



# Firm crash risk, information environment, and speed of leverage adjustment<sup>☆</sup>



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## ABSTRACT

This paper examines the effect of a firm's crash-risk exposure on its speed of leverage adjustment (SOA), and how this effect is influenced by the information environment of the country in which the firm is located. We employ a panel of 19,247 firms across 41 countries from 1989 to 2013, and we find that firms with a higher crash-risk exposure tend to adjust their financial leverages more slowly toward their targets. This evidence supports the dynamic trade-off theory that firms with larger transaction costs adjust their capital structures less often. Equally important, we document that the negative link between crash-risk exposure and SOA is less pronounced in countries with a more transparent information environment.

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## 1. Introduction

Existing capital structure theories demonstrate that information asymmetry is an important determinant of optimal leverage. For example, Myers (1984) and Myers and Majluf (1984) show that firms with high information asymmetry face large external financing costs. The signaling theory of capital structure suggests that the stock market positively (negatively) reacts to an announcement of debt (equity) issuance (Ross, 1977; Noe, 1988). Moreover, the dynamic trade-off theory allows firms to take into account a trade-off between a suboptimal financial structure and leverage adjustment costs (Fischer et al., 1989; Goldstein et al., 2001; Strebulaev, 2007). Therefore, it predicts that firms with higher transaction costs tend to adjust their leverage ratios more slowly toward their targets.

One anecdotal example is the stock-price crash of Olympus in 2011 caused by its accounting scandal. The Japanese company paid inflated advisory fees to takeover advisers in order to hide investment losses in the 1990s. After its former president and CEO, Michael C. Woodford, questioned the fees of the Gyrus acquisition, Olympus' stock fell 70% within three weeks (from mid-October to November 8, 2011), reflecting investors' concerns about the company's actual prospects. In particular, Olympus' shareholders were worried

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about the company being delisted from the Tokyo Stock Exchange, which could restrict access to external equity financing. In addition, the company's credit rating was downgraded, suggesting that its creditworthiness had deteriorated considerably. In this case, reactions from capital-market participants were in accord with the prediction that external financing costs increase crash risk (The Wall Street Journal, December 6, 2011).

In this paper, we investigate how a firm's crash-risk exposure affects its leverage adjustment decision. We argue that firms exposed to a high crash risk are presumably those with extreme information asymmetry between inside managers and outside investors, which is consistent with the evidence of a significant positive relationship between crash risk and extreme information asymmetry in the existing literature (Jin and Myers, 2006; Hutton et al., 2009; Kim et al., 2011a). Thus, we hypothesize that a firm's crash-risk exposure tends to decrease its speed of leverage adjustment (SOA).

More importantly, we expect that the negative crash-risk effect on leverage adjustment is attenuated by a transparent information environment because the impact of the macro information environment on different aspects of financial markets, including institutional shareholding (Li et al., 2006) foreign investor shareholding (Haw et al., 2004; Gelos and Wei, 2005; Leuz et al., 2009), and leverage adjustment (Oztek and Flannery, 2012), has been well documented. To test our hypotheses, we employ an international sample of 41 countries from 1989 to 2013. Using international data has two advantages. First, our sample includes a large number of crash events. Second, multi-country data allows us to examine the effect of information environments on the relationship between crash risk and capital structure adjustment.

We have three main empirical findings. First, we show that crash-risk exposure is significantly and negatively correlated with a firm's speed of capital-structure adjustment toward their targets. Combined with the notion that a firm's crash-risk exposure reflects the opaqueness of its accounting information (Hutton et al., 2009; Kim et al., 2011a). This finding is consistent with capital structure theories based on the information asymmetry, which posit that opaque firms face the high transaction costs of issuing external funds (Myers, 1984; Myers and Majluf, 1984). Furthermore, the documented slow SOA confirms that firms with larger transaction costs tend to adjust their capital structures less frequently (Fischer et al., 1989; Goldstein et al., 2001; Strebulaev, 2007). Second, we find that a transparent information environment significantly attenuates the negative relationship between crash-risk exposure and SOA. This result is consistent with the view that the information environment encourages transparent stock prices and reduces external financing costs (Porta et al., 1998; Bushman et al., 2004). Third, we find that the effect of crash-risk exposure on SOA is negative among over-leveraged firms and mixed among under-leveraged firms. One explanation for the asymmetric effect is that under-leveraged firms with high crash-risk exposure may strategically use debt issuance (as a good signal) to hide bad news.

This paper fits into the empirical literature on dynamic capital structure adjustment. The literature starts from assuming a constant SOA across all firms (Fama and French, 2002; Flannery and Rangan, 2006). Recent studies have advanced the understanding of cross-section variation in SOA. Our paper is mostly related to Faulkender et al. (2012) and Oztek and Flannery (2012), which employ dynamic partial adjustment models of capital structure to analyze the determinants of SOA. Adding to this strand of research, we introduce crash-risk exposure as an important factor that explains the heterogeneity in SOA. This is because the existing crash-risk literature suggests a positive relationship between crash risk and extreme information asymmetry (Hutton et al., 2009; Kim et al., 2011a). Specifically, we use crash risk as a proxy for extreme information asymmetry, and examine its effect on SOA.

Furthermore, this paper sheds insight on the impact of corporate governance on capital structure. For example, Antoniou et al. (2008) find that macro-level corporate governance and investor protection are important determinants of leverage ratios. Fan et al. (2012) show that firms in countries with a poor institutional environment are more likely to have high leverage, while Oztek and Flannery (2012) argue that a better institutional environment lowers the transaction costs of external financing and hence increases SOA. In this paper, we focus on the specific information environment rather than the legal regime and investor protection. We find that a transparent information environment significantly mitigates the (adverse) effect of crash-risk exposure on SOA.

This paper is related to the literature on crash risk. Prior studies (Jin and Myers, 2006; Hutton et al., 2009; Kim et al., 2011a; Kim et al., 2011b; An and Zhang, 2013; Kim et al., 2014; Kim and Zhang, 2014; Kim and Zhang, forthcoming) focus on the determinants of crash risk but do not analyze the consequences of crash-risk exposure on corporate policies. We show that crash-risk exposure can influence a firm's ability to raise capital and adjust capital structure.

This paper also contributes to the study of the impact of macro information environments on financial markets. For example, Gelos and Wei (2005) provide evidence that international funds hold fewer assets in markets with a less transparent (or more opaque) financial information environment. Li et al. (2006) find that the variations of financial institutional large shareholdings are determined by country level corporate information disclosure requirements. They argue that the strengthened monitoring ability of a strong macro corporate governance environment encourages financial institutions to hold concentrated equity positions. Leuz et al. (2009) show that country-level poor information disclosure rules and weak investor protection deter foreign investment, especially for firms with more earnings management. This paper shows that the macro information environment additionally influences leverage adjustment by firms across the world.

The remainder of the paper is organized as follows. Section 2 reviews the related literature and develops our hypotheses. Section 3 describes our empirical methodology. Section 4 discusses data and sample. Section 5 presents the empirical results and robustness tests. Section 6 concludes the paper.

## 2. Hypothesis development

Our hypotheses rest on three strands of research. First, there is a rapidly growing body of research on the significant positive relationship between crash risk and extreme information asymmetry (Jin and Myers, 2006; Hutton et al., 2009; Kim et al., 2011a; Kim et al., 2011b; An and Zhang, 2013; Kim et al., 2014; Kim and Zhang, 2014; Kim and Zhang, forthcoming). One explanation is

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