp reversal after earnings announcements. This pattern is driven by time-varying demand for lottery-like stocks. Although proportionally more stocks in Introduction and Decline stages can be classified as lottery stocks as compared with other life stages, we make a clear distinction from prior lottery stock literature, which is best explained with an example. Consider two firms with similar lottery stocks characteristics, but one firm is in the Maturity stage and the other firm is in the Introduction stage. Based on Birru's (2018) statement that a mature firm has a "more concrete valuation," we would expect a mature firm to be less overvalued prior to earnings announcements relative to the firm in the Introduction stage. For that reason, we would predict a significant price correction to overoptimistic expectations only for the Introduction stage stock, but not for the Maturity stage stock, even though both are categorized as lottery stocks. The following chart summarizes the argument:



A similar argument can be made for Decline stage firms that possess high probabilities of default and jackpot-like payoffs (Conrad, Kapadia, and Xing 2014). Although there are differences in our sample and methodology, we view our study as complementary to Liu et al. (2020) because retail investors are drawn to the speculative nature of Introduction and Decline stage firms. However, an important caveat is that

[9] In contrast, institutions avoid investing in lottery stocks due to prudent man rules (Kumar and Lee 2006; Fong and Toh 2014; Kumar and Page 2014).

based on our argument, a lottery-like stock in the Maturity life stage is *not* expected to experience relatively lower return responses to earnings announcements because it does not have a subjective valuation.

The evidence is consistent with our argument. When we plot lottery stocks' CARs around earnings announcements by firm life stage, the post-announcement sharp reversal reported by Liu et al. (2020) is only evident among firms in the Introduction and Decline stages. In a regression framework, we find that lottery stocks exhibit conditionally lower earnings announcement reactions only for firms in Introduction or Decline stages, but *not* for companies in other life stages. Our results demonstrate that lottery stocks in the Growth, Maturity, and Shake-out stages behave differently around earnings announcements than lottery stocks in the Introduction and Decline stages, suggesting that firm life stage plays a distinct role from lottery characteristics in influencing earnings announcement reactions.

Our evidence supports the idea that subjectively valued Introduction and Decline stage stocks are associated with increased sentiment-driven mispricing (Aboody, Even-Tov, Lehavy, and Trueman 2018) and stronger behavioral biases (Kumar 2009), including greater overconfidence before earnings announcements (Chou, Li, Yin, and Zhao 2020). Cheon and Lee (2018) argue that overconfidence relates to overoptimism which results in overpayment.

Our study also speaks to investors' ambiguity aversion and differences of opinion as well as to momentum and speculative characteristics. Williams (2015) finds that investors respond more strongly to bad earnings news than good earnings news following an increase in the VIX (macroeconomic uncertainty), which is consistent with ambiguity aversion. Since Introduction and Decline stage firms tend to have an ambiguous valuation, it is possible that ambiguity-averse investors adopt a "worst-case scenario" when interpreting earnings news. High stock volatility would result in more pronounced ambiguity aversion by investors, yet we find that high idiosyncratic volatility results in less positive responses to positive earnings surprises only for Introduction and Decline stage firms, but the opposite holds true for firms in other life stages. Moreover, Berkman et al. (2009) report that stocks with high differences of opinion exhibit lower earnings announcement reactions. Aboody, Lehavy, and Trueman (2010) document that past winner stocks exhibit significant pre-announcement run-ups and post-announcement reversals around earnings releases. However, firm life stage continues to play a novel conditional explanatory role in earnings announcement reactions even after accounting for differences of opinion and momentum variables. Similarly, using Birru's (2018) definition of "speculative stocks," we document that Introduction and Decline stage firms with greater financial distress, lower market capitalization, greater operating income volatility, and lower institutional ownership are more likely to exhibit conditionally lower earnings announcement reactions relative to firms in other life stages.[10] Firm life stage drives variations in earnings announcement reactions – beyond those implied by volatility, differences of opinion, momentum, or speculative characteristics alone – because firm life stage captures variations in corporate activities (Miller and Friesen 1984; Dickinson 2011; Vorst and Yohn 2018).

Such differences in corporate activity are directly relevant to the firm's valuation and thus to the investor. As described in Section 2, Introduction and Decline stage companies typically exhibit higher uncertainty about future cash flows, leading to a higher likelihood that investors will value the firms more subjectively.[11]

Overall, our study contributes to the literature by providing novel evidence that investor responses to positive and negative earnings surprises differ based on firm life stage, where Introduction and Decline stage firms exhibit significantly lower reactions than companies in other life stages. Our findings are most consistent with overoptimistic speculation in subjectively valued stocks (Han and Kumar 2013; Birru 2018) as the underlying driver for varying investors responses to earnings releases of firms in different life stages.

The rest of the paper is organized as follows. Section 2 provides the motivation and literature review. Section 3 describes the data. Section 4 presents the results. Section 5 concludes.

[10] Introduction and Decline stage subsamples on average contain firms with lower percentages of institutional ownership (IO) and lower percentages of dividend-paying firms as compared with other life stage subsamples. Our main results hold after controlling for dividend payment policy and firm life stage still plays a conditional effect after controlling for institutional ownership. Our study therefore also contributes to literature on firm life cycle, institutional ownership, and dividends (Dyl and Weigand 1998; Grinstein and Michaely 2005; DeAngelo, DeAngelo, and Stulz 2006; Bulan, Subramanian, and Tanlu 2007; Chay and Suh 2009; Mehran and Peristiani 2010; Banyi and Kahle 2014; Koh, Durand, Dai, and Chang 2015).

[11] Introduction and Decline stage firms typically exhibit less formality in management accounting systems (Moores and Yuen 2001; Silvola 2008). The choice of management accounting system can affect firm value (Kennedy and Affleck-Graves 2001; Holm, Kumar, and Plenborg 2016).

2. MOTIVATION AND LITERATURE REVIEW

Firm life stages reflect distinct multifaceted phases of firm development (Miller and Friesen 1983; Hanks, Watson, Jansen, and Chandler 1994; Vorst and Yohn 2018). Specifically, as a firm passes through different life stages, the company experiences changes in both internal and external factors (Vorst and Yohn 2018). According to Vorst and Yohn (2018), the internal factors include organizational behavior (Miller and Friesen 1984), human resource management practices (Milliman, Von Glinow, and Nathan 1991), and organizational structures (Koberg, Uhlenbruck, and Sarason 1996), whereas the external factors include management's challenges and priorities ((Kazanjian 1988; Smith, Mitchell, and Summer 1985) as well as the relative importance of various stakeholders (Jawahar and McLaughlin 2001). In addition, competition and market structure differ by firm life stage (Gort and Klepper 1982; Klepper 1996; Vorst and Yohn 2018). Moores and Yuen (2001) also document that the formality of management accounting systems varies by firm life stage, where Introduction and Decline stages exhibit the least formal systems (p. 374).[12,13] Overall, Vorst and Yohn (2018) assert that firm life stages "capture differences in internal and external factors that affect a firm's earnings-generating process" (p. 360).

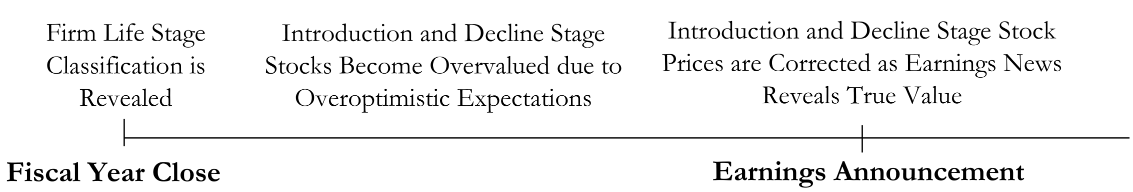
Moreover, the poor information environment of Introduction and Decline stage firms contributes to greater uncertainty about future cash flows (Hasan and Habib 2017), which in turn leads to uncertainty about firm valuation. This ambiguity is compounded by the fact that Introduction and Decline stage companies often do not pay dividends, have negative earnings per share (EPS), have high operating income

[12] Miller and Friesen (1984) describe in detail the five phases of the corporate life cycle. Moores and Yuen (2001) and Silvola (2008) further explain how the formality of management accounting systems varies by life stage. They use different names for the Introduction (called Birth) and Shake-out (called Revival) stages. In the first phase (Birth/Introduction), firms innovate to establish a niche in the marketplace and have a simple structure where a limited amount of information is used by the owner for decision-making. Although internal accounting controls ensure the security of assets and reliability of information, management accounting systems in the Birth/Introduction phase are the most informal. To handle the increased complexity of the firm's operations stemming from their rapidly growing market share, Growth stage firms have the most formal management accounting systems as compared with any other life stage. The Maturity stage is characterized by well-established, stable firms with a more bureaucratic structure, where increased information is collected in the pursuit of operational efficiency. Companies in the Revival/Shake-out phase seek to revitalize themselves through innovation, diversification, and divisional organization. Division managers use formal management accounting systems to gather timely information for strategic decision-making. The Decline stage is characterized by corporate stagnation as markets shrink and products become obsolete. The top executives simply react to crises and make decisions less formally, without a clear strategy, and with minimal information. The description of firm life stages in this paragraph was adapted from pages 1169-1175 of Miller and Friesen (1984), pages 359-360 of Moores and Yuen (2001), and page 131 of Silvola (2008).

[13] Kennedy and Affleck-Graves (2001) argue that "the choice of management accounting system … may have a significant effect on firm value" (p. 19). This assertion is corroborated by Holm, Kumar, and Plenborg (2016).

volatility, and have shorter earnings history. Consequently, investors will have difficulty using traditional valuation models such as the dividend growth model or discounted cash flow model. Although the firm's age is a factor in life cycle, firm age and firm life stage are not identical (Miller and Friesen 1984, Dickinson 2011). According to Miller and Friesen (1984), "Firms that do not grow or diversify, but simply get older, are unlikely to move between phases. Age alone does not confer greater environmental or administrative complexity…" (p. 1177). Rather than using firm age to proxy for life cycle, Dickinson (2011) convincingly argues that her cash flow-based classification system that aligns better with the functional form of firm profitability.[14] Furthermore, we believe that her method to correctly classify firms into life stages sheds light on what firms are more prone to be subjectively valued by investors. Specifically, investors in Introduction and Decline stage firms are faced with more limited information due to life stage-related differences and consequently valuation is more likely to be subjective.

Subjectively valued stocks are often considered speculative stocks which attract individual – as opposed to institutional – investors (Birru 2018). Without a concrete valuation, individual investors will tend to overweight the tails of stock return distribution, specifically the probability of a very good outcome (Barberis and Huang 2008; Brunnermeier, Gollier, and Parker 2007), leading to an overoptimistic bias for Introduction and Decline stage firms. This bias is likely to be particularly severe prior to earnings announcements when arbitrageurs/short sellers are less active due to increased uncertainty and noise trader risk (Liu et al. 2020). Stock prices correct to fundamental value after earnings are released – and optimistic investors are disappointed. Thus, we predict downward pressure on stock prices for Introduction and Decline stage firms at earnings announcements. The following chart summarizes our reasoning:



[14] Dickinson's (2011) methodology captures the reality that most firms have a portfolio of multiple products and can thus move non-sequentially through life stages.

How exactly do we classify firms into life stages? We follow Dickinson (2011), who utilizes Livnat and Zarowin's (1990) cash flow decomposition into operating, investing, and financing cash flows, to classify firms into five life stages. The following chart, taken from p. 1974 of Dickinson (2011), explains the life stage classification system:

	1 Introduction	2 Growth	3 Maturity	4 Shake-out	5 Shake-out	6 Shake-out	7 Decline	8 Decline
	Predicted Sign							
Cash flow from operating activities	−	+	+	−	+	+	−	−
Cash flow from investing activities	−	−	−	−	+	+	+	+
Cash flow from financing activities	+	+	−	−	+	−	+	−

Dickinson (2011) argues that each of Gort and Klepper's (1982) five life stages is characterized by distinct cash flow patterns.[15] Her methodology is therefore based on firm performance and allocation of resources as reported on the statement of cash flows. She points out that a company represents a portfolio of multiple products at different product life stages, which leads to a nonlinear progression from stage to stage throughout a firm's life cycle. She directly compares her life stage classification model with that of Anthony and Ramesh (1992), who use dividend payout, sales growth, and age to identify life stage. Dickinson (2011) notes that Anthony and Ramesh's (1992) life stage methodology sometimes leads to inconsistent firm life stage classification particularly in the stagnant stage, but Anthony and Ramesh (1992) were limited by the data available in that the Statement of Cash Flows did not become mandatory until 1988. Anthony and Ramesh (1992) find the market response to unexpected sales growth and unexpected capital investment monotonically declines from the growth stage to the stagnant stage, but there is no pattern for responses to unexpected earnings. Yet, their methodology did not differentiate between positive or negative earnings surprises. Our study builds on this literature by utilizing Dickinson's (2011) classification system to

[15] Gort and Klepper (1982) trace the steps of market development after the introduction of a new product. They identify five distinct stages in a product market's life cycle. The first producer introduces a new product in Stage I. A rapid growth in the number of producers marks Stage II. The number of entering and exiting firms is roughly balanced in Stage III as the market matures. There are structural changes in the market leading to a shake-out of firms as more exit than enter in Stage IV. Stage V is characterized by firms facing an eventual decline of the market size due to the existing product becoming obsolete.

investigate whether investors respond differently to earnings surprises based on the firm's life stage during the prior fiscal year.

It is notable that both Introduction and Decline stage firms have negative operating cash flows by construction of Dickinson's (2011) cash flow classification model, although Shake-out stage firms may also have negative operating cash flows in some cases. We focus on firm life stage rather than operating cash flow sign to capture heterogeneity in earnings announcement responses between Introduction, Shake-out and Decline stage firms. For instance, a negative earnings surprise may have a more harmful impact on an Introduction stage firm because it might not yet have an established investor base and poor earnings news could turn off potential investors (Mehran and Peristiani 2010).

This exploration of the intersection between firm life stage, investor perceptions, and earnings announcement reactions has potential to make a significant contribution to the literature. While there is a rich literature on firm life cycle in corporate finance, little research has examined the relationship between firm life stage and investors' reactions.[16] Prior literature demonstrates that firm life stage significantly impacts corporate policy, including decisions related to advertising, cash holdings, corporate restructuring, debt issuance, dividend policy, equity issuance, firm rigidity, leverage, and mergers/acquisitions.[17] Furthermore, our paper connects to the rich older literature on earnings announcement reactions (e.g., Ball and Brown 1968; Beaver 1968) as well as to new developments in this line of research (Skinner and Sloan 2002; DellaVigna and Pollet 2009; Hirshleifer, Lim, and Teoh 2009; Aboody, Lehavy, and Trueman 2010; Kaniel, Liu, Saar, and Titman 2012; Mian and Sankaraguruswamy 2012; Williams 2015; Drake, Gee, and Thornock 2017; Lobo, Song, and Stanford 2017; Hartzmark and Shue 2018; Huang, Nekrasov, and Teoh 2018; Bockay, Hales, and Chava 2020; Liu et al. 2020; Ertan, Karolyi, Kelly, and Stoumbos 2021). Our study also adds to recent studies on financial or managerial accounting and firm life stage (Dickinson 2011; Collins, Hribar, and Tian 2014; Srivastava 2014; Hribar and Yehuda 2015; Vorst and Yohn 2018;

[16] See Habib and Hasan (2019) for a survey of the firm life stage literature.

[17] Relevant studies include DeAngelo, DeAngelo, and Stulz (2006); Cohen, Mashruwala, and Zach (2010); Owen and Yawson (2010); Dickinson (2011); Koh, Durand, Dai, and Chang (2015); Arikan and Stulz (2016); Faff, Kwok, Podolski, and Wong (2016); Loderer and Waelchli (2015); and Loderer, Stulz, and Waelchli (2017).

Cantrell and Dickinson 2020; Drake and Martin 2020).[18] As such, our paper represents a convergence of major strands of literature in accounting, economics, and finance on firm life stage.

3. DATA

We obtain quarterly earnings announcements from I/B/E/S from 1996 to 2018.[19] Standardized unexpected earnings (SUE) are defined as earnings per share minus the median analyst forecast divided by the prior day's stock price. Observations with extreme SUEs in the top and bottom 1% of the sample are discarded, following Kinney, Burgstahler, and Martin (2002). Stocks with prices less than $1 are excluded from the sample. Daily returns are from the Center for Research in Security Prices (CRSP). Daily abnormal return is calculated as the raw return minus the return on an equal-weighted characteristic-matched size, B/M, and momentum portfolio, consistent with Daniel, Grinblatt, Titman and Wermers (1997). While some event studies control for size, B/M, and momentum on the right hand side of regression equations, we account for these characteristics on the left hand side, following Hartzmark and Shue (2018). Cumulative DGTW announcement returns from Day –1 to Day 1 are defined as CAR(–1,+1).

