Does Corporate Diversification Influence the Financing and Investment Constraints Faced by Overleveraged Acquiring Firms?

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Abstract

Using data on UK mergers and acquisitions, this paper provides evidence on whether corporate diversification (both industrial and geographic) moderates the financing and investment constraints faced by firms that deviate from their target leverage ratios. Based on the trade-off theory of capital structure, we argue and find that firms that deviate from their target leverage ratios do face significant investment constraint in the form of a reduced ability to initiate and complete mergers and acquisitions. Furthermore, consistent with the co-insurance hypothesis, we show that firms that deviate from their target leverage ratios face *reduced* investment constraint when they undertake diversifying (cross-industry) acquisitions than when they pursue related (within-industry) acquisitions. The results on the impact of geographic diversification are mixed. Overall, the findings improve our understanding of how the perceived risks associated with planned investments influence the *ex-ante* financing and investment constraints faced by firms that deviate from their leverage targets.

Keywords: Corporate diversification; industrial diversification; geographic diversification; leverage deviation; overleverage; mergers and acquisitions.

1. Introduction

The finance literature pays considerable attention to the link between corporate diversification strategy and leverage (see Lewellen, 1971; Mansi and Reeb, 2002; Hann, Ogneva, and Ozbas, 2013). In theory, corporate diversification may enhance acquirers'ability to raise debt capital because diversification should reduce the volatility of firms' earnings (see Lewellen, 1971). However, the empirical evidence in this area is mixed (see Reeb, Kwok, and Baek, 1998; Mattoo and Zhang, 2008). This paper adds to the literature by proposing and testing hypotheses regarding the significance of corporate diversification (both product and geographic) in determining the relationship between the probability of undertaking an acquisition and leverage. The existing empirical literature on the link between leverage and corporate diversification is primarily based upon cross-sectional variations among diversified and focused firms (see e.g. Mansi and Reeb, 2002; Singhal and Zhu, 2013). This approach relies on segment level data to measure the extent of diversification, and has been the subject of recent criticism (see Hyland and Diltz, 2002). For instance, Hyland and Diltz (2002) argue that many changes in the number of reported segments do not necessarily represent an increase or decrease in the level of diversification. An important contribution of this paper is to examine the link between leverage and diversification based upon data on mergers and acquisitions (M&A) that may actually result in changes in the extent of corporate diversification. Specifically, the study's empirical analysis is based on the

link between the probability of undertaking diversifying and non-diversifying acquisitions and firms' deviations from their target leverage.

This paper is directly linked to Harford, Klasa and Walcott (2009) and Uysal (2011) who show that firms' deviations from their target leverage (i.e. leverage deviation) reduce the probability of undertaking debt- and cash-financed acquisitions. However, an important gap in these studies is the lack of distinction between diversifying and non-diversifying acquisitions. The present paper fills this gap. The empirical analysis which is based on a sample of 10,951 domestic and cross-border acquisitions completed by UK firms between 1997-2011 suggests that a unit deviation from a firm's target leverage is associated with a 12.7% lower probability of undertaking an acquisition in the following 5 years. Throughout this paper, the term "investment constraint" is used to describe this reduced ability to undertake acquisitions which is associated with firms' deviations from their leverage targets. The paper also provides evidence to suggest that corporate diversification (especially industrial) eliminates, or at least, reduces the investment constraints faced by acquirers who deviate from their target leverage ratios. These findings have at least two important implications for both theory and practice in corporate policy. First, the results provide support for the relevance of the target leverage ratio and the trade-off theory of capital structure by suggesting that deviations from the target (i.e. optimal) leverage may hinder firms' ability to undertake some investment projects. Second, the findings imply that firms that deviate from their leverage targets have better prospects of successfully completing acquisitions when they select acquisition deals that have the potential of diversifying their cash flows across other industries.

