Firm life cycle and idiosyncratic volatility ☆

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ABSTRACT

This paper investigates the association between idiosyncratic volatility and firm life cycle stages. Since firm performance and availability of information vary across life cycle stages, and such variation affects uncertainty about future cash flows and stock returns, we argue that idiosyncratic volatility also varies across firm life cycle stages. Using US data, this study shows that idiosyncratic volatility is significantly higher in the introduction and decline stages, and significantly lower in the growth and mature stages, when compared to that in the shake-out stage. Our study also reveals that the roles of both cash flow volatility and information uncertainty in affecting idiosyncratic volatility vary depending on firm life cycle stages. Our results are robust to alternative specifications of life cycle proxies and idiosyncratic volatility, and to an alternative regression specification.

1. Introduction

This paper examines the variation in idiosyncratic volatility (IVOL) across firm life cycle stages, and evaluates the roles of fundamental uncertainty and information uncertainty in explaining this variation. IVOL reflects firm specific return volatility, which results primarily from a firm's actions and is independent of the common market movement. The motivation for this study comes from the observation that IVOL accounts for most of the variation in the risk of an individual stock over time (Campbell, Lettau, Malkiel, & Xu, 2001; Morck, Yeung, & Yu, 2000). Accordingly, the potential determinants and the market pricing of IVOL have become one of the most actively researched topics in the asset-pricing arena. Another motivation stems from the mixed evidence in the finance literature (explained below) that attempts to explain the role of firm age in affecting IVOL. IVOL has important implications for portfolio management, diversification strategy, arbitrage process, valuation of employee stock options and managerial compensation policies (March & Shapira, 1987; Weber, 2004).

Several recent papers suggest that product market competition (Gaspar & Massa, 2006), option-based compensation (Chen, Steiner, & Whyte, 2006; Meulbroek, 2001), cash flow volatility and corporate growth options (Irvine & Pontiff, 2009; Wei & Zhang, 2006; Cao, Simin, & Zhao, 2008), business cycle (Bekaert, Hodrick, & Zhang,

2012), and deteriorating financial reporting quality (Rajgopal & Venkatachalam, 2011) have been largely responsible for a surge in IVOL over time. Moreover, Brown and Kapadia (2007) and Fink, Fink, Grullon, and Weston (2010) show that a decline in maturity of the typical US public firm is associated positively with IVOL. Prior studies overwhelmingly use firm age as a life cycle proxy. Some studies show that IVOL is lower for older firms (Fink et al., 2010; Gaspar & Massa, 2006). In contrast, other studies find a positive association between age and IVOL (Luo & Bhattacharya, 2009; Ferreira & Laux, 2007), whereas another study finds no association between them (Tan & Liu, 2016). We argue that this mixed evidence relates to the use of firm age as a proxy for life cycle: a measure that ascribes a *linear* progression from birth to decline and largely fails to capture the dynamism in a firm's transition from one stage to another. We incorporate a 'dynamic resource-based view' as a theoretical lens for understanding IVOL in different life cycle stages. Recent evidence suggests that firms non-monotonically move back and forth in their life cycle (Dickinson, 2011), and experience varying fundamental risk and information uncertainty at different life cycle stages (Al-Hadi, Hasan, & Habib, 2016; Dickinson, 2011, Habib & Hasan, in press). Therefore, it is important to understand the implications of non-linear life cycle stages for IVOL using a precise proxy that can capture the dynamic nature of firm life cycles.

Firm life cycle theory proposes that the resources, capabilities, strategies, structures and functioning of the firm vary significantly with particular stages of development (Miller & Friesen, 1980, 1984; Quinn & Cameron, 1983). Recent empirical studies suggest that firm life cycle is a combination of observable and unobservable, internal and external, firm, manager, and macro-economic characteristics. As such, it is an inherent and time-varying factor that is able to predict financial policy (e.g., dividend policy, cash holdings, and capital structure), firm

performance, and disclosure level (Al-Hadi et al., 2016; DeAngelo, DeAngelo, & Stulz, 2006; Dickinson, 2011; Faff, Kwok, Podolski, & Wong, 2016). We argue that the strong firm performance and the superior information environment associated with growth and mature firms reduce uncertainty about future cash flows and stock returns, and this reduced uncertainty, in turn, reduces IVOL. On the other hand, introduction and decline stage firms are exposed to weaker firm performance and a poor information environment, both of which increase uncertainty about future cash flows and returns and, therefore, IVOL.

Given that future cash flow and information uncertainties increase IVOL (Irvine & Pontiff, 2009; Rajgopal & Venkatachalam, 2011), and these uncertainties vary across the life cycle stages (Al-Hadi et al., 2016; Dickinson, 2011; Kimberly & Miles, 1980), we examine how such variations differentially affect IVOL. Firms in the introduction (decline) stages are exposed to uncertain and volatile cash flow because of the 'liability of newness' ('liability of senescence'). During the growth and mature stages, firms establish their brand identity and market share and, thereby, enjoy an increasing profitability and a reducing future cash flow volatility. Thus, varying cash flow volatility at different life cycle stages should moderate the association between idiosyncratic volatility and life cycle stages. We also investigate how variation in the information uncertainty across the life cycle stages affects IVOL. Given the higher (lower) firm-specific disclosures during growth and mature (introduction and decline) stages (Al-Hadi et al., 2016), we expect the varying information uncertainty across the life cycle stages to moderate the association between IVOL and life cycle stages.

Using the Dickinson (2011) five-stage life cycle model, we find IVOL to be higher in the introduction and decline stages of the firm life cycle compared to the shake-out stage,[1] but lower in the growth and mature stages of the firm life cycle. Our results remain robust even after controlling for firm age and listing cohort, and for other known determinants of IVOL. We also find that, both cash flow volatility and information uncertainty affect IVOL differentially across life cycle stages.