For our regression analysis, other stock-level firm characteristics are gathered from CRSP, Compustat, I/B/E/S, and Thomson Reuters 13F. These variables include number of analysts following (#Analysts), accruals, book-to-market (B/M), analyst forecast dispersion (Dispersion), failure probability (Distress), firm age, Amihud's (2002) illiquidity measure (ILLIQ), income volatility (INCVOL), institutional ownership of the prior quarter (IO), idiosyncratic skewness (ISKEW), idiosyncratic volatility (IVOL), prior maximum return (MAX), momentum, the stock price from six days ago, prior rolling

[18] Dickinson (2011) reports that that mature firms' profitability does not mean revert, changes in asset turnover predicts changes in future profitability, and elevated profitability persists. Section IV of her paper documents that one-year-ahead buy-and-hold size-B/M adjusted returns are significantly positive for Maturity stage firms, suggesting that investors undervalue Maturity stage firms.

[19] According to DellaVigna and Pollet (2009), earnings announcements prior to 1995 were recorded with an error of at least one trading day. 89% of total earnings announcements in our sample occur overnight, consistent with Jiang, Likitapiwat, and McInish (2012), de Haan, Shevlin, and Thornock (2015), and Lyle, Stephan, and Yohn (2019). The overnight period is from 4:00 PM to 9:30 AM. Berkman and Truong (2009) emphasize the importance of of accounting for after-hours announcements for event studies around earnings announcements. Michaely, Rubin, and Vedrashko (2016) find that earnings news announced within trading hours results in approximately 50% smaller immediate reactions relative to those not announced during trading hours. Our untabulated results show little difference in the proportion of announcements made during trading hours across life stages.

month's return (Reversal), return on net operating assets (RNOA), sales growth, market capitalization (Size), and turnover. In regression analyses, we use rolling 20 trading days (days $t-25$ to $t-6$) to calculate IVOL, MAX, ISKEW, and Reversal to better match the experience of the investor. IVOL is idiosyncratic volatility, defined as the second moment of the residuals by implementing Fama-French-Carhart (FFC) four-factor model on daily returns (Ang, Hodrick, Xing, and Zhang 2006; Fama and French 1993; Carhart 1997). Following Fu (2009), a stock must have at least 15 trading days in the rolling window to calculate IVOL. MAX is calculated as the average of the five highest daily returns of the stock during the rolling window, with a minimum of 15 daily return observations (Bali, Cakici, and Whitelaw 2011; Bali, Brown, Murray, and Tang 2017). Following Han and Kumar (2013), ISKEW is defined as the scaled third moment of residuals from a factor model that contains market return minus the risk-free rate (RMRF) and $RMRF^2$ as factors.

#Analysts is the most recent number of analysts' estimates from I/B/E/S. Accruals are total accruals, calculated as changes in noncash working capital minus depreciation expense, scaled by average total assets for the previous two fiscal years (Sloan 1996). B/M is as defined in Fama and French (1992). Dispersion is the most recent standard deviation of analysts' forecasts from I/B/E/S. Distress is defined as probability of default in Campbell, Hilscher, and Szilagyi (2008). Firm age is the number of years since the firm appeared in CRSP. Following Berkman et al. (2009), INCVOL is measured as the standard deviation of the seasonally differenced ratio of quarterly operating income before depreciation divided by average total assets, measured over the 20 quarters prior to the current fiscal quarter, where a minimum of eight quarterly observations is required. IO is the prior quarter's institutional ownership (percentage of shares owned by institutions) from Thomson Reuters 13F holdings.[20] Momentum is the cumulative monthly stock return from month $t-12$ to $t-1$. Reversal is calculated as the buy-and-hold return over the past 20 trading days ended five days prior to the date of interest. Sales growth is the sales growth in

[20] A value of zero is assigned if no institutional ownership is reported for a stock.

the current quarter minus the sales growth four quarters ago, scaled by the sales growth four quarters ago. Turnover is monthly trading volume divided by shares outstanding.[21]

Table 2 presents the mean values of the variables. IVOL, MAX, Price, ISKEW, and Reversal are at the monthly level in Table 2, but are calculated using a rolling window in all regressions. Dividend Payer (%) presents the percentage of observations in which firms pay dividends. Net Loss (%) reports the percentage of observations where the EPS is negative. Optionable (%) is the percentage of firms with listed options in OptionMetrics. As compared with Growth, Maturity, and Shake-out stage firms, Introduction and Decline stage firms on average have lower analyst coverage, slightly lower B/M, higher analyst forecast dispersion, higher probability of failure, lower percentage of dividend paying firms, a shorter life as a public firm, higher illiquidity, lower institutional ownership, higher idiosyncratic skewness, higher idiosyncratic volatility,[22] higher prior maximum returns, lower momentum (losers on average), a higher likelihood of reporting a net loss, lower percentage of optionable firms, lower stock prices, lower prior month returns, lower RNOA,[23] and smaller market capitalization. One of the most dramatic difference is in operating income volatility (INCVOL) where INCVOL is 13.84% for Introduction stage firms and 12.66% for Decline stage firms, whereas INCVOL is 3.32%, 2.27%, and 3.77% for Growth, Maturity, and Shake-out stage firms, respectively. The higher relative volatility of operating income supports the idea that Introduction and Decline stage firms are more difficult to value than firms in other life stages.

In addition, substantially more firm-quarter observations fall into the Growth and Maturity stages (88,026 and 94,910, respectively) as compared with Introduction (27,985), Shake-out (22,430), and Decline (14,079). This pattern is also apparent in the average number of firms each year: Introduction (355), Growth (1,074), Maturity (1,091), Shake-out (242), and Decline (169). Life Stage Persistence is percentage of firms that remain in the same life stage the next year. Similar to Dickinson's (2011) Table 3B, we find

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[21] To address the issue of double-counting of volume for NASDAQ stocks, we follow Anderson and Dyl (2005) and scale down the volume of NASDAQ stocks by 50% for 1996 and 1997 and 38% after 1997 to make it roughly comparable to the volume on the NYSE.

[22] The differences in idiosyncratic volatility between life stages is documented by Hasan and Habib (2017).

[23] Although profitability is lower on average for Introduction and Decline stage firms, Miller and Friesen (1983) find both successful and unsuccessful firms in all life stages.

that the Growth and Maturity stage are the most stable life stages whereby 61.86% and 60.38% of firms, respectively, remain in the same stage year after year.

We previously presented the cumulative DGTW returns each day for the five days prior and five days after the earnings announcement for all earnings announcements in Figure 1B and for positive and negative earnings surprises in Figures 2A and 2B, respectively.[24] Table 1 reports the *t*-statistics of tests of whether raw and abnormal cumulative returns are statistically different than zero. In Panel A, for All SUEs (i.e. all earnings announcements), Introduction and Decline stage firms exhibit negative and significant mean CRR(–1,+1) and CAR(–1,+1), while the average CRR(–1,+1) and CAR(–1,+1) are positive and significant for all other life stages. Specifically, the mean CAR(–1,+1) is –0.97% for Introduction stage firms and –1.01% for Decline stage companies, while the average CAR(–1,+1) is 0.18%, 0.31%, and 0.15% for Growth, Maturity, and Shake-out stage firms, respectively. Therefore, the difference between the two groups (Introduction/Decline or Growth/Maturity/Shake-out) is at least 112 bps. The difference between these two groups is at least 70 bps among positive earnings surprises and at least 99 bps among negative earnings surprises. For positive earnings surprises, the mean CAR(–1,+1) is 0.90% and 0.65% for Introduction and Decline stage companies, respectively, while the average CAR(–1,+1) is 1.60%, 1.65%, and 1.60% for Growth, Maturity, and Shake-out stage firms, respectively. For negative earnings surprises, the average CAR(–1,+1) is –3.33% and –3.22% for Introduction and Decline stage firms, respectively, while the average CAR(–1,+1) is –2.23%, –2.11%, and –2.20% for Growth, Maturity, and Shake-out stage companies, respectively.

In the Internet Appendix, we verify that the patterns identified are not concentrated among stocks with net losses (negative earnings per share) or related to extreme earnings surprises. In the regression analysis, we control for net losses and an ordinal standardized unexpected earnings (SUE) measure to address this concern directly.

[24] To verify that our results are not driven by the dot-com bubble or the financial crisis periods, we repeat the same graphical analysis in Figure 1 after excluding the years 1999-2002 and 2007-2009 in the Internet Appendix. The figure is qualitatively similar to Figure 1, suggesting that unusual market activity during those periods is not driving our findings.

Panels B and C of Table 1 report the average CAR(–5, –1) and CAR(+1,+5) by life stage. In Panel B, the mean CAR(–5, –1) is economically larger for Introduction and Decline stage firms relative to firms in other life stages, except for negative earnings surprises. In Panel C, for all announcements, the average CAR(+1,+5) is negative and significant for Introduction and Decline stage companies (–0.80% and –0.60%, respectively), while it ranges from –0.06% to 0.09% for firms in other life stages. This pattern is consistent with the notion that Introduction and Decline stage firms exhibit a correction to overly optimistic expectations upon the release of earnings news, and we explore the statistical significance of this result in a regression analysis in the next section.

Overall, Figure 1, Figure 2, and Table 1 indicate that the average immediate earnings announcement reactions are lower on average for firms in the Introduction and Decline stage as compared with other life stages.

4. RESULTS

4.1 Firm Life Stage and Earnings Announcement Reactions

To examine whether there is a statistically significant difference between earnings announcement reactions of Introduction and Decline stage firms relative to other life stage firms, we turn to a regression framework. We are most interested in the immediate reaction to earnings announcements, so we focus on the CAR(–1,+1) for our main tests. We replace CAR(–1,+1) with CAR(–5, –1) and CAR(+1,+5) for supplemental tests. Using Fama-MacBeth quarterly regressions as in Liu et al. (2020), we estimate the following equation:

$$\textbf{CAR(–1,+1)} = \alpha + \beta_1 \,\textbf{Introduction} + \beta_2 \,\textbf{Decline} + \beta_3 \,\textbf{SUE Decile} + \beta_4 \,\textbf{Net Loss} + \varepsilon \qquad \textbf{(1)}$$

We estimate equation (1) for the entire sample (All SUEs) as well as the SUE ≥ 0 and SUE < 0 subsamples. Introduction is a dummy variable equal to one if the firm is in the Introduction stage in the previous fiscal year. Decline is a dummy variable equal to one if the firm is in the Decline stage in the previous fiscal year. SUE Decile is an ordinal variable ranging from 0 to 9, where firms in each SUE ≥ 0 and SUE < 0

subsamples are divided into deciles and assigned rank of 0 to 9 based on SUE. For our regressions with All SUEs, SUE Decile ranges from 0 to 19 where a constant of 10 is added to SUE Decile for the SUE ≥ 0 subsample. This methodology is similar to DellaVigna and Pollet (2009) who split SUE > 0 firms into quintiles and SUE ≥ 0 firms into quintiles and Hartzmark and Shue (2018) who split SUE into 20 bins.[25] Net Loss is a dummy variable equal to one if EPS < 0, similar to Vorst and Yohn (2018).

Table 3 presents the results. First, in Model 1, the Introduction coefficient is –1.687 (t = –15.37) and the Decline coefficient has an estimate of –1.431 (t = –12.99). After controlling for SUE Decile in Model 2, the Introduction coefficient is –1.665 (t = –15.03) and the Decline coefficient is –1.436 (t = –12.97). Controlling for the Net Loss dummy in Model 3 has a substantial influence on the magnitude of the life stage coefficients. The Introduction and Decline coefficients are –1.079 (t = –11.91) and –0.869 (t = –8.47) in Model 3. This evidence suggests that after accounting for the information content of earnings announcement as captured by SUE Decile and Net Loss, Introduction stage firms exhibit on average a 108 bps lower earnings announcement reaction and Decline stage companies have an 87 bps lower earnings announcement reaction relative to Growth, Maturity, and Shake-out stage firms.

Models 4 through 6 and Models 7 through 9 follow the same specifications as Models 1 through 3, but do so for positive and negative earnings surprises, respectively. Among positive earnings surprises, the Introduction and Decline coefficients are –0.644 (t = –6.79) and –0.796 (t = –7.33) after controlling for SUE Decile and Net Loss in Model 6. Therefore, for positive earnings surprises, Introduction stage and Decline stage firms experience a 64 bps and 80 bps lower announcement return, respectively, as compared with firms in other life stages. For negative earnings surprises in Model 9 with all controls, the Introduction and Decline coefficients remains negative and significant, with estimates of –0.829 (t = –8.23) and –0.506 (t = –4.39), respectively. Thus, Introduction and Decline stage firms exhibit an 83 bps and 51 bps lower announcement return, respectively, as compared with all other life stage firms among

[25] Unlike DellaVigna and Pollet (2009), we do not include a separate group for observations where the standardized unexpected earnings are exactly zero.

negative earnings surprises. In untabulated results, we repeat our analysis using the current fiscal year for the firm life stage classification and our findings are quantitatively similar.

As for the control variables, the SUE Decile coefficients are positive and significant, indicating that return responses are higher as SUE increases. Also consistent with intuition, the Net Loss coefficients are negative and significant, indicating earnings announcers with negative EPS exhibit lower stock returns.

Table 3 demonstrates that Introduction and Decline stage companies have significantly lower announcement reactions to earnings announcements as compared with firms in the Growth, Maturity, and Shake-out stages. These differences are robust to controlling for the information content of earnings announcements and are economically large in magnitude. The evidence suggests that firm life stage plays a significant role in investors' reactions to earnings announcements.

4.2 Lottery Characteristics

Given the findings of Liu et al. (2020), a natural question is whether investors in lottery stocks behave differently around earnings announcements based the firm's life stage. Consider two lottery stocks that are identical in every way except that one is in the Introduction stage and one is in the Maturity stage. If a Maturity stage firm has a more concrete valuation, while an Introduction stage company has a more subjective valuation, then we would expect lower earnings announcement reactions only for the Introduction stage firm, even though both stocks are lottery-like. Thus, we expect lottery stocks' behavior to vary by life stage.

To test this idea, we first replicate the graphical findings of Liu et al. (2020) with our sample and methodology.[26] Figure 3A displays the cumulative DGTW returns for firms in each firm life stage in the five days preceding to five days after earnings announcements for lottery and non-lottery stocks. Lottery

[26] Liu et al. (2020) use earnings announcement dates from Compustat Quarterly over the 1972-2014 period. In their study, excess returns are calculated as buy-and-hold returns in excess of the CRSP-value weighted market index return. SUE is defined the difference in split-adjusted quarterly earnings per share between the current fiscal quarter and the same fiscal quarter in the previous year, divided by the standard deviation of this change over the previous eight quarters. Day 0 is defined as the earnings announcement day in Liu et al. (2020). We define Day 0 as the trading day after the earnings announcement for overnight announcements and as the same trading day for intraday announcements (we have the time of day an announcement is made for our sample period). Liu et al. (2020) also focus their analysis on the pre-event (–5,–1) and post-event (1,5) windows, rather than the event window (–1,1) as in our analysis.

Stocks are defined using a ranked Lottery variable using idiosyncratic volatility (IVOL), prior maximum returns (MAX), idiosyncratic skewness (ISKEW), and the negative of the natural logarithm of one plus price (nPRC). To better match the average investor's experience, we use lottery measures that can be calculated over a rolling 20-day window, which precludes the use of expected idiosyncratic skewness and jackpot probability (Conrad, Kapadia, and Xing 2014; Liu et al. 2020). Stocks in the top Lottery tercile are defined as Lottery Stocks, while all stocks in the bottom Lottery tercile are defined as Non-Lottery Stocks. Consistent with Liu et al. (2020), we find graphical evidence in Figure 3A of a run-up and reversal for Lottery Stocks, but no run-up or reversal for Non-Lottery Stocks.[27]

When we disaggregate Lottery Stocks by firm life stage in Figure 3B, one can see a sharp reversal in *only* Introduction and Decline stage firms, but a weak reversal for Growth and Maturity stage firms. For Non-Lottery Stocks in Figure 3C, there is a downward drift for Introduction and Decline stage firms after the earnings announcement, but returns are mildly positive for all other life stages.

Furthermore, given that positive and negative earnings surprises are associated with different investor reactions, we separate cumulative abnormal returns for Lottery Stocks around earnings announcements by life stage and by positive or negative earnings surprise in Figure 4. Figure 4A displays the cumulative abnormal returns for Lottery Stocks for earnings announcements with SUE ≥ 0. One can see that Growth, Maturity, and Shake-out stage Lottery Stocks exhibit substantial positive reactions to positive earnings surprises, while Introduction and Decline stage lottery stocks demonstrate muted responses to earnings releases. Figure 4B reports the cumulative abnormal returns for Lottery Stocks for earnings announcements with SUE < 0. All life stages experience negative reactions to negative earnings surprises, where Introduction, Growth, and Decline stage firms exhibit the most negative responses.