2. Related literature and hypotheses development

2.1 - The link between leverage deviation, financing, and investment

The trade-off theory of capital structure predicts that firms should maintain optimal leverage ratios because deviations from the optimal leverage ratios (i.e. leverage deviations) are costly (see, e.g. Byoun, 2008; Uysal, 2011). It can be argued that when firms keep their leverage levels close to the optimal (target) level, investors would consider such firms to be better performers since Myers (1977) describes the optimal leverage as the level of leverage that maximizes the market value of the firm. Thus, investors may be unwillingly to lend to firms that substantially deviate from this optimal leverage since such firms may be deemed as too risky. As noted by Kayhan and Titman (2007), firms with leverage deviation (especially overleveraged firms – i.e. those that go beyond the optimal leverage) do face significant debt financing constraints since they face a higher bankruptcy risk. Uysal (2011) directly links the debt financing constraints faced by firms with leverage deviations to their investment activities. Based on his sample of US domestic acquisitions from 1990-2007, he finds that firms with leverage deviations exhibit a lower probability of undertaking an acquisition. He concludes that leverage deviation limits the ability of firms to raise debt capital, which, in turn, constrains them from bidding aggressively and successfully for acquisition targets.

Collectively, the literature suggests that investors may be reluctant to provide debt capital to firms with leverage deviations. This may create debt financing constraints for such firms and subsequently affect their investment activities. Given that over 70% of all acquisitions that require external funds are financed with new debt issues (see Martynova and Renneboog, 2009), these debt financing and investment constraints associated with leverage deviation are likely to be particularly severe for acquisition transactions (see Uysal, 2011). According, the first hypothesis is proposed for testing.

H1: *There is a negative association between leverage deviation and the probability of undertaking an acquisition.*

2.2 - The industrial diversification hypothesis

I argue, in this section, that the negative relationship between leverage deviation and acquisitions is likely to be less pronounced for diversifying acquisitions than for related acquisitions. Lewellen (1971) posits that M&As, especially diversifying mergers, create a combined entity that has less volatile cash flows compared to the pre-merger firm. This reduced volatility, he notes, is due to the co-insurance effect that may exist when the cash flows of acquirers and target firms are less than perfectly positively correlated. The implication is that the enhanced stability in cash flow (i.e. reduced default risk) due to the coinsurance effect should translate into debt financing advantages for diversified firms. The empirical literature provides some evidence for the prediction of lower default risk and higher borrowing ability associated with industrial diversification. For instance, Singhal and Zhu (2013) find that diversification reduces the probability of a firm filing for bankruptcy, while Hann et al. (2013) show that industrial diversification reduces firms' cost of capital by reducing their systematic risk.

Since investors tend to anticipate the benefits of diversification and react accordingly at the announcement of acquisitions (see Ghosh and Jain, 2000), acquiring firms may not need to wait until the consummation of acquisition deals in order to materialise the benefits of lower default risk and lower cost of capital. It is probable that those benefits would be realised in the pre-merger years when a firm proposes and commits to undertaking diversifying acquisitions. Therefore, the *ex-ante* debt financing constraints faced by firms with leverage deviations may be lessened, if not completely removed when such firms propose to undertake investments that have the tendency to reduce corporate risks and improve debt capacities. Therefore, we propose the following hypothesis:

H2: *The association between leverage deviation and the probability of undertaking acquisitions is less pronounced in diversifying (cross-industry) acquisitions than in related (within-industry) acquisitions.*

2.3 - The geographic diversification hypothesis

The finance and international business literature suggest that acquiring domestic firms should have different risk implications compared to undertaking cross-border acquisitions (see Hughes, Logue, and Sweeney, 1975; Reeb et al., 1998). Hughes et al. (1975) argue that corporate geographic diversification lowers earnings volatility as firms are able to receive cash flows from imperfectly correlated foreign markets, which, in turn, leads to lower cost of borrowing for geographically diversified firms. Empirically, Reeb, Mansi, and Allee (2001) report that geographic diversification is positively (negatively) related to credit rating (yield spread). Also, Mansi and Reeb (2002) find that an average geographically diversified firm in their sample enjoys about a 52 basis point reduction in its cost of debt financing, which appears to translate into greater borrowing capacity for it. Specifically, they report that an average geographically diversified firm employs about 30% more debt in its capital structure relative to a purely domestic firm. In aggregate, default risk (borrowing ability) appears to be typically lower (higher) for geographically diversified corporations in comparison to purely domestic corporations.