The Brown and Kapadia (2007) and Fink et al. (2010) papers are closely related to our paper. Brown and Kapadia (2007) use listing cohort of the firm, and show that fundamental change in the character of a typical publicly traded firm is largely responsible for surges in the IVOL. Fink et al. (2010), on the other hand, use firm age, and document that an increase in IVOL during the internet boom can be attributed to a market-wide decline in maturity of the typical public firm.

While both of the aforementioned studies examine *time trend* in IVOL, we argue that firm age is a noisy proxy for firm life cycle, and there is no guarantee that the documented negative association between firm age and IVOL will also be applicable to the life cycle theory. Both Dickinson (2011) and Faff et al. (2016) stress the importance of using a proper proxy for firm life cycle stages. In particular, they argue that firm age is not a good proxy for life-cycle, because the time required for firms' transition across life cycle stages varies across industries, and firms of the same age can learn at different rates depending on their feedback mechanisms. Moreover, age as a life cycle measure cannot track the transition of a firm across different life cycle stages, since this proxy relies on the assumption that a firm *moves monotonically* through its life cycle (Dickinson, 2011). Our direct measure, on the other hand, is free of this contentious assumption, captures the dynamic nature of life cycle stages and shows that IVOL differs significantly across the life cycle stages. Furthermore, our life cycle proxy incorporates changes in the variation in innate factors across life cycle stages. Therefore, we do not consider life cycle stages as a 'catch all' proxy for explaining the IVOL.

Our study makes a number of contributions. First, we contribute to the extant theoretical and empirical literature on the determinants of IVOL[2] by documenting the role of firm life cycle in explaining IVOL. Prior research on the association between firm age and IVOL provides mixed evidence as mentioned above. In contrast, based on a more intuitive measure of life cycle (Dickinson, 2011), our results suggest a *non-linear* relation between the IVOL and life cycle stages. Second, we contribute to the life cycle literature by showing the unique role of firm life cycle in explaining cross-sectional variation in IVOL. Recent research in finance and accounting documents the role of firm life cycle in financial policy, performance and the functioning of a firm (DeAngelo et al., 2006; DeAngelo, DeAngelo, & Stulz, 2010; Faff et al., 2016; Habib & Hasan, in press; Hasan, Hossain, Cheung, & Habib, 2015; Koh, Dai, & Chang, 2015). Our study sheds further light on the role of firm life cycle on investors' valuation of the firm. The contribution of our paper may be viewed in the context of its additional validation of the Dickinson (2011) measure, which, to the best of our knowledge, has remained unexplored. Finally, our study has direct implications for investors' portfolio and hedging strategies. For example, high levels of IVOL in the introduction and decline stages indicate low correlations between stocks and, therefore, investors holding stock of introduction and decline firms need to increase the number of securities required to generate a well-diversified portfolio (see Campbell et al., 2001, pp. 23–27). Moreover, given that IVOL is important in explaining the cross-sectional difference in expected returns (Ang, Hodrick, Xing, & Zhang, 2006; Goyal & Santa-Clara, 2003; Herskovic, Kelly, Lustig, & Van Nieuwerburgh, 2016), our study suggests that investors should appraise IVOL in conjunction with the firm life cycle stages.

The remainder of the paper proceeds as follows. Section 2 develops the hypotheses. Section 3 explains research design. Section 4 explains sample selection, descriptive statistics, and regression results. The final section concludes the paper.

2. Hypotheses development

We hypothesize that idiosyncratic volatility will be higher during the introduction phase of the firm life cycle because of uncertain profitability and cash flows (Habib & Hasan, in press; Irvine & Pontiff, 2009; Pástor & Veronesi, 2003). A high degree of information asymmetry between managers and investors during this stage allows managers to invest in diversifying strategies inefficiently, enter into hedging and insurance relationships, or seek opportunities to increase the longevity of the company, to the detriment of short-run optimization (Donaldson & Lorsch, 1983; Doukas & Kan, 2004). Although firms in the growth stage of the life cycle have insufficient resource base, these firms are promising, profitable, and have strong potential and less uncertainty about cash flow (Dickinson, 2011; Spence, 1977, 1979, 1981). The characteristics of growth firms attract greater analyst coverage, attaining potential benefits from private information acquisition (Barth, Kasznik, & McNichols, 2001; Lehavy, Li, & Merkley, 2011). Greater analyst coverage, in turn, reduces mispricing and information asymmetry (Barth et al., 2001; Brennan & Subrahmanyam, 1995), and should reduce IVOL.

Firms in the mature stage of the life cycle are relatively larger, more profitable, and generate larger operating cash flows. Owing to their large customer base and diversification advantage, these firms are exposed to relatively less cash flow risk. Moreover, mature firms, having had a long existence in the market, are more closely followed by analysts and investors. Thus, these attributes of mature firms help to reduce

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[1] Shake-out is a transitory stage in the firm life cycle. As Dickinson (2011) remarks, the literature clearly spells out the role of all stages of the firm life cycle except for the shake-out stage. As a result, the expected signs of this stage are unclear. Thus, in developing hypotheses, we use the shake-out stage as a basis for comparison with other stages of the firm life cycle.

[2] The market pricing of IVOL has also been a topic of intense research. Although modern risk-based asset pricing theories (e.g., Sharpe, 1964) maintain that IVOL is not a priced risk factor, research finding in favor of market pricing include Ang et al. (2006), Lui, Markov, and Tamayo (2007), and Goyal and Santa-Clara (2003). On the other hand, evidence supporting the contention that IVOL is not a priced factor include Bali and Cakici (2008), Huang, Liu, Rhee, and Zhang (2010), Khovansky and Zhylyevskyy (2013) and Han and Lesmond (2011).