We repeat Figure 4's graphical analysis for Non-Lottery Stocks in the Figure A.2 of the Appendix. Announcement reactions are similar for positive earnings surprises across firm life stages, but Introduction

[27] Liu et al. (2020) use quintiles rather than terciles. We use terciles because we split the firms further into five firm life stages; quintiles would generate subsamples with too few observations.

and Decline stage companies clearly show the worst subsequent performance in response to negative earnings surprises.

Our goal is not to fully replicate the analysis of Liu et al. (2020), but rather to examine whether lottery stocks' performance around earnings announcements varies based on life stage. To that end, we conduct further tests in a multivariate framework. Given the focus of our paper on immediate announcement reactions, we examine CAR(–1,+1). We augment equation (1) as follows:

$$\begin{aligned}\textbf{CAR(–1,+1)} = \alpha + \beta_1\,\textbf{Introduction} \times \textbf{Characteristic} + \beta_2\,\textbf{Introduction} \\ + \beta_3\,\textbf{Decline} \times \textbf{Characteristic} + \beta_4\,\textbf{Decline} + \beta_5\,\textbf{Characteristic} \\ + \beta_6\,\textbf{SUE Decile} + \beta_7\,\textbf{Net Loss} + \varepsilon \qquad \textbf{(2)}\end{aligned}$$

Characteristic is a firm characteristic. We first consider firm characteristics associated with lottery preferences: IVOL, MAX, ISKEW, nPRC, and our composite Lottery variable. We examine other firm characteristics in later tests. To minimize the effect of outliers, each characteristic is an ordinal variable ranging from 0 to 19, where all stocks are ranked into 20 groups each quarter by the characteristic.

Table 4 reports the results of estimating equation (2) by replace Characteristic in equation (2) with each lottery firm characteristic in five separate regressions. Panel A reports the results for all announcements, Panel B for the positive earnings surprises, and Panel C for negative earnings surprises. The Introduction × Characteristic term is an interaction between Introduction and the firm characteristic listed above the regression model number. For instance, Model 1 uses IVOL so that Introduction × Characteristic is Introduction × IVOL.

In Model 1 (IVOL), we find that the Introduction × IVOL coefficient is negative and significant with an estimate of –0.431 (t = –5.67) and the Decline × IVOL coefficient is negative and significant with an estimate of –0.281 (t = –4.41). As compared with Table 3, the Introduction coefficient flips signs and becomes positive, suggesting that Introduction stage firms in the lowest 5% of IVOL (IVOL = 0 from 0 to 19) exhibit more positive announcement reactions than other life stage firms with the same low idiosyncratic volatility. The Decline and IVOL coefficients are insignificant. This evidence suggests that as

IVOL increases, Introduction and Decline stage firms have a conditionally lower earnings announcement reactions when compared with firms in the Growth, Maturity, or Shake-out life stages.

Models 2, 3, and 4 use MAX, ISKEW, and nPRC as the Characteristic. In Model 2, the Introduction × MAX and the Decline × MAX coefficients are negative and significant. The Introduction × ISKEW coefficient is negative and significant, but the Decline × ISKEW coefficient is insignificant in Model 3. The Introduction × nPRC and Decline × nPRC coefficients are negative and significant. Model 5 reports the findings using the composite Lottery measure. The Introduction × Lottery and Decline × Lottery coefficients are negative and significant with estimates of –0.497 (t = –6.57) and –0.219 (t = –3.63), respectively. Therefore, as lottery characteristics increase, earnings announcement reactions incrementally decrease for Introduction and Decline stage firms relative to companies in other life stages.

Panel B of Table 4 reports the results for positive earnings surprises. In Model 1 (IVOL), the Introduction × IVOL coefficient is negative and significant and the Decline × IVOL coefficient is negative and significant. The IVOL coefficient itself is positive and significant. These results suggest that among stocks with positive earnings surprises, IVOL has a positive relationship with earnings announcement reactions for Growth, Maturity, and Shake-out stage firms, but an increase in IVOL is associated with conditionally lower reactions for Introduction and Decline stage companies. The pattern is similar across Models 2 through 5. The MAX, nPRC, and Lottery coefficients alone are positive and significant. Introduction × MAX, Decline × MAX, Introduction × ISKEW, Introduction × nPRC, Decline × nPRC, Introduction × Lottery, and Decline × Lottery coefficients are all negative and significant. Thus, when good earnings news is released, lottery stocks in general exhibit higher immediate reactions than non-lottery stocks, but this is not the case for firms in the Introduction or Decline stage. These Introduction and Decline stage firms demonstrate conditionally lower reactions to positive earnings surprises as stocks become more lottery-like.

Negative earnings surprises are presented in Panel C of Table 4. Although the individual lottery characteristics interaction terms are largely insignificant, the combined Lottery variable's interaction terms tell a clear story. Introduction × Lottery and Decline × Lottery coefficients are negative and significant with estimates of –0.207 (t = –3.23) and –0.118 (t = –2.05), respectively. The IVOL, MAX, ISKEW, nPRC, and Lottery coefficients alone all carry negative and significant or marginally significant coefficients. This evidence suggests that lottery-like stocks have more negative reactions to negative earnings surprises than non-lottery-like stocks, but the effect is significantly more pronounced for firms in the Introduction and Decline stages.

In Table A.2 of the Appendix, we conduct a tercile analysis to examine the return patterns by lottery characteristics, firm life stage, and earnings surprise. We begin by independently sorting stocks into lottery characteristic terciles. Next, we split the sample by firm life stage and report the results for All SUEs, SUE ≥ 0, or SUE < 0. Panel A presents the average CAR(–1,+1) for each group, the t-statistic for the statistical difference from zero for each return, and the number of observations in each group. The High-Low Lottery tercile differences are also reported along with the t-statistic for difference in means using a two-sample t-test. Panels B and C repeat the same procedure for CAR(–5, –1) and CAR(+1,+5), respectively. Panel A indicates that stocks in the High Lottery Tercile are associated with a significant negative average CAR(–1,+1) for the Introduction and Decline stage firms, while the mean average CAR(–1,+1) is insignificant for Growth and Shake-out stage firms and positive and significant for Maturity stage firms. The High-Low Lottery Tercile difference is negative and significant for the Introduction stage (–1.35%, t = –6.82) and Decline stage (–0.94%, t = –3.66), but is insignificant for the Maturity and Shake-out stage and significant but economically smaller in magnitude for the Growth stage (–0.34%, t = –4.14). Among positive earnings surprises, the High-Low Lottery Tercile difference is negative and marginally significant for Introduction stage firms and is insignificant for Decline stage firms. In contrast, the High-Low Lottery Tercile differences are *positive* and significant for all other life stages. This finding corroborates the regression analysis in that, for positive earnings surprises, lottery characteristics have a positive effect on earnings announcement reactions, but a negative conditional effect when a firm is in the Introduction or Decline stage.

Yet, this finding is not incompatible with those of Liu et al. (2020). Rather than focusing on CAR(–1,+1) patterns as we do in this study, Liu et al. (2020) specifically examine CAR(+1,+5) to test for a reversal from the pre-announcement run-up in cumulative return spreads between lottery and non-lottery stocks. In Panels B and C of Table A.2, we find that the High-Low Lottery tercile differences in CAR(+1,+5) are the most negative in economic magnitude for the Introduction and Decline stage firms (–0.95% and –0.45%, respectively), which mitigates pre-announcement run-up evident in High-Low Lottery tercile differences in CAR(–5,–1) for Introduction and Decline stage companies (0.74% and 0.84%, respectively). Thus, we deduce that the inverted V-shaped pattern in cumulative spreads between lottery and non-lottery stocks documented by Liu et al. (2020) is stronger among Introduction and Decline stage firms. This finding is consistent with individual investors' overoptimistic speculation in Introduction and Decline stage firms driving a pre-announcement run-up and disappointment driving a post-announcement reversal.[28]

Overall, Table 4 indicates that lottery characteristics have a significant impact on earnings announcement reactions, yet the direction of this effect differs based on firm life stage. For positive earnings surprises, lottery stocks are associated with higher announcement reactions for Growth, Maturity, and Shake-out stage firms, whereas there is a significant negative conditional relationship between CAR(–1,+1) and lottery features for Introduction and Decline stage firms. These novel findings suggest that, due to biased expectations, retail investors/noise traders bid up the prices for Introduction and Decline stocks, but are subsequently disappointed when even positive earnings news fails to justify the high stock valuations. The revelation of earnings news partially corrects overpricing due to the release of cash flow information and resolution of uncertainty.

4.3 Additional Speculative/Subjective Valuation Characteristics

Lottery features are one subset of the broad category of firm characteristics associated with speculation, subjective valuation, and/or limits to arbitrage. Nineteen of these characteristics are delineated

[28] The number of firms in each tercile indicates that compared with other life stages, proportionally more (although not all) stocks in Introduction and Decline stages stocks are lottery-like. Yet, the presence of some Low Lottery tercile stocks in Introduction and Decline stages suggests that, while the firm life cycle and lottery characteristics are related, firm life stage is not simply capturing lottery characteristics. While both are related to noise/retail trader participation, firm life stage is a cash flow-based measure, while lottery characteristics are market-based measures. In addition, we replicate the analysis in Table 4 using CAR(–5,–1) and CAR(+1,+5) as dependent variables in the Internet Appendix. Our results are generally consistent with our tercile analysis.

by Birru (2018), including idiosyncratic volatility, MAX, price, failure probability (Distress), return on assets (ROA), analyst forecast dispersion, size, illiquidity, and cash flow volatility. All of these variables are included in our summary statistics in Table 2 with minor modifications. We use RNOA, however, as opposed to ROA to be consistent with Dickinson (2011). We use operating income volatility as opposed to cash flow volatility to be consistent with Berkman et al. (2009). Specifically, Introduction and Decline stage firms on average exhibit higher failure probability, lower RNOA,[29] higher dispersion, smaller size, higher illiquidity, and greater income volatility than companies in other life stages. We add institutional ownership (IO) to this list based on the idea that stocks with lower institutional ownership will have a greater presence of retail traders (Conrad, Kapadia, and Xing 2014; Bali et al. 2019) and consequently prices are more likely to deviate from fundamentals due to increased noise trading.[30] Table 2 reports that institutional ownership is on average below 45% for Introduction and Decline stage firms, while it is above 60% for firms in other life stages. If more noise traders are drawn to firms with the above speculative characteristics especially prior to earnings announcements, we would expect these characteristics to have a significant conditional effect on earnings announcement reactions based on firm life stage.

Table 5 presents the results of estimating equation (2) using Distress, RNOA, Dispersion, Size, ILLIQ, INCVOL, and IO as the Characteristics in Models 1 through 7, respectively. Panel A reports the results for All SUEs, Panel B for positive earnings surprises, and Panel C for negative earnings surprises. Across Panels A through C, in Model 1, the Introduction × Distress and Decline × Distress coefficients are negative and significant or marginally significant. This evidence suggests that firms with a higher probability of default are associated with conditionally lower announcement reactions for Introduction and Decline stage firms. Furthermore, the Distress coefficient alone is positive and significant in Panels B and C (but insignificant in Panel A), suggesting distressed firms exhibit more positive reactions on average for firms in the Growth, Maturity, and Shake-out stages. Given that firms with higher default probabilities

[29] In Table 2, the mean RNOA is negative for Introduction and Decline stage firms, while it is positive for all other life stages.
[30] According to Stambaugh, Yu, and Yuan (2012), "Individual investors are natural candidates for sentiment-driven investors." (p. 290, footnote 6).

are considered more speculative (Conrad, Kapadia, and Xing 2014), this finding fits with our earlier argument about investors' speculation and subsequent correction for Introduction and Decline stage firms as a driver for differing earnings announcement reactions by firm life stage.

In Models 2 through 6, Size, ILLIQ, and INCVOL have significant conditional effects on earnings announcement reactions for Introduction and Decline stage firms. In Model 4 in Panels A and B, the Introduction × Size and Decline × Size coefficients are positive and significant or marginally significant, whereas the Size coefficient is negative and significant (Atiase 1985). Thus, smaller size firms respond more positively to earnings announcements in general, but smaller Introduction and Decline stage companies show comparatively reduced reactions.[31] In Model 5 in Panels A and B, the Introduction × ILLIQ and coefficient is negative and significant, while the ILLIQ coefficient is positive and significant, suggesting that Introduction stage companies show conditionally lower reactions as illiquidity rises. The INCVOL coefficient alone is negative and significant in Model 6 of Panel A, consistent with the findings of Berkman et al. (2009) that firms with higher INCVOL have lower earnings announcement reactions in general. However, for positive earnings surprises in Panel B, the INCVOL coefficient is positive and significant in Model 6, suggesting that this result may reversed for firms in Growth, Maturity, or Shake-out stages with positive earnings surprises. Panels A and B indicate that the Introduction × INCVOL and Decline × INCVOL coefficients are negative and significant, implying that as income volatility increases, Introduction and Decline stage have significantly lower conditional earnings announcement responses.[32]

Institutional ownership and its interaction with Introduction and Decline stage variables provide the most notable result in Table 5. In Model 7 across Panels A through C, the Introduction × IO and Decline × IO coefficients are positive and significant or marginally significant. Thus, lower institutional ownership is associated with incrementally lower announcement reactions to positive earnings surprises

[31] The positive signs of the Introduction × Size and Decline × Size coefficients are consistent with the notion that retail investors are overly optimistic about smaller stocks in Introduction and Decline stages and such optimism is associated with a negative correction when earnings are released.

[32] The conditional effect of RNOA is significant in Panel A, marginally significant in Panel B, and insignificant in Panel C. Dispersion has insignificant conditional effects for all but Decline stage firms with negative earnings surprises. In Models 2 through 6 in Panel C, the interaction terms with the Introduction dummy variable are insignificant, while the interaction terms with the Decline stage variable have mixed signs and significance.

for Introduction and Decline stage firms relative to companies in other life stages. This result is consistent with the notion that stocks with higher retail investor participation (i.e. lower institutional ownership) have significantly reduced earnings announcement reactions for Introduction and Decline stage firms, whereby retail investors have overoptimistic expectations for Introduction and Decline stage stocks which are subsequently corrected around earnings releases.

In sum, higher failure probability, smaller market capitalization, higher illiquidity, greater income volatility, and lower institutional ownership are associated with conditionally lower investor responses for Introduction and Decline stage firms as compared with other firm life stages, all else equal. These results are particularly strong for positive earnings surprises and support the idea that the more speculative the security or the lower the presence of institutions in a stock, the more likely Introduction and Decline stage firms are to exhibit reduced reactions to positive earnings surprises.

4.4 Other Firm Characteristics

In this subsection, we explore whether other firm characteristics affect the magnitude of earnings announcement reactions of Introduction and Decline stage firms relative to Growth, Maturity, and Shake-out stage firms.

We previously observed in Table 2 that Introduction and Decline stage firms have on average lower analyst coverage, slightly lower B/M, lower prior month returns, and lower momentum than companies in other life stages. We also add accruals, sales growth, turnover, and SUE to this list of firm characteristics for completeness even though there is no clear pattern with respect to firm life stages in Table 2. To explore the impact of these other firm characteristics, we investigate the marginal effects of these variables in a regression framework in Table 6. As before, we replace Characteristic in equation (2) with each firm characteristic in eight separate regressions for all announcements in Panel A, and positive and negative earnings surprises subsamples, respectively, in Panels B and C.

We focus first on positive earnings surprises in Panel B of Table 6. We find that firms with greater analyst coverage exhibit smaller reactions to positive earnings surprises, consistent with prior disclosure of earnings-related information for firms with more analyst coverage. Yet, for Introduction stage firms, lower analyst coverage is associated with conditionally lower reactions to positive earnings surprises, consistent with the notion that retail trading in a poor information environment (Bhattacharya 2001) leads to a stock price correction upon earnings releases for Introduction stage firms. According to the accrual anomaly, firms with lower accruals have greater future abnormal returns (Sloan 1996). The evidence in Model 2 suggests that higher accruals are associated with conditionally higher announcement reactions to positive earnings surprises for Introduction and Decline stage firms, suggesting that investors are not fully accounting for the accrual anomaly in Introduction and Decline stage firms.[33] Zhang (2013) demonstrates that low B/M stocks have significantly more positive skewness than high B/M stocks and implies that investors with lottery preferences prefer glamour (low B/M) stocks with high skewness. Model 3 suggests that low B/M stocks have lower announcement reactions, and this effect is more pronounced for Introduction and Decline stage firms. Aboody, Lehavy, and Trueman (2010) find that extreme winner stocks have a run-up before and subsequent reversal after earnings announcements. Our results in Model 4 regarding momentum suggest that winner stocks tend to do better around earnings announcements for Introduction and Decline stage firms relative to firms in other life stages, while Aboody, Lehavy, and Trueman's (2010) result of poor performance of winner stocks holds true for firms in other life stages.[34]

For negative earnings surprises in Panel C, SUE Decile has a magnified conditional effect on investor responses to negative earnings surprises for Introduction and Decline stage firms.[35] This evidence suggests that more extreme negative earnings surprises are associated with even more negative announcement reactions, especially for Introduction and Decline stage firms.