I argue that when firms pursue cross-border acquisitions, they are able to increase the extent of their geographic diversification. Therefore, if investors incorporate the risk implications of the proposed acquisition deal into their lending decisions, then the financing and investment constraints associated with leverage deviation may be less severe for firms

with leverage deviations proposing to undertake cross-border acquisitions than for those pursuing domestic acquisitions. Accordingly, hypothesis H3 is proposed:

H3: *The association between leverage deviation and the probability of undertaking acquisitions is less pronounced in cross-border acquisitions than in domestic acquisitions.*

3. Data and definition of key variables and subsamples

3.1 Data

In order to examine the link between the probability of undertaking acquisitions and leverage deviations, I follow a two-step procedure (see Uysal, 2011). In the first step, I estimate the leverage deviations for firms in year *t* using cross-sectional regressions as in Kayhan and Titman (2007). In the second step, I examine whether the leverage deviation of a firm in year *t* affects its probability of undertaking acquisitions (diversifying vs. non-diversifying) in the following five years (i.e. from year *t*+1 to year *t*+5).

I obtained our data from two sources. The first dataset is the financial and accounting data for all public listed UK firms for the period 1996 to 2006 from Datastream. The cut-off year was chosen because of the requirement to observe the acquisition activities of firms for the next 5 years. Thus, for firms in 2006, I observed their acquisitions from years 2007 till 2011. Since leverage deviation is a key variable of the study, I only keep those firms in our sample for which there is available data required to calculate leverage deviation. Following the extant corporate finance literature (e.g. Kayhan and Titman, 2007; Mittoo and Zhang, 2008), I also exclude financial firms and regulated utilities industries. The final sample consists of 11,206 firm-year observations for 1,993 firms. In order to relate the future acquisition activities of each firm-year in our sample to its leverage deviations, I also obtain data on all completed acquisitions by our sample firms during 1997-2011 from Thomson ONE.

Over half (52%) of the firm-years in our sample had made at least one acquisition during the period their acquisitions were observed. These firm-years are classified as acquirers, while the remaining 48% of the firm-years in our sample are classified as non-acquirers. In terms of the types of acquisitions, over 45% of all completed deals are purely cash-financed whereas only about 5% of the deals are purely equity-financed. The remaining half is either financed by a mixture of cash and equity or by some other means. Since most cash-financed deals are financed with external debt (see Harford et al., 2009), these statistics suggest the importance leverage deviation in financing acquisitions. The total number of completed M&As are roughly evenly split between related (51%) and diversifying deals (49%). We define acquisitions as diversifying (related) when the acquirer and the target firm have different (the same) 2-digit SIC codes. Also, acquisitions are defined as cross-border (domestic) when the acquirer and the target firm are domiciled in different (the same) countries (country). The number of domestic deals (61%) in our sample outweighs that of cross-border deals (39%). In terms of the size of the transactions, the average value of M&As completed by our sample firms was around £71 million, with a typical related acquisition being over twice the size of a typical diversifying acquisition (£100 million vs. £38 million). Also, the average cross-border acquisition is significantly larger than the average domestic acquisition (£117 million vs. £39 million). These differences are statistically significant.

3.2 Definition of leverage deviation and constrained firms

A crucial variable in the empirical analysis is leverage deviation. Following prior studies (e.g. Kayhan and Titman, 2007; and Uysal, 2011), I define this variable as the

difference between a firm's *actual* leverage ratio and its *"optimal"* (*target*) leverage ratio. Thus, positive deviations denote overleveraging while negative deviations imply underleveraging. Based on the estimated leverage deviation variable, I divide the sample firms into quartiles. The fourth (first) quartile firms are classified as *extremely overleveraged* (*extremely underleveraged*) and are considered to be at high risk of facing financial and investment constraints, since they are far away from the optimal leverage ratio. In contrast, the third (second) quartile firms are classified as *moderately overleveraged* (*moderately underleveraged*) and are deemed not to face substantial risk of financial and investment constraints since they are relatively closer to the optimal leverage levels. Therefore, when I come to examine the link between leverage deviation and acquisition probability, the unconstrained (Q2 and Q3) firms are used as benchmarks against which to measure the acquisition probability of constrained (Q1 and Q4) firms.

3.3 Estimation of the target leverage ratio

As noted above, defining leverage deviation involves estimating firms' *actual* and *target* leverage ratios. While the *actual* leverage ratio can be readily computed from the publicly available financial data, the *target* leverage ratio is unobservable and needs to be estimated. Based on the tradition in this field of research (see Harford et al., 2009; Uysal, 2011), I estimate the target leverage ratio of a firm by its fitted value of a market leverage regression. In specifying the regression equation, I utilised the determinants of capital structure documented in prior studies (e.g. Rajan and Zingales, 1995). Specifically, the explanatory variables included in the target leverage ratio are non-debt tax shelter, growth opportunities, asset tangibility, bankruptcy cost, profitability, research and development (R&D) expense ratio, missing R&D dummy, firm size, stock return, past levels of market leverage, and 13 dummy variables to capture the industry fixed-effect.