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[33] In Model 2, the Accruals coefficient is negative and significant (consistent with the accrual anomaly), while the Introduction × Accruals and Decline × Accruals coefficients are positive and significant. Hribar and Yehuda (2015) find that free cash flows subsume total accruals mispricing in the maturity and decline stages but not in the growth stage, suggesting that total accruals mispricing varies by firm life stage. Thus, our exploration of the impact of accruals on earnings announcement reactions by firm life stage is relevant.

[34] Da, Jagannathan, and Shen (2013) find that firms with high sales growth and low gross margins that went public during industry waves tend to underperform, which begs the question whether sales growth impacts investor responses for Introduction stage firms. However, the Introduction × Sales Growth coefficient is insignificant.

[35] The positive B/M coefficient is consistent with Skinner and Sloan (2002), who find that low B/M stocks have more negative responses to negative earnings surprises.

The conditional effects evident in Panels B and C are largely corroborated in Panel A, although the firm characteristics alone have mixed signs and significance. The number of analysts, accruals, B/M, reversal, sales growth, turnover, and standardized unexpected earnings all have some conditional impacts on announcement reactions for Introduction and/or Decline stage firms relative to companies in other life stages.

Next, in Table 7, we examine whether our main results are driven by firm age or whether firms pay dividends or has listed options. According to Table 2, dividend payers are less common among Introduction and Decline stage firms. Ham, Kaplan, and Utke (2020) find that earnings response coefficients are lower among firms that pay dividends. For this reason, in Models 1, 4, and 7, we augment to equation (1) a dummy variable DIV which is equal to one if a firm pays dividends. The Introduction and Decline coefficients continue to remain negative and significant after the inclusion of DIV for all announcements as well as positive and negative earnings surprises separately. Consistent with Ham, Kaplan, and Utke (2020) who find that earnings announcement reactions are attenuated for dividend payers as compared with non-dividend payers, the DIV coefficient is negative and significant for positive earnings surprises, while the DIV coefficient is positive and significant for negative earnings surprises.

Another possible objection is that our findings are picking up an already documented effect by Loughran and Ritter (1995) that firms underperform in the five years after an IPO. If our Introduction and Decline stage subsamples are dominated by younger firms, perhaps our results are driven by this phenomenon. Therefore, we augment Firm Age to equation (1), where Firm Age is measured as the number of years since the firm appeared in CRSP. In Models 2, 5, and 8, our main results hold after controlling for Firm Age.

Moreover, prior literature suggests that firms with and without options have differential responses to earnings announcements (e.g., Skinner 1990, Mendenhall and Fehrs 1999). For this reason, in Models 3, 6, and 9, we control for Optionable, a dummy variable equal to one if a firm has listed options in OptionMetrics. Our main findings hold after controlling for the Optionable variable.

It is natural to wonder whether our main results are stronger in one specific industry. The information technology industry is of particular interest given the preponderance of articles in the popular press about tech IPOs and their subsequent performance. In the Internet Appendix, we regress CAR(–1,+1) on the Introduction and Decline dummy variables for each GICS industry sector separately. Introduction and Decline stage firms exhibit significantly less positive reactions to positive earnings surprises and significantly more negative reactions to negative earnings surprises across several industry sectors, including Information Technology. These results speak to the ongoing debate about investor excitement surrounding new publicly traded technology firms. Yet, our findings are relevant to other industry sectors as well, suggesting that the impact of firm life stage has broad implications for earnings announcers in a variety of industries.

In addition, in Table A.1 in the Appendix, we test whether our results are simply picking up general underperformance of Introduction and Decline stage stocks relative to stocks in other life stages. Using the firms in our sample, we calculate DGTW daily returns for every day from 1996 to 2018. We split these daily returns by firm life stage into four groups: (i) non-earnings announcement days, (ii) announcement days, (iii) positive earnings surprises days, and (iv) negative earnings surprise days. Positive earnings surprises days include the Days –1, 0, and 1 surrounding positive earnings surprises, while negative earnings surprises days are defined analogously for negative earnings surprises. Then, we compute the quarterly time series averages of cross-sectional averages for each group. We find that non-announcement day DGTW returns for Introduction stage firms are insignificant (–0.01%, t = –0.66), while Decline stage firms' abnormal returns are positive and marginally significant (0.02%, t = 1.85). Non-announcement days are insignificant in the Growth stage and positive and significant for the Maturity and Shake-out stages. In contrast, all the DGTW returns are positive and significant for positive earnings surprises and are negative and significant for negative earnings surprises. Given that on non-earnings announcement days Introduction stage firms do not significantly underperform and Decline stage firms marginally outperform, it is unlikely that our results are driven by persistent underperformance of firms in certain life stages on any given day.

5. Conclusion

According to Miller and Friesen (1984), a corporation's strategy, structure, situation, and decision-making varies across firm life stages. In particular, Introduction and Decline stage companies typically exhibit higher uncertainty about future cash flows, which contributes to a greater tendency for investors to value these firms more subjectively. Lacking concrete valuation information, individual investors may overweight the probability of good future states, leading to an overoptimistic bias and speculation in Introduction and Decline stage companies. Stock prices will correct, however, at the release of value-relevant cash flow news at earnings announcements, when hard numbers fail to justify such optimistic expectations. As investor disappointment is incorporated in stock prices, earnings announcements reactions will be lower for Introduction or Decline stage companies relative to firms in other life stages that are less subjectively valued.

Indeed, we find that Introduction and Decline stage companies exhibit significantly lower three-day cumulative abnormal returns (CARs) around earnings announcements, where such firms exhibit less positive CARs around positive earnings surprises and more negative CARs around negative earnings surprises as compared with companies in Growth, Maturity, and Shake-out stages. In a regression framework which controls for the information content of earnings announcements, positive earnings surprise announcement reactions are 64 bps and 80 basis points less positive for Introduction and Decline stage firms, respectively, as compared with Growth, Maturity, and Shake-out stage firms. Among negative earnings surprises, announcement reactions are 83 bps and 51 bps more negative for Introduction and Decline stage companies relative to other life stage firms.

Moreover, Liu, Wang, Yu, and Zhao (2020) find that lottery-like stocks (e.g., high idiosyncratic volatility, high skewness, low price) underperform after earnings announcements. We argue that lottery stocks' earnings announcement reactions will vary based on firm life stage, where companies in the Introduction and Decline stage have the most subjective valuation. Therefore, two otherwise identical lottery stocks in different life stages – one in the Introduction stage, one in the Maturity stage – will exhibit different reactions to earnings announcements because the former is more subjectively valued and attracts greater investor speculation.

Our regression results demonstrate that lottery stocks exhibit conditionally lower earnings announcement reactions for Introduction and Decline stage firms relative to companies in other life stages. Graphical evidence suggests lottery stocks' post-announcement reversal is most pronounced among Introduction and Decline stage firms and is attenuated for companies in other life stages. Our findings suggest the correction to individual investors' overoptimistic expectations drives the lower earnings announcement reactions for companies in the Introduction and Decline stages.

Firm life stage is related to the well-established product life cycle that drives the competitive landscape and evolution of industries (Porter 2004). A promising area for future research is to explore the relationship between the nature of competitive strategy, financial reporting, and investing behavior. Specifically, one could examine whether investors respond differently to executives' strategic decisions involving capital structure, issuance, dividends, or acquisitions depending on the firm's life stage. One could further investigate whether investors' reactions influence managers' subsequent decision-making and those of peer firms in the same industry. It would also be worthwhile to study whether financial reporting plays varying roles in different life stages in communicating information between managers, investors, and regulators. We leave these ideas to future research. Based on our evidence, we conclude that firm life stage affects investor (mis)perceptions.

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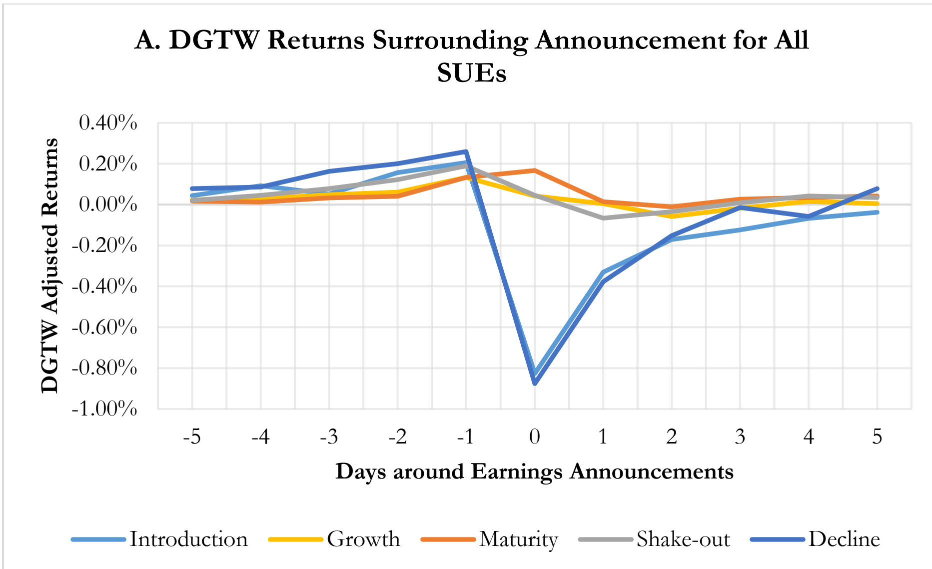
Variable Definitions Appendix

Dependent Variable	
DGTW return	DGTW return is calculated as the raw return minus the return on an equal-weighted characteristic-matched size, B/M, and momentum portfolio, following Daniel, Grinblatt, Titman and Wermers (1997).
CAR(–1,+1)	The cumulative DGTW announcement returns from Day –1 to Day 1.
CAR(–5,–1)	The cumulative DGTW announcement returns from Day –5 to Day –1.
CAR(+1,+5)	The cumulative DGTW announcement returns from Day 1 to Day 5.
Independent Variables and Other Variables	
#Analysts	The most recent number of analysts' estimates from I/B/E/S.
Accruals	Total accruals are defined as changes in noncash working capital minus depreciation expense, scaled by average total assets for the previous two fiscal years (Sloan 1996).
B/M	Book-to-market value as defined in Fama and French (1992).
Decline	Decline is a dummy variable equal to one if the firm is in the Decline stage in the prior fiscal year. Following Dickinson (2011), companies are classified as in the Decline stage if the firm exhibits negative cash flow from operating activities and positive cash flow from investing activities.
Dispersion	The most recent standard deviation of analysts' forecasts from I/B/E/S.
Distress	The probability of default in Campbell, Hilscher, and Szilagyi (2008).
Dividend Payer (%)	The percentage of firms that pay dividends.
Firm Age	The number of years since the firm appeared in CRSP.
Lottery	A ranked lottery variable using IVOL, MAX, ISKEW, and nPRC.
Illiq	Amihud's (2002) illiquidity measure.
INCVOL	Operating income volatility (in percent). Following Berkman et al. (2009), INCVOL is measured as the standard deviation of the seasonally differenced ratio of quarterly operating income before depreciation divided by average total assets, measured over the 20 quarters prior to the current fiscal quarter. A minimum of eight quarterly observations is required.
Introduction	Introduction is a dummy variable equal to one if the firm is in the Introduction stage in the prior fiscal year. Following Dickinson (2011), firms are classified as in the Introduction stage if the company exhibits negative cash flow from operating activities, negative cash flow from investing activities, and positive cash flow from financing activities.
IO	Institutional ownership of the prior quarter.
ISKEW	The scaled third moment of residuals from a factor model that contains market return over the risk-free rate (RMRF) and $RMRF^2$ as factors.
IVOL	Idiosyncratic volatility is defined as the second moment of the residuals by implementing Fama-French-Carhart (FFC) four-factor model on daily returns (Ang et al, 2006; Fama and French, 1993; Carhart, 1997). Following Fu (2009), a stock must have at least 15 trading days in the rolling window to calculate IVOL.
Life Stage Persistence	The percentage of firms that remain in the same life stage the next year.

MAX	MAX is calculated as the average of the five highest daily returns of the stock during the rolling window, with a minimum of 15 daily return observations (Bali, Brown, Murray, and Tang 2017).
Momentum	The cumulative monthly stock return from month $t-12$ to $t-1$.
Net Loss	A dummy variable equal to one if EPS < 0.
Net Loss Firms (%)	The percentage of firms with net losses.
nPRC	The negative of the natural logarithm of one plus stock price of six days ago.
Optionable (%)	Percentage of firms with listed options.
Price	The prior day's stock price.
Reversal	The buy-and-hold return over the past 20 trading days.
RNOA	Return on net operating assets as defined by Dickinson (2011).
Sales Growth	Sales growth in the current quarter minus the sales growth four quarters ago, scaled by the sales growth four quarters ago.
Size	Market capitalization.
SUE	SUE is defined as earnings per share minus the median analyst forecast divided by the prior day's stock price.
SUE Decile	An ordinal variable ranging from 0 to 9, where firms in each SUE ≥ 0 and SUE < 0 subsample are divided into deciles and assigned rank of 0 to 9 based on SUE. SUE Decile ranges from 0 to 19 for all announcements together (All SUEs).
Turnover	Turnover is calculated as monthly trading volume divided by the number of shares outstanding. To address the issue of double-counting of volume for NASDAQ stocks, we follow Anderson and Dyl (2005) and scale down the volume of NASDAQ stocks by 50% for 1996 and 1997 and 38% after 1997 to make it roughly comparable to the volume on the NYSE.

Figure 1: Abnormal Returns Around Earnings Announcements by Firm Life Stage

This figure displays the average and cumulative DGTW returns for firms in each firm life stage in the five days before to five days after earnings announcements. Firm life stages are Introduction, Growth, Maturity, Shake-out, and Decline. Figure 1 divides firm-date observations by life stage and presents the DGTW returns in the five days before to five days after earnings announcements. Average and cumulative DGTW returns are presented in Figures 1A and 1B, respectively. The sample period is from 1996 to 2018.



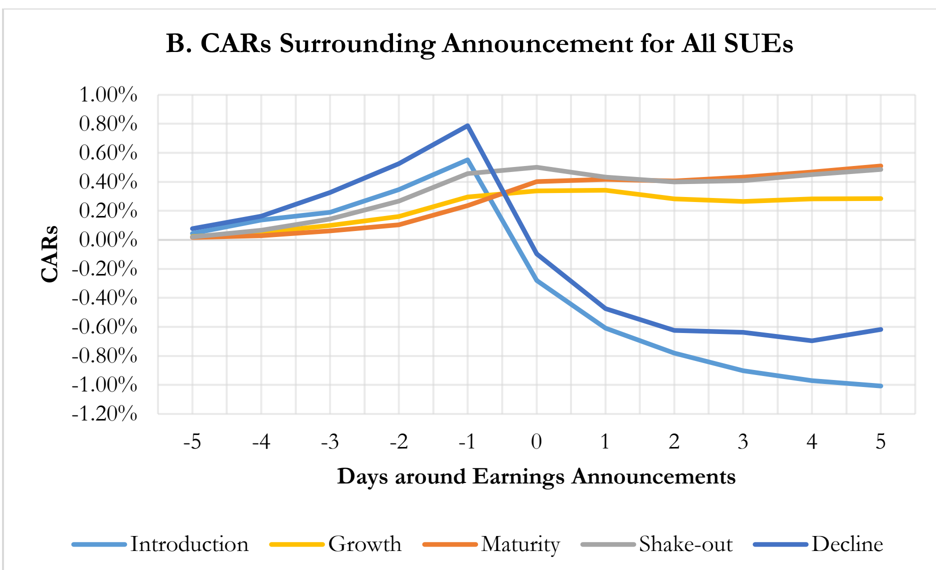
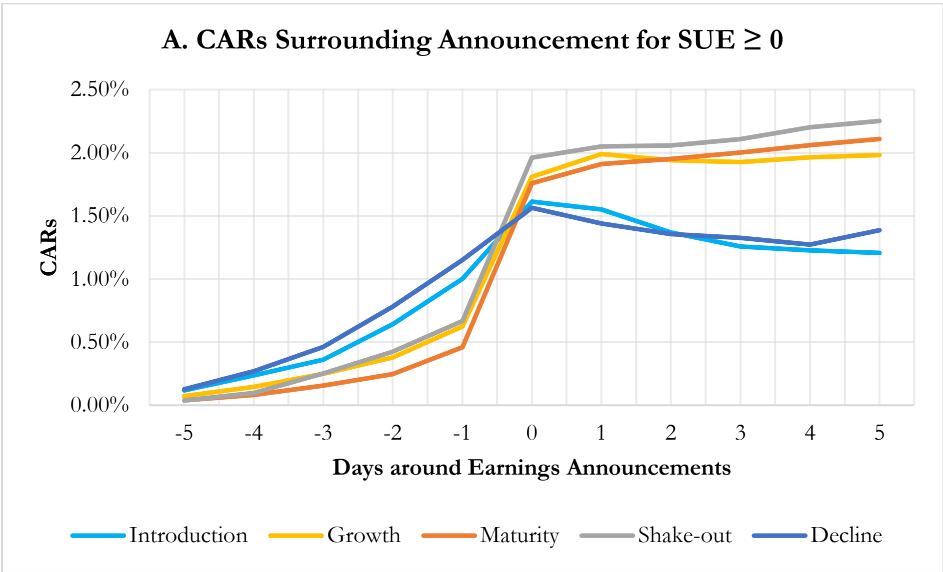


Figure 2: Abnormal Returns Around Earnings Announcements by Firm Life Stage for Positive and Negative Earnings Surprises

This figure displays the cumulative DGTW returns for firms in each firm life stage in the five days before to five days after earnings announcements for positive and negative earnings surprises. Firm life stages are Introduction, Growth, Maturity, Shake-out, and Decline. Figures 2A and 2B divide firm-date observations by life stage and present the cumulative DGTW returns in the five days before to five days after earnings announcements for positive earnings surprises (EPS ≥ 0) and for negative earnings surprises (EPS ≥ 0), respectively. The sample period is from 1996 to 2018.



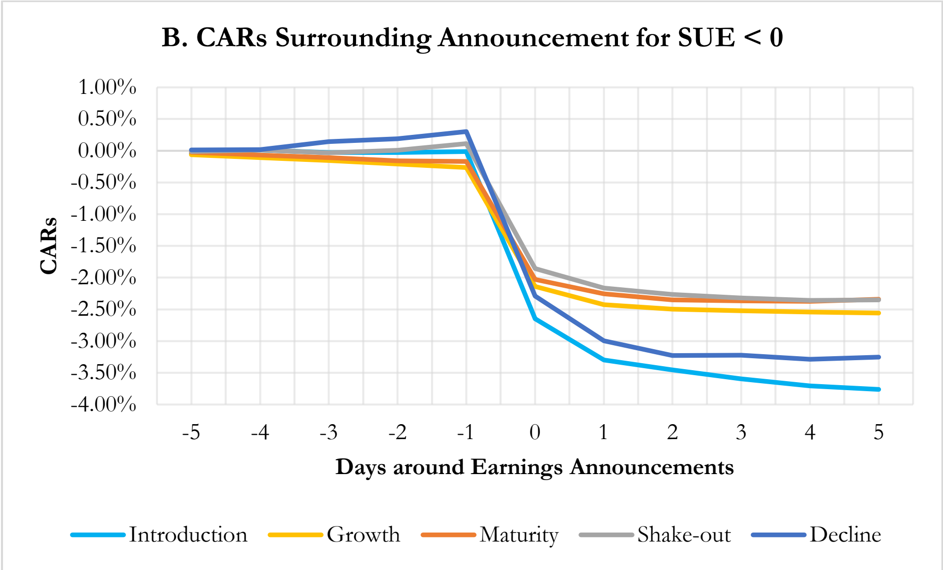
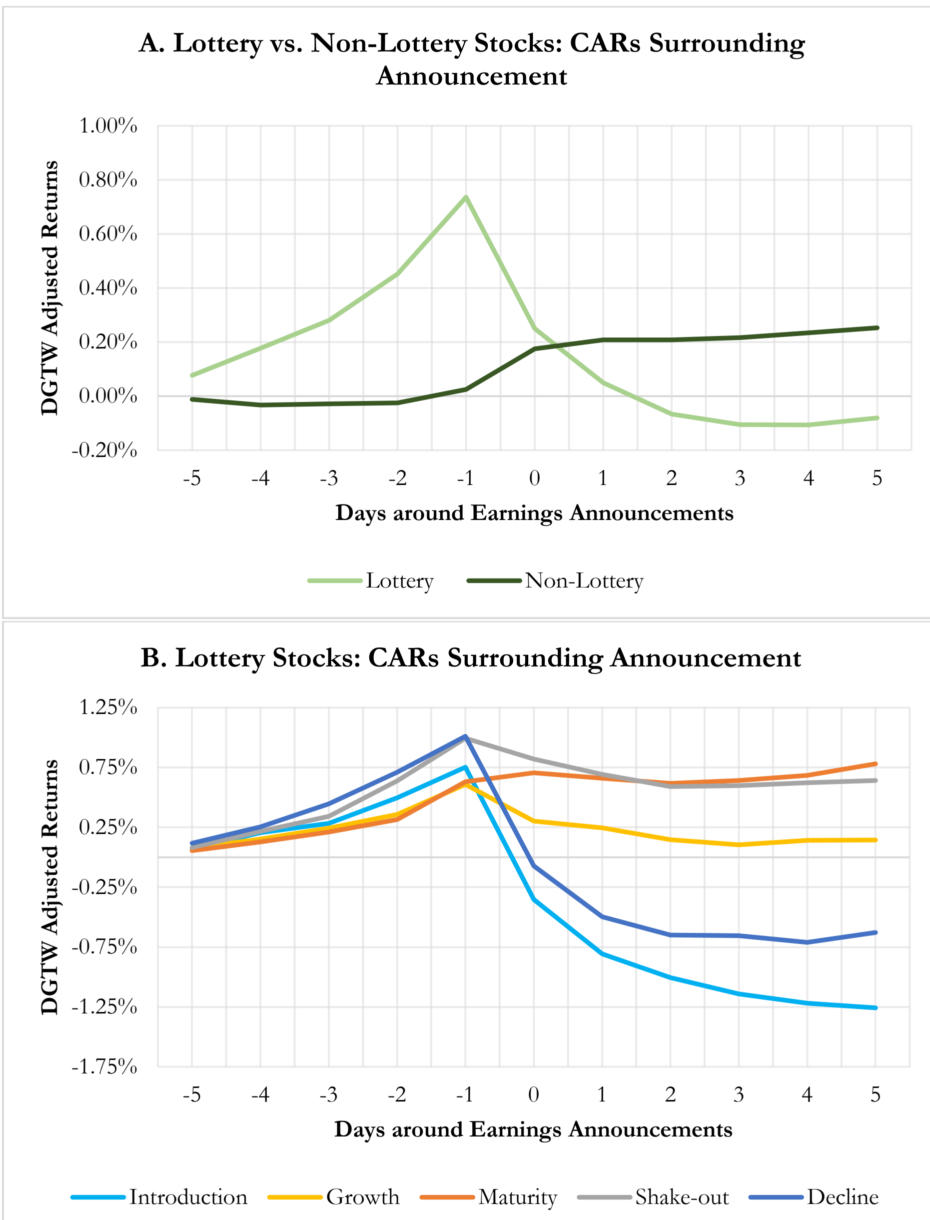


Figure 3: Cumulative Announcement Returns for Lottery vs. Non-Lottery Stocks by Firm Life Stage

This figure displays the cumulative DGTW returns for firms in each firm life stage in the five days before to five days after earnings announcements for lottery and non-lottery stocks. Lottery Stocks are defined with a ranked Lottery variable using idiosyncratic volatility (IVOL), prior maximum returns (MAX), idiosyncratic skewness (ISKEW), and the negative of the natural logarithm of one plus price (nPRC). IVOL, MAX, and ISKEW are calculated using rolling 20 trading days (days $t-25$ to $t-6$). Stocks in the top Lottery tercile are defined as Lottery Stocks, while all stocks in the bottom Lottery tercile are defined as Non-Lottery Stocks. Firm life stages are Introduction, Growth, Maturity, Shake-out, and Decline. Figure 2A presents cumulative DGTW returns in the five days before to five days after earnings announcements for Lottery and Non-Lottery Stocks. We divide firm-date observations by life stage and present cumulative DGTW returns for Lottery Stocks and Non-Lottery Stocks in Figures 2B and 2C, respectively. The sample period is from 1996 to 2018.



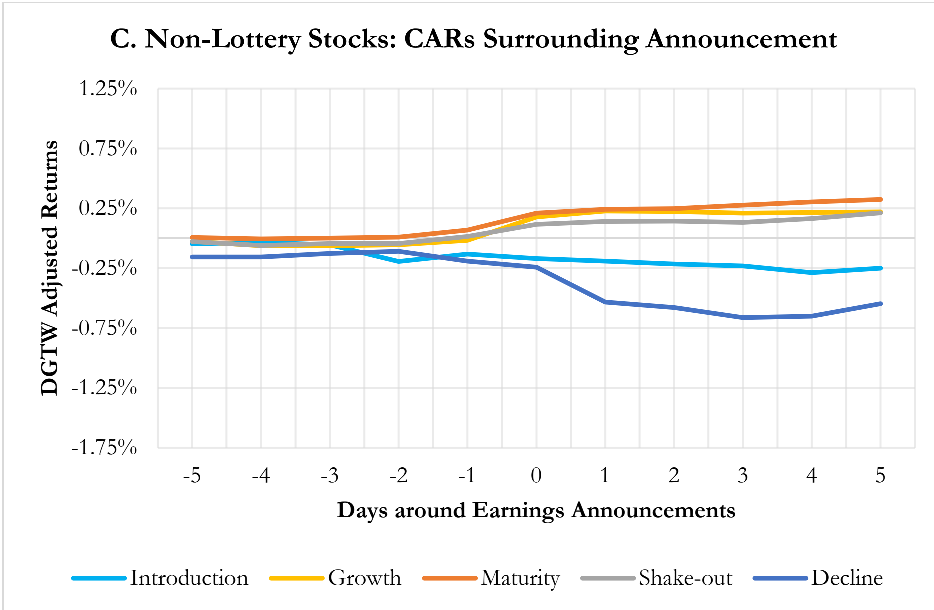
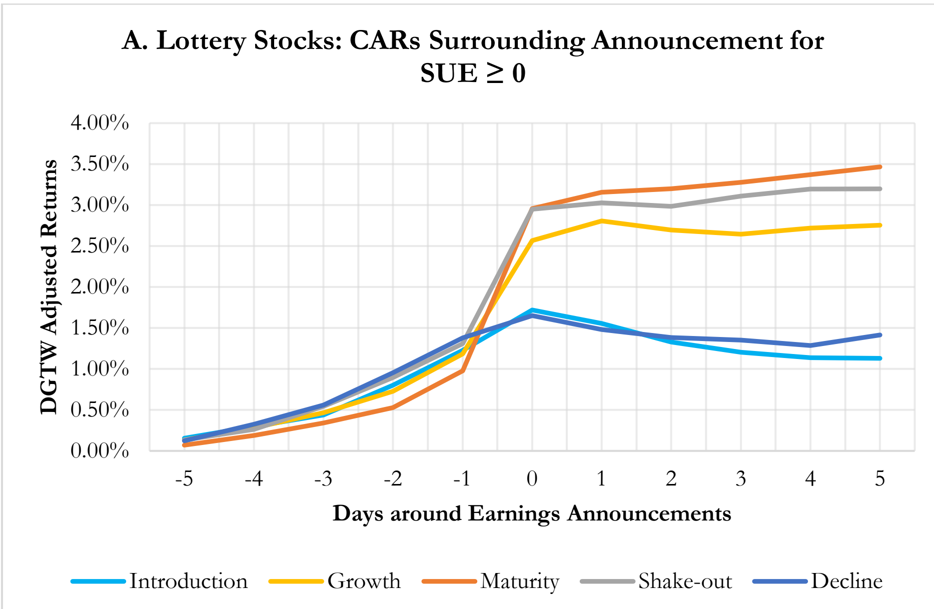

C. Non-Lottery Stocks: CARs Surrounding Announcement
1.25%
0.75%
0.25%
-0.25%
-0.75%
-1.25%
-1.75%
DGTW Adjusted Returns
-5
-4
-3
-2
-1
0
1
2
3
4
5
Days around Earnings Announcements
Introduction
Growth
Maturity
Shake-out
Decline

Figure 4: Cumulative Announcement Returns for Lottery Stocks by Firm Life Stage for Positive and Negative Earnings Surprises

This figure displays the cumulative DGTW returns for firms in each firm life stage in the five days before to five days after earnings announcements for lottery stocks for positive and negative earnings surprises. Lottery Stocks are defined with a ranked Lottery variable using idiosyncratic volatility (IVOL), prior maximum returns (MAX), idiosyncratic skewness (ISKEW), and the negative of the natural logarithm of one plus price (nPRC). Stocks in the top Lottery tercile are defined as Lottery Stocks. Firm life stages are Introduction, Growth, Maturity, Shake-out, and Decline. Cumulative DGTW returns by firm life stage in the five days before to five days after earnings announcements for Lottery Stocks are presented for positive (SUE ≥ 0) and negative (SUE < 0) earnings surprises in Figures 3A and 3B, respectively. The sample period is from 1996 to 2018.



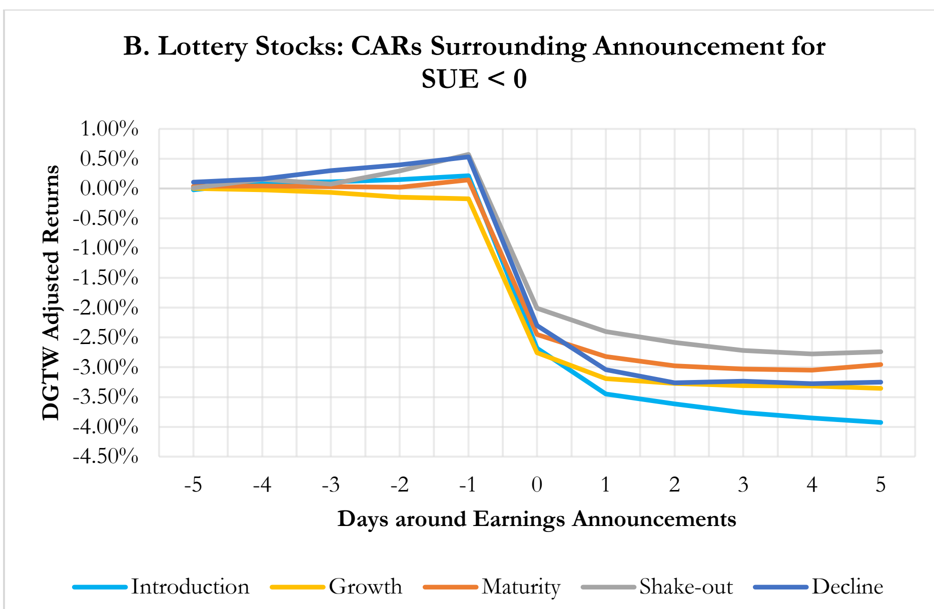


Table 1: Earnings Announcement Returns by Firm Life Stage

This table presents the mean raw and announcement reactions for firms in each firm life stage for positive and negative earnings surprises. In Panel A, we present the cumulative raw announcement returns from Day –1 to Day 1, defined as CRR(–1,1), and the DGTW announcement returns from Day –1 to Day 1, defined as CAR(–1,+1). DGTW refers to abnormal returns calculated using Daniel, Grinblatt, Titman, and Wermers' (DGTW) approach. We present the returns from Day –5 to Day –1 in Panel B and returns from Day 1 to Day 5 in Panel C. Firm life stages are Introduction, Growth, Maturity, Shake-out, and Decline. SUE is defined as earnings per share minus the median analyst forecast divided by the stock price of the prior day. We divide firm-date observations by life stage and then present returns for all announcements (All SUEs) and positive and negative SUE (SUE ≥ 0 or SUE < 0). The *t*-statistic in parentheses tests whether the return is statistically different from zero. The sample period is from 1996 to 2018.