4. Empirical tests and results

4.1 – The univariate tests

The first test investigates whether extreme leverage deviation constrains firms from undertaking future acquisitions (H1). This test is conducted by comparing the acquisition activities using the *acquisition rates* for the subsamples of constrained (Q1 and Q4) and unconstrained (Q2 and Q3) firms. For each subsample, the acquisition rate is defined as the number of acquirers divided by the total number of firms. The differences between the acquisition rates for the relevant subsamples are then tested for statistical significance using the two-sample equality of proportion tests. Table 1 presents the results which generally support the assertion that substantial deviations from target leverage ratios are associated with a reduced probability of undertaking acquisitions (H1). In Column (a) of Table 1, for example, the observed acquisition rate is lowest among the constrained (Q1 and Q4) firms (i.e. 11.0% and 13.0%). As expected, unconstrained (Q2 and Q3) firms seem to be more active in the market for corporate control, having acquisition rates of approximately 14%. The differences between the acquisition rates for constrained and unconstrained firms are statistically significant at 1% level.

The results in Columns (b) and (c) largely provide evidence in support of hypothesis H2. Specifically, the acquisition rates among the constrained (Q1 and Q4) firms are higher in diversifying acquisitions (6.3% and 5.3%) than those of related acquisitions (6.0% and 4.8%), suggesting that extreme leverage deviation constrains related acquisitions more than it constrains diversifying acquisitions.

Tables 1

The proportion of acquisitions across the main subsamples and the acquisition types

Q1 firms have large negative leverage deviations, Q2 firms have small negative leverage deviations, Q3 firms have small positive leverage deviations, and Q4 firms have large positive leverage deviations. a, b, and c represent statistical significance at 1%, 5%, and 10%, respectively.

		(a)	(b)	(c)	(d)	(e)
		General	**Industrial diversification**		**Geographic diversification**	
No.	**Sample/subsamples**	**All deals**	**Diversifying**	**Related**	**Domestic**	**Cross-border**
1	Ratio of extremely underleveraged acquirers (Q1)	0.130	0.063	0.060	0.100	0.059
2	Ratio of moderately underleveraged acquirers (Q2)	0.139	0.067	0.067	0.101	0.075
3	Ratio of moderately overleveraged acquirers (Q3)	0.143	0.067	0.067	0.099	0.077
4	Ratio of extremely overleveraged acquirers (Q4)	0.110	0.053	0.048	0.084	0.047
5	Difference (1 - 4)	0.020[a]	0.010[a]	0.012[a]	0.015[a]	0.012[a]
6	Difference (2 - 4)	0.029[a]	0.014[a]	0.019[a]	0.017[a]	0.028[a]
7	Difference (3 - 4)	0.033[a]	0.014[a]	0.018[a]	0.015[a]	0.030[a]

In fact, among diversifying acquisitions, the acquisition rates are relatively similar for the constrained (Q1 and Q4) and unconstrained (Q2 and Q3) firms. However, when we consider related acquisitions, we find a relatively wider gap between the acquisition rates for the constrained (Q1 and Q4) and unconstrained (Q2 and Q3) firms. Finally, Columns (d) and (e) indicate higher investment constraint in cross-border acquisitions relative to domestic acquisitions. In cross-border acquisitions, there is a wider gap between the acquisition rates for constrained (Q1 and Q4) firms (i.e. 5.9% and 4.7%) and the unconstrained (Q2 and Q3) firms (i.e. 7.5% and 7.7%). In contrast, the acquisition rates are closer for constrained (Q1 and Q4) firms (i.e. 10.0% and 8.4%) and the unconstrained (Q2 and Q3) firms (i.e. 10.1% and 9.9%) in domestic deals. These results suggest that the investment constraint associated with extreme leverage deviation is stronger in cross-border acquisitions than in domestic acquisitions. These findings are inconsistent with hypothesis H2, but rather imply that corporate *geographic* diversification intensifies the *ex-ante* financing and investment constraints associated with leverage deviations.