Panel A: Day -1 to Day +1

	All SUEs		SUE ≥ 0		SUE < 0	
	CRR(-1,+1)	CAR(-1,+1)	CRR(-1,+1)	CAR(-1,+1)	CRR(-1,+1)	CAR(-1,+1)
Introduction	-0.87%	-0.97%	1.03%	0.90%	-3.26%	-3.33%
	(-10.40)	(-12.15)	(8.78)	(8.03)	(-28.42)	(-30.40)
Growth	0.38%	0.18%	1.85%	1.60%	-2.12%	-2.23%
	(11.47)	(5.77)	(46.63)	(43.20)	(-38.14)	(-43.04)
Maturity	0.50%	0.31%	1.90%	1.65%	-2.03%	-2.11%
	(17.89)	(11.93)	(57.16)	(53.56)	(-43.07)	(-48.00)
Shake-out	0.37%	0.15%	1.84%	1.60%	-2.02%	-2.20%
	(5.61)	(2.48)	(23.01)	(21.34)	(-18.37)	(-21.13)
Decline	-0.90%	-1.01%	0.75%	0.65%	-3.11%	-3.22%
	(-8.53)	(-9.95)	(5.33)	(4.84)	(-19.81)	(-21.49)

Panel B: Day -5 to Day -1

	All SUEs		SUE ≥ 0		SUE < 0	
	CRR(-5,-1)	CAR(-5,-1)	CRR(-5,-1)	CAR(-5,-1)	CRR(-5,-1)	CAR(-5,-1)
Introduction	0.64%	0.45%	1.10%	0.91%	0.06%	-0.14%
	(8.92)	(6.81)	(11.71)	(10.69)	(0.51)	(-1.39)
Growth	0.55%	0.26%	0.89%	0.60%	-0.02%	-0.31%
	(20.73)	(11.16)	(27.05)	(20.63)	(-0.36)	(-7.67)
Maturity	0.50%	0.21%	0.71%	0.44%	0.11%	-0.20%
	(24.42)	(11.87)	(29.39)	(20.81)	(2.99)	(-6.28)
Shake-out	0.70%	0.42%	0.90%	0.63%	0.38%	0.07%
	(12.96)	(8.73)	(14.21)	(11.30)	(3.87)	(0.76)
Decline	0.94%	0.69%	1.29%	1.08%	0.48%	0.17%
	(8.86)	(7.03)	(8.95)	(8.09)	(3.05)	(1.17)

Panel C: Day +1 to Day +5						
	All SUEs		SUE ≥ 0		SUE < 0	
	CRR(+1,+5)	CAR(+1,+5)	CRR(+1,+5)	CAR(+1,+5)	CRR(+1,+5)	CAR(+1,+5)
Introduction	-0.61%	-0.80%	-0.26%	-0.44%	-1.06%	-1.26%
	(-8.83)	(-12.34)	(-2.88)	(-5.27)	(-9.79)	(-12.32)
Growth	0.18%	-0.06%	0.39%	0.16%	-0.19%	-0.45%
	(6.14)	(-2.42)	(11.02)	(5.00)	(-3.94)	(-10.26)
Maturity	0.36%	0.09%	0.60%	0.33%	-0.06%	-0.34%
	(16.66)	(4.82)	(22.96)	(14.25)	(-1.58)	(-9.67)
Shake-out	0.19%	-0.04%	0.49%	0.27%	-0.29%	-0.54%
	(3.39)	(-0.72)	(7.00)	(4.20)	(-2.90)	(-5.97)
Decline	-0.42%	-0.60%	-0.06%	-0.25%	-0.89%	-1.06%
	(-4.12)	(-6.28)	(-0.47)	(-2.03)	(-5.70)	(-7.12)

Table 2: Mean Values of Variables

This table reports the mean values of each variable in the sample by firm life stage. Firm life stages are Introduction, Growth, Maturity, Shake-out, and Decline. Variables include number of analysts following (#Analysts), accruals, book-to-market (B/M), analyst forecast dispersion (Dispersion), percentage of dividend payers, failure probability (Distress), firm age, Amihud's (2002) illiquidity measure (ILLIQ), income volatility (INCVOL), institutional ownership of the prior quarter (IO), idiosyncratic skewness (ISKEW), idiosyncratic volatility (IVOL), prior maximum return (MAX), momentum, percentage of firms with net losses, percentage of optionable firms, stock price (Price), prior month's return (Reversal), sales growth, market capitalization (Size), standardized unexpected earnings (SUE), and turnover. All variables are defined in the Variable Definitions Appendix. Size is in millions of dollars. Life Stage Persistence is the percentage of firms that remain in the same life stage the next year. #Firms is the average number of unique firms per year in each subsample. No. of obs. is the number of observations in each subsample. The sample period is from 1996 to 2018.

	Introduction	**Growth**	**Maturity**	**Shake-out**	**Decline**
#Analyst	2.99	4.74	5.06	3.77	2.59
Accruals	-3.53%	-4.01%	-5.54%	-3.45%	-4.21%
B/M	0.37	0.48	0.46	0.58	0.45
Dispersion	1.33%	0.49%	0.43%	0.75%	1.60%
Distress	0.065%	0.030%	0.023%	0.029%	0.071%
Dividend Payer (%)	9.81%	37.27%	55.59%	42.16%	8.82%
Firm Age	7.36	11.78	16.52	13.31	8.70
ILLIQ ($x10^6$)	4.17%	0.70%	0.52%	1.40%	5.62%
INCVOL	13.84%	3.32%	2.27%	3.77%	12.66%
IO	41.84%	65.07%	69.15%	60.45%	41.31%
ISKEW	0.22	0.12	0.11	0.14	0.24
IVOL	3.07%	1.88%	1.57%	1.94%	3.12%
MAX	4.63%	3.09%	2.65%	3.13%	4.71%
Momentum	-9.89%	7.30%	9.97%	6.27%	-8.34%
Net Loss Firms (%)	65.65%	10.11%	6.12%	24.13%	81.62%
Optionable (%)	49.31%	61.00%	67.12%	58.19%	46.60%
Price	7.30	21.69	25.65	15.73	5.73
Reversal	-1.12%	0.38%	0.76%	0.53%	-0.44%
RNOA	-16.35%	13.66%	20.16%	9.90%	-23.68%
Sales Growth	11.64%	13.12%	5.09%	3.43%	3.41%
Size	192	738	1,144	549	166
SUE	-0.026%	0.043%	0.051%	0.075%	0.055%
Turnover	12.81%	12.15%	11.31%	10.90%	11.62%
Life Stage Persistence	54.80%	61.86%	60.38%	23.51%	32.34%
#Firms	355	1,074	1,091	242	169
No. of obs.	27,985	88,026	94,910	22,430	14,079

Table 3: Earnings Announcement Reactions of Introduction and Decline Stage Firms Relative to Firms in Other Life Stages

This table presents the results of Fama-MacBeth regressions using equation (1) for firms with an earnings announcement reported in I/B/E/S. The dependent variable is the cumulative DGTW announcement returns from Day –1 to Day 1, defined as CAR(–1,+1) in Panel A. The dependent variable is CAR(–5, –1) in Panel B and CAR(+1, +5) in Panel C. Introduction is a dummy variable equal to one if the firm is in the Introduction stage in the prior fiscal year. Decline is a dummy variable equal to one if the firm is in the Decline stage in the prior year. Models 1 through 3 contain all earnings announcements, Models 4 through 6 contain positive earnings surprises, and Models 7 through 9 contain negative earnings surprises. All SUEs are all earnings announcements. SUE ≥ 0 reflects a positive earnings surprise and SUE < 0 captures a negative earnings surprise. Models 1, 4, and 7 include only the Introduction and Decline dummy variables, while subsequent models progressively add more variables in equation (1). SUE Decile is an ordinal variable ranging from 0 to 9, where firms in each SUE ≥ 0 and SUE < 0 subsample are divided into deciles and assigned rank of 0 to 9 based on SUE. For the All SUEs regressions (Models 1 through 3), SUE Decile ranges from 0 to 19 where a constant of 10 is added to SUE Decile for the SUE ≥ 0 subsample. Net Loss is a dummy variable equal to one if EPS < 0. Variables are defined in the Variable Definitions Appendix. Fama-MacBeth quarterly regressions are used. *t*-statistics are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The sample is from 1996 to 2018.

Panel A: CAR(-1,+1)									
	All SUEs			SUE ≥ 0			SUE < 0		
	1	2	3	4	5	6	7	8	9
Introduction	-1.687***	-1.665***	-1.079***	-0.804***	-1.017***	-0.644***	-1.348***	-1.251***	-0.829***
	(-15.37)	(-15.03)	(-11.91)	(-7.56)	(-9.22)	(-6.79)	(-13.53)	(-12.39)	(-8.23)
Decline	-1.431***	-1.436***	-0.869***	-0.960***	-1.219***	-0.796***	-0.962***	-0.877***	-0.506***
	(-12.99)	(-12.97)	(-8.47)	(-8.45)	(-10.87)	(-7.33)	(-8.93)	(-8.03)	(-4.39)
SUE Decile		1.755***	1.760***		2.056***	2.091***		0.357***	0.341***
		(11.45)	(11.43)		(12.46)	(12.45)		(4.83)	(4.47)
Net Loss			-0.851***			-0.645***			-0.520***
			(-8.99)			(-6.59)			(-4.89)
Intercept	0.749***	-1.313***	-1.600***	4.406***	0.725**	-0.104	-4.588***	-3.459***	-3.054***
	(7.45)	(-13.39)	(-16.50)	(18.98)	(7.87)	(-1.01)	(-19.92)	(-26.08)	(-25.33)
Adj. R^2	0.36%	0.81%	0.90%	0.26%	1.18%	1.28%	0.42%	0.51%	0.67%
N	247,430	247,430	247,430	153,968	153,968	153,968	93,462	93,462	93,462

Panel B: CAR(-5,-1)									
	All SUEs			SUE ≥ 0			SUE < 0		
	1	2	3	4	5	6	7	8	9
Introduction	0.124	0.133	-0.046	0.320***	0.244**	0.081	0.041	0.050	-0.088
	(1.08)	(1.15)	(-0.52)	(3.09)	(2.40)	(0.91)	(0.36)	(0.44)	(-0.91)
Decline	0.375***	0.371***	0.148	0.428***	0.336**	0.127	0.287**	0.291**	0.119
	(2.71)	(2.70)	(1.46)	(2.83)	(2.27)	(1.08)	(2.42)	(2.49)	(1.11)
SUE Decile		0.520***	0.518***		0.679***	0.650***		-0.007	0.034
		(6.87)	(6.87)		(8.04)	(8.04)		(-0.10)	(0.51)
Net Loss			0.355***			0.318***			0.317***
			(3.00)			(2.94)			(3.07)
Intercept	0.986***	0.108	0.366***	1.754***	0.439***	0.547***	-0.540***	-0.335***	-0.014
	(7.93)	(1.54)	(3.34)	(12.24)	(6.15)	(5.62)	(-7.37)	(-4.11)	(-0.14)
Adj. R^2	0.25%	0.30%	0.41%	0.34%	0.47%	0.59%	0.35%	0.40%	0.55%
N	247,430	247,430	247,430	153,968	153,968	153,968	93,462	93,462	93,462

Panel C: CAR(+1,+5)									
	All SUEs			SUE ≥ 0			SUE < 0		
	1	2	3	4	5	6	7	8	9
Introduction	-1.112***	-1.108***	-0.734***	-0.730***	-0.761***	-0.591***	-0.891***	-0.847***	-0.511***
	(-7.90)	(-7.86)	(-7.29)	(-5.66)	(-5.95)	(-6.09)	(-7.83)	(-7.57)	(-5.34)
Decline	-0.742***	-0.740***	-0.411***	-0.530***	-0.565***	-0.406***	-0.604***	-0.562***	-0.263***
	(-6.37)	(-6.34)	(-4.10)	(-4.03)	(-4.27)	(-3.50)	(-6.61)	(-6.25)	(-2.92)
SUE Decile		0.400***	0.405***		0.359***	0.386***		0.214***	0.183***
		(5.60)	(5.69)		(4.73)	(5.13)		(3.58)	(3.14)
Net Loss			-0.513***			-0.249**			-0.473***
			(-4.57)			(-2.11)			(-5.72)
Intercept	0.041	-0.364***	-0.680***	0.838***	0.181**	-0.116	-1.009***	-0.898***	-1.062***
	(0.39)	(-4.16)	(-6.53)	(7.87)	(2.24)	(-1.08)	(-10.34)	(-10.29)	(-11.61)
Adj. R^2	0.34%	0.38%	0.48%	0.38%	0.44%	0.60%	0.36%	0.39%	0.47%
N	247,430	247,430	247,430	153,968	153,968	153,968	93,462	93,462	93,462

Table 4: Lottery Characteristic Regression Analysis

This table presents a regression analysis to explore the impact of lottery characteristics on earnings announcement reactions by firm life stage. We report the results of Fama-MacBeth regressions using equation (2) for firms with an earnings announcement reported in I/B/E/S. The dependent variable is CAR(–1,+1). In the regression analysis, each lottery characteristic (IVOL, MAX, ISKEW, nPRC) is an ordinal variable ranging from 0 to 19, where an observation is ranked as 0 if its value is below the 5th percentile in a quarter. Lottery is a composite ranked lottery variable using idiosyncratic volatility (IVOL), prior maximum returns (MAX), idiosyncratic skewness (ISKEW), and the negative of the natural logarithm of one plus price (nPRC). The Introduction × Characteristic term is an interaction between Introduction and the firm characteristic listed above the regression model number. For instance, in Model 1 (IVOL), Introduction × Characteristic is an interaction term between Introduction and IVOL. Panel A presents the results for all earnings announcements (All SUEs), Panel B presents the results for positive earnings surprises, and Panel C presents the results for negative earnings surprises. SUE ≥ 0 reflects a positive earnings surprise and SUE < 0 captures a negative earnings surprise. Variables are defined in the Variable Definitions Appendix. Fama-MacBeth quarterly regressions are used. *t*-statistics are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The sample is from 1996 to 2018.

Panel A: All SUEs					
	IVOL	MAX	ISKEW	nPRC	Lottery
Model	1	2	3	4	5
Introduction × Characteristic	-0.431***	-0.371***	-0.340***	-0.380***	-0.497***
	(-5.67)	(-4.82)	(-4.69)	(-4.94)	(-6.57)
Introduction	0.277**	0.087	-0.197	0.132	0.460***
	(2.08)	(0.67)	(-1.59)	(0.92)	(3.47)
Decline × Characteristic	-0.281***	-0.257***	0.034	-0.161***	-0.219***
	(-4.41)	(-4.04)	(0.48)	(-2.62)	(-3.63)
Decline	0.114	-0.019	-0.758***	-0.093	-0.024
	(0.87)	(-0.15)	(-5.50)	(-0.60)	(-0.17)
Characteristic	-0.062	-0.089	0.057	-0.061	-0.047
	(-0.73)	(-1.07)	(1.03)	(-0.79)	(-0.58)
SUE Decile	1.746***	1.751***	1.750***	1.741***	1.743***
	(11.47)	(11.44)	(11.40)	(11.42)	(11.44)
Net Loss	-0.643***	-0.673***	-0.827***	-0.670***	-0.628***
	(-7.08)	(-7.30)	(-8.70)	(-7.24)	(-6.81)
Intercept	-1.218***	-1.229***	-1.485	-1.229***	-1.209***
	(-14.25)	(-14.08)	(-15.76)	(-13.00)	(-13.74)
Adj. R^2	1.02%	1.01%	0.96%	1.00%	1.01%
N	247,429	247,429	247,429	247,430	247,429

Panel B: SUE ≥ 0					
	IVOL	MAX	ISKEW	nPRC	Lottery
Model	1	2	3	4	5
Introduction × Characteristic	-0.475***	-0.423***	-0.160**	-0.471***	-0.478***
	(-6.40)	(-5.33)	(-2.28)	(-6.13)	(-6.70)
Introduction	0.633***	0.496***	-0.151	0.545***	0.689***
	(3.99)	(3.15)	(-1.01)	(3.35)	(4.63)
Decline × Characteristic	-0.336***	-0.315***	0.125*	-0.315***	-0.265***
	(-5.18)	(-4.58)	(1.75)	(-4.49)	(-3.99)
Decline	0.280*	0.188	-0.901***	0.329	0.145
	(1.67)	(1.16)	(-6.07)	(1.59)	(0.83)
Characteristic	0.780***	0.495***	0.004	0.950***	0.784***
	(7.67)	(5.20)	(0.09)	(9.44)	(7.94)
SUE Decile	2.026***	2.044***	2.082***	1.957***	2.000***
	(12.38)	(12.40)	(12.43)	(12.49)	(12.37)
Net Loss	-0.796***	-0.677***	-0.647***	-0.930***	-0.820***
	(-8.53)	(-7.13)	(-6.57)	(-9.48)	(-8.58)
Intercept	-0.764***	-0.477***	-0.099	-0.968***	-0.776***
	(-7.78)	(-4.79)	(-1.00)	(-8.90)	(-7.83)
Adj. R^2	1.56%	1.52%	1.36%	1.61%	1.54%
N	153,968	153,968	153,968	153,968	153,968

Panel C: SUE < 0					
	IVOL	MAX	ISKEW	nPRC	Lottery
Model	1	2	3	4	5
Introduction × Characteristic	-0.051	-0.071	-0.358***	-0.026	-0.207***
	(-0.83)	(-1.05)	(-5.25)	(-0.38)	(-3.23)
Introduction	-0.296*	-0.219	0.074	-0.392**	0.211
	(-1.74)	(-1.37)	(0.54)	(-1.97)	(1.24)
Decline × Characteristic	-0.102*	-0.063	-0.088	0.009	-0.118**
	(-1.84)	(-1.06)	(-1.31)	(0.14)	(-2.05)
Decline	0.097	-0.079	-0.236	-0.320	0.163
	(0.54)	(-0.45)	(-1.31)	(-1.28)	(0.78)
Characteristic	-0.824***	-0.916***	-0.112*	-0.493***	-0.851***
	(-9.02)	(-9.77)	(-1.91)	(-6.31)	(-9.31)
SUE Decile	0.228***	0.237***	0.339***	0.242***	0.186***
	(3.33)	(3.36)	(4.40)	(3.30)	(2.71)
Net Loss	-0.064	-0.081	-0.470***	-0.173*	0.011
	(-0.64)	(-0.81)	(-4.37)	(-1.71)	(0.11)
Intercept	-1.518***	-1.503***	-2.675***	-1.836***	-1.381***
	(-15.36)	(-14.94)	(-21.36)	(-17.29)	(-13.28)
Adj. R^2	1.05%	1.17%	0.84%	0.92%	1.12%
N	93,461	93,461	93,461	93,462	93,461

Table 5: Additional Speculative/Subjective Valuation Characteristics

This table presents a regression analysis to explore the impact of additional firm characteristics associated with speculation/subjective valuation on earnings announcement reactions by firm life stage. Lottery characteristics are a subset of these characteristics and were explored in Table 4. These additional firm characteristics include Distress, RNOA, Dispersion, Size, ILLIQ, and IO. We report the results of Fama-MacBeth regressions using equation (2) for firms with an earnings announcement reported in I/B/E/S. The dependent variable is CAR(–1,+1). In the regression analysis, each firm characteristic (Distress, RNOA, Dispersion, Size, ILLIQ, INCVOL, and IO) is an ordinal variable ranging from 0 to 19, where an observation is ranked as 0 if its value is below the 5th percentile in a quarter. In Model 1 (Distress), Introduction × Characteristic is an interaction term between Introduction and Distress. Panel A presents the results for all earnings announcements (All SUEs), Panel B presents the results for positive earnings surprises, and Panel C presents the results for negative earnings surprises. SUE ≥ 0 reflects a positive earnings surprise and SUE < 0 captures a negative earnings surprise. Variables are defined in the Variable Definitions Appendix. Fama-MacBeth quarterly regressions are used. *t*-statistics are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The sample is from 1996 to 2018.

Panel A: All SUEs							
	Distress	RNOA	Dispersion	Size	ILLIQ	INCVOL	IO
Model	1	2	3	4	5	6	7
Introduction × Characteristic	-0.415***	0.227***	-0.074	0.313***	-0.227***	-0.420***	0.389***
	(-6.14)	(2.85)	(-1.02)	(3.90)	(-2.95)	(-6.26)	(4.96)
Introduction	0.208*	-0.694**	-0.478***	-1.248***	-0.270*	0.192*	-1.284***
	(1.75)	(-6.27)	(-3.70)	(-11.46)	(-1.76)	(1.68)	(-12.53)
Decline × Characteristic	-0.144**	0.028	-0.094	0.117*	-0.058	-0.184***	0.264***
	(-2.10)	(0.41)	(-1.30)	(1.71)	(-0.82)	(-3.19)	(3.63)
Decline	-0.264*	-0.431***	-0.285*	-0.906***	-0.463***	-0.104	-1.081***
	(-1.92)	(-3.75)	(-1.73)	(-6.50)	(-2.62)	(-0.73)	(-7.87)
Characteristic	0.004	1.642***	-0.617***	-0.141**	0.182***	-0.274***	0.324***
	(0.05)	(12.20)	(-8.20)	(-2.08)	(2.77)	(-3.66)	(5.25)
SUE Decile	1.746***	1.549***	1.466***	1.749***	1.753***	1.748***	1.728***
	(11.40)	(11.09)	(11.48)	(11.45)	(11.45)	(11.57)	(11.07)
Net Loss	-0.773***	0.442***	-0.775***	-0.809***	-0.835***	-0.491***	-0.674***
	(-8.32)	(5.29)	(-7.80)	(-8.60)	(-8.84)	(-5.39)	(-7.07)
Intercept	-1.368***	-1.884***	-0.869***	-1.344***	-1.566***	-0.958***	-1.584***
	(-14.29)	(-18.76)	(-9.29)	(-13.56)	(-16.83)	(-10.69)	(-14.97)
Adj. R^2	1.01%	1.35%	0.96%	0.99%	0.99%	1.00%	1.03%
N	246,036	207,923	198,359	247,430	247,428	241,468	238,293

Panel B: SUE ≥ 0							
	Distress	RNOA	Dispersion	Size	ILLIQ	INCVOL	IO
Model	1	2	3	4	5	6	7
Introduction × Characteristic	-0.375***	0.146*	0.059	0.385***	-0.317***	-0.507***	0.402***
	(-5.41)	(1.83)	(0.87)	(4.81)	(-4.19)	(-7.35)	(5.12)
Introduction	0.383***	-0.310**	-0.443***	-1.303***	0.139	0.695***	-1.112***
	(2.58)	(-2.07)	(-3.46)	(-9.94)	(0.76)	(4.08)	(-9.35)
Decline × Characteristic	-0.224***	0.015	0.103	0.197***	-0.162**	-0.330***	0.319***
	(-3.39)	(0.21)	(1.43)	(2.68)	(-2.10)	(-5.00)	(4.60)
Decline	-0.076	-0.447***	-0.736***	-1.249***	-0.272	0.384**	-1.252***
	(-0.44)	(-3.25)	(-3.79)	(-7.22)	(-1.22)	(1.97)	(-7.76)
Characteristic	0.449***	0.877***	-2.090***	-1.343***	1.257***	0.371***	-0.128**
	(5.28)	(9.34)	(-12.43)	(-11.27)	(10.97)	(4.71)	(-2.22)
SUE Decile	2.055***	2.038***	3.177***	2.015***	2.043***	2.006***	2.089***
	(12.45)	(12.70)	(15.58)	(12.60)	(12.59)	(12.41)	(12.24)
Net Loss	-0.713***	0.178*	-0.470***	-1.020***	-0.969***	-0.524***	-0.551***
	(-7.39)	(1.78)	(-4.88)	(-10.50)	(-9.97)	(-5.73)	(-5.51)
Intercept	-0.477***	-0.291***	0.433***	0.945***	-1.236***	-0.261***	0.113
	(-4.46)	(-2.67)	(4.27)	(8.61)	(-12.20)	(-2.75)	(1.02)
Adj. R^2	1.47%	1.72%	2.68%	1.81%	1.77%	1.45%	1.42%
N	153,144	129,549	128,021	153,968	153,966	150,165	148,227

Panel C: SUE < 0							
	Distress	RNOA	Dispersion	Size	ILLIQ	INCVOL	IO
Model	1	2	3	4	5	6	7
Introduction × Characteristic	-0.239***	0.081	-0.089	0.002	0.023	0.106	0.165**
	(-4.08)	(1.14)	(-1.27)	(0.02)	(0.32)	(1.62)	(2.27)
Introduction	0.057	-0.710***	-0.233	-0.592***	-0.598***	-0.653***	-0.926***
	(0.40)	(-5.29)	(-1.14)	(-4.77)	(-2.88)	(-3.80)	(-7.42)
Decline × Characteristic	-0.124*	0.181**	-0.260***	0.009	0.047	0.126**	0.127*
	(-1.78)	(2.52)	(-3.64)	(0.14)	(0.74)	(2.30)	(1.83)
Decline	-0.018	-0.514***	0.588**	-0.329*	-0.519**	-0.650***	-0.626***
	(-0.09)	(-3.96)	(2.04)	(-1.95)	(-2.15)	(-3.05)	(-3.79)
Characteristic	0.356***	0.596***	1.778***	0.475***	-0.314***	-1.122***	0.010
	(4.51)	(7.60)	(12.65)	(6.42)	(-4.66)	(-10.62)	(0.16)
SUE Decile	0.349***	0.103	1.831***	0.351***	0.376***	0.230***	0.309***
	(4.53)	(1.38)	(14.67)	(4.79)	(4.92)	(3.40)	(3.96)
Net Loss	-0.604***	0.058	-0.781***	-0.272**	-0.350***	0.049	-0.511***
	(-5.81)	(0.59)	(-6.42)	(-2.60)	(-3.32)	(0.47)	(-4.72)
Intercept	-3.075***	-2.978***	-6.954***	-3.222***	-2.344***	-1.177***	-2.854***
	(-24.80)	(-23.30)	(-21.21)	(-24.87)	(-21.30)	(-11.22)	(-23.21)
Adj. R^2	0.86%	0.98%	2.43%	0.93%	0.86%	1.25%	0.90%
N	92,892	78,374	70,338	93,462	93,462	91,303	90,066

Table 6: Other Firm Characteristics

This table presents a regression analysis to explore the impact of other firm characteristics on earnings announcement reactions by firm life stage. We report the results of Fama-MacBeth regressions using equation (2) for firms with an earnings announcement reported in I/B/E/S. The dependent variable is CAR(–1,+1). In the regression analysis, each firm characteristic (#Analyst, Accrual, B/M, Momentum, Reversal, Sales Growth, and Turnover) is an ordinal variable ranging from 0 to 19, where an observation is ranked as 0 if its value is below the 5th percentile in a quarter. In Model 1 (#Analyst), Introduction × Characteristic is an interaction term between Introduction and #Analyst. Panel A presents the results for all earnings announcements (All SUEs), Panel B presents the results for positive earnings surprises, and Panel C presents the results for negative earnings surprises. SUE ≥ 0 reflects a positive earnings surprise and SUE < 0 captures a negative earnings surprise. In Model 7, SUE Decile is used as a Characteristic. Variables are defined in the Variable Definitions Appendix. Fama-MacBeth quarterly regressions are used. *t*-statistics are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The sample is from 1996 to 2018.

Panel A: All SUEs								
	#Analyst	Accrual	B/M	Momentum	Reversal	Sales Growth	Turnover	SUE Decile
Model	1	2	3	4	5	6	7	8
Introduction × Characteristic	0.156**	0.215***	0.307***	0.121*	0.189**	-0.094	-0.080	0.219***
	(2.08)	(2.77)	(3.90)	(1.72)	(2.52)	(-1.24)	(-1.11)	(2.70)
Introduction	-1.024***	-1.061***	-1.261***	-0.985***	-1.136***	-0.863***	-0.657***	-0.998***
	(-10.77)	(-8.55)	(-12.63)	(-9.29)	(-9.00)	(-7.80)	(-6.83)	(-9.14)
Decline × Characteristic	0.013	0.113*	0.173**	0.057	0.088	-0.188***	-0.207***	-0.054
	(0.21)	(1.71)	(2.35)	(0.79)	(1.28)	(-2.77)	(-2.70)	(-0.77)
Decline	-0.699***	-0.816***	-1.016***	-0.781***	-0.915***	-0.504***	-0.303**	-0.577***
	(-5.71)	(-5.63)	(-8.04)	(-5.67)	(-6.78)	(-4.26)	(-2.27)	(-4.92)
Characteristic	0.019	-0.312***	0.123	0.156*	0.750***	1.975***	-0.218**	5.346***
	(0.33)	(-4.26)	(1.57)	(1.77)	(7.93)	(11.87)	(-2.50)	(14.18)
SUE Decile	1.752***	1.752***	1.744***	1.729***	1.668***	1.573***	1.771***	
	(11.42)	(11.44)	(11.39)	(11.54)	(11.81)	(10.81)	(11.46)	
Net Loss	-0.832***	-0.873***	-0.713***	-0.787***	-0.672***	-0.612***	-0.800***	-0.688***
	(-8.78)	(-8.94)	(-7.68)	(-8.41)	(-7.53)	(-6.41)	(-8.69)	(-7.22)
Intercept	-1.474***	-1.290***	-1.433***	-1.542***	-2.007***	-2.800***	-1.287***	-4.271***
	(-15.87)	(-13.29)	(-13.91)	(-15.81)	(-20.01)	(-25.88)	(-14.04)	(-29.39)
Adj. R^2	0.96%	1.00%	1.02%	1.00%	1.31%	1.82%	1.05%	4.98%
N	247,430	245,702	246,505	245,486	245,486	223,118	247,430	247,430

Panel B: SUE ≥ 0								
	#Analyst	Accrual	B/M	Momentum	Reversal	Sales Growth	Turnover	SUE Decile
Model	1	2	3	4	5	6	7	8
Introduction × Characteristic	0.267***	0.279***	0.408***	0.276***	0.290***	0.099	-0.026	-0.040
	(3.43)	(4.07)	(4.89)	(3.81)	(3.61)	(1.37)	(-0.37)	(-0.56)
Introduction	-1.005***	-0.929***	-1.140***	-0.981***	-1.056***	-0.656***	-0.449***	-0.412***
	(-8.71)	(-7.03)	(-9.35)	(-8.32)	(-6.06)	(-4.38)	(-4.00)	(-3.83)
Decline × Characteristic	0.059	0.141**	0.198***	0.218***	0.145*	-0.021	-0.146*	0.013
	(0.83)	(2.14)	(2.57)	(3.02)	(1.87)	(-0.31)	(-1.89)	(0.18)
Decline	-0.788***	-0.882***	-1.073***	-1.098***	-1.007***	-0.679***	-0.354**	-0.626***
	(-4.69)	(-5.29)	(-6.33)	(-6.56)	(-6.07)	(-4.97)	(-2.12)	(-4.28)
Characteristic	-0.392***	-0.254***	0.189**	-0.522***	0.100	1.024***	-0.331***	1.942***
	(-5.27)	(-3.95)	(2.23)	(-5.70)	(1.36)	(9.68)	(-3.73)	(12.75)
SUE Decile	1.987***	2.069***	2.037***	2.046***	1.892***	2.033***	2.110***	
	(12.25)	(12.47)	(12.44)	(12.54)	(12.73)	(12.16)	(12.48)	
Net Loss	-0.669***	-0.628***	-0.474***	-0.699***	-0.603***	-0.513***	-0.592***	-0.635***
	(-6.75)	(-6.62)	(-4.77)	(-7.32)	(-6.17)	(-5.23)	(-6.10)	(-6.46)
Intercept	0.268**	0.126	-0.105	0.390***	-0.150	-0.947***	0.212**	-0.104
	(2.43)	(1.24)	(-0.89)	(3.62)	(-1.32)	(-9.18)	(2.00)	(-1.03)
Adj. R^2	1.47%	1.39%	1.56%	1.49%	1.64%	1.90%	1.53%	1.35%
N	153,968	152,932	153,414	152,676	152,676	139,968	153,968	153,968

Panel C: SUE < 0								
	#Analyst	Accrual	B/M	Momentum	Reversal	Sales Growth	Turnover	SUE Decile
Model	1	2	3	4	5	6	7	8
Introduction × Characteristic	-0.057	-0.104	-0.178**	0.064	0.066	-0.127*	0.040	0.463***
	(-0.74)	(-1.37)	(-2.36)	(0.94)	(0.90)	(-1.69)	(0.58)	(6.52)
Introduction	-0.590***	-0.463***	-0.275**	-0.788***	-0.777***	-0.627***	-0.669***	-1.423***
	(-4.24)	(-3.05)	(-1.96)	(-5.95)	(-5.37)	(-4.45)	(-5.65)	(-10.20)
Decline × Characteristic	-0.037	-0.035	-0.100	0.053	0.071	-0.038	-0.084	0.308***
	(-0.62)	(-0.54)	(-1.47)	(0.74)	(1.09)	(-0.57)	(-1.31)	(4.43)
Decline	-0.381**	-0.338*	-0.153	-0.499***	-0.618***	-0.432**	-0.208	-0.947***
	(-2.54)	(-1.87)	(-1.00)	(-2.99)	(-3.58)	(-2.52)	(-1.41)	(-5.31)
Characteristic	-0.377***	0.101	0.529***	-0.074	0.346***	0.348***	-0.604***	0.149**
	(-6.60)	(1.31)	(6.19)	(-0.94)	(4.80)	(5.74)	(-6.99)	(2.15)
SUE Decile	0.440***	0.329***	0.374***	0.327***	0.330***	0.108	0.302***	
	(5.68)	(4.18)	(4.54)	(4.15)	(4.89)	(1.42)	(3.95)	
Net Loss	-0.556***	-0.468***	-0.524***	-0.475***	-0.303***	-0.352***	-0.481***	-0.516***
	(-5.21)	(-4.62)	(-4.90)	(-4.32)	(-2.90)	(-3.29)	(-4.52)	(-4.86)
Intercept	-2.673***	-2.957***	-3.301***	-2.796***	-3.070***	-2.959***	-2.239***	-2.858***
	(-23.55)	(-21.30)	(-23.59)	(-22.12)	(-23.16)	(-24.95)	(-20.69)	(-23.79)
Adj. R^2	0.86%	0.88%	0.98%	0.93%	0.97%	0.86%	1.04%	0.81%
N	93,462	92,770	93,091	92,810	92,810	83,150	93,462	93,462

Table 7: Dividend Payer, Firm Age, or Optionality

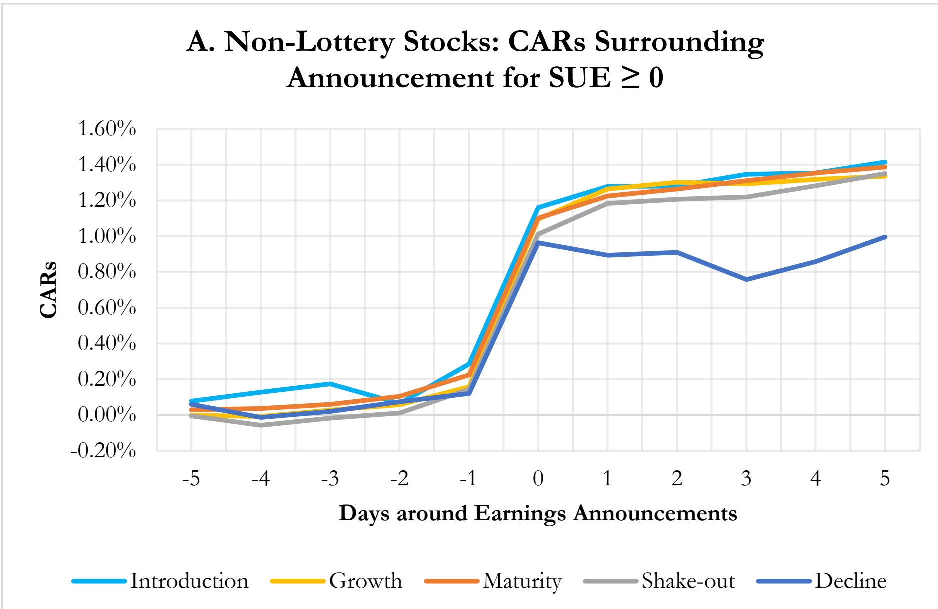
This table addresses whether our main results are explained by whether the firm pays dividends, the firm's age, or whether the firm has traded options. DIV is a dummy variable equal to one if the firm pays dividends. Firm age is the number of years since the firm appeared in CRSP. Optionable is a dummy variable equal to one if the firm has listed options. All SUEs are all earnings announcements. SUE ≥ 0 reflects a positive earnings surprise and SUE < 0 captures a negative earnings surprise. Fama-MacBeth quarterly regressions are used. *t*-statistics are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The sample is from 1996 to 2018.

	All SUEs			SUE ≥ 0			SUE < 0		
	1	2	3	4	5	6	7	8	9
Introduction	-1.091***	-1.099***	-1.058***	-0.741***	-0.727***	-0.650***	-0.647***	-0.720***	-0.841***
	(-12.09)	(-12.13)	(-11.59)	(-7.79)	(-7.69)	(-6.84)	(-6.29)	(-7.05)	(-8.35)
Decline	-0.879***	-0.881***	-0.841***	-0.865***	-0.835***	-0.806***	-0.382***	-0.441***	-0.509***
	(-8.58)	(-8.55)	(-8.19)	(-7.94)	(-7.67)	(-7.45)	(-3.29)	(-3.81)	(-4.44)
DIV	-0.072			-0.854***			1.498***		
	(-0.80)			(-10.49)			(15.13)		
Firm Age		-0.131**			-0.568***			0.603***	
		(-2.14)			(-8.69)			(8.43)	
Optionable			0.420***			-0.137			-0.215***
			(5.38)			(-1.58)			(-3.00)
SUE Decile	1.764***	1.755***	1.762***	2.052***	2.092***	2.093***	0.269***	0.365***	0.341***
	(11.44)	(11.40)	(11.43)	(12.37)	(12.46)	(12.47)	(3.76)	(4.97)	(4.39)
Net Loss	-0.845***	-0.871***	-0.816***	-0.848***	-0.757***	-0.661***	-0.081	-0.384***	-0.527***
	(-9.06)	(-9.37)	(-8.71)	(-8.87)	(-7.94)	(-6.76)	(-0.80)	(-3.73)	(-4.92)
Intercept	-1.583***	-1.513***	-1.710***	0.028	0.119	-0.059	-3.202***	-3.315***	-2.882***
	(-16.02)	(-15.15)	(-17.49)	(0.27)	(1.11)	(-0.58)	(-25.54)	(-25.89)	(-25.03)
Adj. R^2	0.95%	0.91%	0.94%	1.40%	1.35%	1.35%	1.11%	0.82%	0.70%
N	247,430	247,430	247,430	153,968	153,968	153,968	93,462	93,462	93,462

Appendix

Figure A.1: Cumulative Announcement Returns for Non-Lottery Stocks by Firm Life Stage for Positive and Negative Earnings Surprises

This figure displays the cumulative DGTW returns for firms in each firm life stage in the five days before to five days after earnings announcements for non-lottery stocks for positive (SUE ≥ 0) and negative (SUE < 0) earnings surprises in Figures A.1A and A.1B, respectively. Lottery Stocks are defined with a ranked Lottery variable using idiosyncratic volatility (IVOL), prior maximum returns (MAX), idiosyncratic skewness (ISKEW), and the negative of the natural logarithm of one plus price (nPRC). Stocks in the bottom Lottery tercile are defined as Non-Lottery Stocks. Firm life stages are Introduction, Growth, Maturity, Shake-out, and Decline. The sample period is from 1996 to 2018.



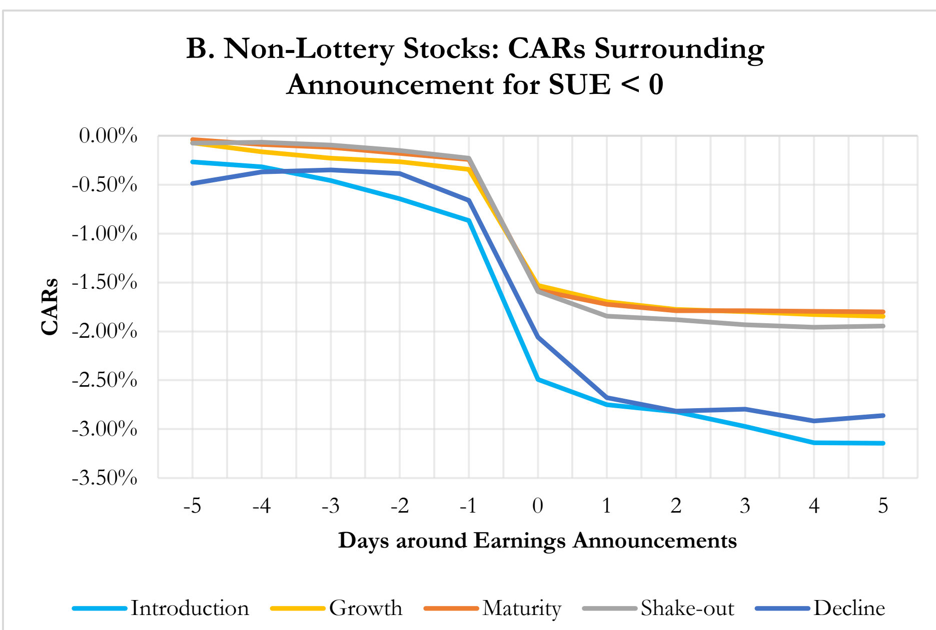


Table A.1: Addressing Possible Concern

This table addresses the concern that our results could be simply picking up general underperformance of Introduction and Decline stage stocks on all days (not just earnings announcement days) relative to Growth, Maturity, and Shake-out stage stocks. Using the firms in our sample, we calculate DGTW daily returns for every day from 1996 to 2018. We split these daily returns by life stage into four groups: (i) non-earnings announcement days, (ii) earnings announcement days, (iii) positive earnings surprises days, and (iv) negative earnings surprise days. Then, we compute the quarterly time series averages of cross-sectional averages for each group. The sample is from 1996 to 2018.

	Non-Announcement Days	Announcement Days	SUE ≥ 0	SUE < 0
Introduction	-0.01%	-0.85%	0.70%	-2.66%
	(-0.66)	(-11.96)	(7.18)	(-22.87)
Growth	0.00%	0.03%	1.24%	-1.87%
	(-0.78)	(1.05)	(18.50)	(-24.33)
Maturity	0.01%	0.16%	1.31%	-1.76%
	(3.88)	(4.74)	(22.98)	(-18.75)
Shake-out	0.02%	0.05%	1.26%	-1.85%
	(4.23)	(0.91)	(17.75)	(-16.81)
Decline	0.02%	-0.85%	0.49%	-2.48%
	(1.85)	(-10.01)	(4.33)	(-20.22)

Table A.2: Lottery Characteristic Tercile Analysis

This table presents a tercile analysis to explore the impact of lottery characteristics on earnings announcement reactions by firm life stage. We present cumulative DGTW announcement returns from Day –1 to Day 1 defined as CAR(–1,+1), from Day –5 to Day –1 defined as CAR(–5, –1), and from Day 1 to Day 5 defined as CAR(+1,+5). Lottery is an ordinal variable using lottery characteristics which include idiosyncratic volatility (IVOL), prior maximum returns (MAX), idiosyncratic skewness (ISKEW), and the negative of the natural logarithm of (1 + stock price) (nPRC). IVOL, MAX, and ISKEW are calculated using rolling 20 trading days (days *t* – 25 to *t* – 6). In Panel A, we independently sort stocks into Lottery terciles and by firm life stage. We present the average CAR(–1,+1) for each group, the *t*-statistic for the statistical difference from zero for each return, and the number of observations in each group. The High-Low differences are also reported along with the *t*-statistic for difference in means using a two-sample *t*-test. Panels B and C repeat the same procedure for CAR(–5, –1) and CAR(+1,+5), respectively. Variables are defined in the Variable Definitions Appendix. The sample is from 1996 to 2018.

Panel A: CAR(-1,+1)

	All SUEs				SUE ≥ 0				SUE < 0			
Lottery Terciles	Low	Mid	High	High-Low	Low	Mid	High	High-Low	Low	Mid	High	High-Low
Introduction	0.04%	-0.45%	-1.31%	-1.35%	1.25%	1.05%	0.78%	-0.48%	-2.02%	-2.62%	-3.71%	-1.70%
	(0.25)	(-3.56)	(-12.01)	(-6.82)	(6.18)	(6.74)	(4.81)	(-1.84)	(-7.39)	(-12.77)	(-26.68)	(-5.53)
	2,515	7,110	18,359		1,583	4,207	9,824		932	2,903	8,535	
Growth	0.27%	0.29%	-0.07%	-0.34%	1.26%	1.64%	1.97%	0.71%	-1.55%	-2.13%	-3.03%	-1.49%
	(7.08)	(5.91)	(-1.00)	(-4.14)	(27.85)	(27.34)	(21.96)	(7.09)	(-24.47)	(-25.56)	(-26.22)	(-11.28)
	29,603	32,860	25,563		19,133	21,133	15,129		10,470	11,727	10,434	
Maturity	0.23%	0.39%	0.36%	0.13%	1.15%	1.87%	2.45%	1.30%	-1.59%	-2.28%	-2.78%	-1.19%
	(7.81)	(8.57)	(4.71)	(1.61)	(33.95)	(33.87)	(26.12)	(13.03)	(-31.35)	(-30.38)	(-23.42)	(-9.21)
	42,291	31,861	20,758		28,059	20,522	12,462		14,232	11,339	8,296	
Shake-out	0.17%	0.38%	-0.07%	-0.23%	1.17%	1.73%	1.90%	0.73%	-1.70%	-1.96%	-2.74%	-1.04%
	(2.29)	(3.83)	(-0.49)	(-1.54)	(13.13)	(14.68)	(11.26)	(3.85)	(-13.85)	(-11.83)	(-13.29)	(-4.34)
	6,800	7,568	8,062		4,432	4,797	4,644		2,368	2,771	3,418	
Decline	-0.27%	-0.61%	-1.21%	-0.94%	0.60%	0.98%	0.55%	-0.05%	-1.61%	-2.74%	-3.52%	-1.91%
	(-1.22)	(-3.14)	(-9.45)	(-3.66)	(2.17)	(3.71)	(3.27)	(-0.15)	(-4.52)	(-10.05)	(-18.59)	(-4.73)
	1,018	3,075	9,986		616	1,763	5,664		402	1,312	4,322	

Panel B: CAR(-5,-1)												
	All SUEs				SUE ≥ 0				SUE < 0			
Lottery Terciles	Low	Mid	High	High-Low	Low	Mid	High	High-Low	Low	Mid	High	High-Low
Introduction	-0.15%	0.27%	0.60%	0.74%	0.25%	0.66%	1.12%	0.87%	-0.83%	-0.29%	-0.01%	0.81%
	(-1.14)	(2.53)	(6.69)	(4.70)	(1.74)	(5.01)	(9.31)	(4.63)	(-3.29)	(-1.62)	(-0.11)	(2.86)
	2,513	7,106	18,349		1,581	4,204	9,820		932	2,902	8,529	
Growth	0.03%	0.26%	0.54%	0.51%	0.21%	0.59%	1.09%	0.88%	-0.30%	-0.35%	-0.26%	0.04%
	(1.21)	(7.33)	(8.95)	(7.72)	(6.67)	(13.87)	(14.05)	(10.43)	(-6.72)	(-5.72)	(-2.80)	(0.36)
	29,596	32,847	25,555		19,129	21,123	15,124		10,467	11,724	10,431	
Maturity	0.08%	0.18%	0.53%	0.45%	0.25%	0.44%	0.88%	0.63%	-0.26%	-0.28%	0.00%	0.26%
	(4.15)	(5.96)	(9.72)	(7.80)	(10.76)	(11.67)	(13.52)	(9.13)	(-7.69)	(-5.37)	(-0.01)	(2.51)
	42,284	31,852	20,755		28,055	20,520	12,459		14,229	11,332	8,296	
Shake-out	0.00%	0.30%	0.88%	0.88%	0.15%	0.59%	1.13%	0.98%	-0.29%	-0.22%	0.54%	0.83%
	(-0.06)	(4.24)	(8.21)	(7.47)	(2.48)	(6.96)	(8.76)	(6.86)	(-3.46)	(-1.82)	(2.97)	(4.15)
	6,797	7,567	8,061		4,430	4,797	4,644		2,367	2,770	3,417	
Decline	0.08%	0.11%	0.93%	0.84%	0.33%	0.56%	1.33%	1.00%	-0.29%	-0.49%	0.41%	0.70%
	(0.51)	(0.72)	(7.23)	(4.05)	(1.57)	(2.74)	(7.47)	(3.62)	(-1.12)	(-2.02)	(2.21)	(2.19)
	1,017	3,074	9,983		616	1,763	5,661		401	1,311	4,322	

Panel C: CAR(+1,+5)												
	CAR(+1,+5)				CAR(+1,+5)				CAR(+1,+5)			
Lottery Terciles	Low	Mid	High	High-Low	Low	Mid	High	High-Low	Low	Mid	High	High-Low
Introduction	-0.09%	-0.44%	-1.04%	-0.95%	0.31%	-0.21%	-0.66%	-0.97%	-0.77%	-0.77%	-1.48%	-0.71%
	(-0.67)	(-4.02)	(-11.87)	(-6.01)	(1.84)	(-1.49)	(-5.73)	(-4.76)	(-3.66)	(-4.42)	(-11.06)	(-2.84)
	2,510	7,108	18,348		1,582	4,206	9,820		928	2,902	8,528	
Growth	0.02%	0.03%	-0.28%	-0.31%	0.23%	0.21%	0.01%	-0.22%	-0.36%	-0.29%	-0.72%	-0.36%
	(0.84)	(0.63)	(-4.72)	(-4.63)	(6.76)	(3.41)	(0.20)	(-2.71)	(-7.09)	(-4.38)	(-6.98)	(-3.14)
	29,585	32,849	25,559		19,124	21,127	15,127		10,461	11,722	10,432	
Maturity	0.14%	0.10%	0.01%	-0.13%	0.30%	0.33%	0.42%	0.11%	-0.19%	-0.33%	-0.61%	-0.42%
	(6.48)	(2.89)	(0.10)	(-2.07)	(11.68)	(8.06)	(5.71)	(1.47)	(-5.21)	(-5.66)	(-6.02)	(-3.91)
	42,274	31,852	20,752		28,050	20,520	12,456		14,224	11,332	8,296	
Shake-out	0.12%	0.00%	-0.21%	-0.33%	0.37%	0.24%	0.20%	-0.17%	-0.35%	-0.42%	-0.76%	-0.41%
	(2.08)	(0.03)	(-1.78)	(-2.52)	(5.33)	(2.69)	(1.30)	(-1.01)	(-3.47)	(-2.94)	(-4.23)	(-2.01)
	6,793	7,566	8,057		4,427	4,796	4,643		2,366	2,770	3,414	
Decline	-0.18%	-0.65%	-0.62%	-0.45%	0.22%	-0.31%	-0.29%	-0.51%	-0.80%	-1.11%	-1.07%	-0.27%
	(-0.89)	(-3.72)	(-5.15)	(-1.91)	(0.83)	(-1.29)	(-1.83)	(-1.64)	(-2.73)	(-4.37)	(-5.59)	(-0.79)
	1,017	3,072	9,977		615	1,762	5,660		402	1,310	4,317	