4.2 – The multivariate tests

The univariate analysis above fails to account for several important factors that may be related to the probability of undertaking acquisitions (e.g. growth opportunities). Therefore, in this section, I incorporate control variables into the analysis of the link between leverage deviations and the probability of undertaking different types of acquisitions. The baseline model is a probit regression specified in Eq. (1) below:

$$P_{it+1,t+5}(Acquirer = 1) = \beta_1 + \beta_2 Deviation_{it} + \sum_{k=1}^{k} X_{kit}^{1} \beta_k + u_{it} \qquad \text{(Eq. 1)}$$

In the above equation, $P_{it+1,t+5}$ refers to the probability of firm *i* making at least one acquisition during the 5 years after deviating from its target leverage. When testing the industrial and geographic diversification hypotheses, the definitions of $P_{it+1,t+5}$ are slightly modified to reflect the probability of undertaking the specific type of acquisition (i.e. diversifying/related/domestic/cross-border acquisitions). The β s represent the intercept (β_1), the coefficients for the leverage deviation variable (β_2), and for the control variables (β_k). The u_{it} is the random error term assumed to be serially uncorrelated and homoscedastic. $Deviation_{it}$ represents the leverage deviation variable. When analysing the specific effect of extreme overleveraging and extreme underleveraging, $Deviation_{it}$ in Eq. (1) then becomes an indicator variable of one for the constrained (Q1 and Q4) firms and zero for the unconstrained (Q2 and Q3) firms.

Finally, X_{ki} in Eq. (1) represents one of the following *k* control variables that may affect the acquisition probability. I control for long-term leverage, since Uysal (2011) reports a negative association between a firm's long-term leverage and its acquisition activities. Long-term leverage ratio is defined as the a firm's leverage for the last 3 years. Also, I control for firm size (proxied as the natural log of net sales) because large firms may find it easier to raise funds for acquisitions. Since Harford (1999) suggests that better performing firms tend to be acquirers, I account for this effect by including the ratio of earnings before interest, tax, depreciation and amortization (EBITDA) to total asset in the model. Jensen's (1986) free cash flow hypothesis implies that high free-cash flow firms are more likely to make acquisitions. Accordingly, the ratio of cash and cash equivalents to total assets is included to control for this effect. Further, I include the average annual stock return to account for two effects, i.e.,

the performance effect and the misvaluation effect posited by Shleifer and Vishny (2003). Firms with high stock return may be deemed as better performing/overvalued and hence are more likely to make acquisitions. In addition, high growth firms may be more likely to undertake acquisitions. Thus, the market-to-book ratio is included in the model to control for growth opportunities. Since M&As tend to come in waves (see Martynova and Renneboog, 2008), I capture this effect on the acquisition probability by including the industry M&A liquidity variable. Following Uysal (2011), I measure this variable as the sum of the transaction values of all acquisitions made in a year by all firms in a particular industry divided by the total sales of the industry in that year. Also, Uysal (2011) argues that firms in highly concentrated industries have fewer targets available for acquisition within the industry. I therefore include the industry Herfindahl index in the regression to capture the extent of industry concentration. In testing the industrial diversification hypothesis (H2), I also include the pre-acquisition Herfindahl diversification index of the firms to account for the effect of firms' existing diversification strategies. I expect diversified (focused) firms to have higher propensity for diversifying (related) acquisitions. Similarly, when addressing the geographic diversification hypothesis (H3), I include the foreign sales ratio to proxy for firm' experience in foreign markets. I expect multinational (domestic) firms to be more likely to undertake cross-border (domestic) acquisitions. Finally, in all the models, I include year dummies in order to account for changes in macroeconomic conditions over the sample period. The year dummies are expected to capture the effects of factors like interest rates and inflation rates which could impact the level of M&A activity in the economy.

In Eq. (1) above, I am particularly interested in the sign, magnitude, and significance of β_2 (i.e. the co-efficient on the leverage deviation variable) as it represents the extent of association between leverage deviations and the probability of undertaking acquisitions. I interpret this to mean the extent of financing and investment constraints associated with leverage deviation. The results are presented in Table 2. In order to interpret the coefficients as probabilities, the average marginal effects are reported as in Uysal (2011). Columns (a) and (b) of Table 2 displays the result for the test of H1 which are largely consistent with the univariate results and strongly support the view that leverage deviation (particularly overleveraging) reduces firms' ability to undertake new investments. Specifically, Column (a) shows that the coefficient of the leverage deviation variable is negative (-0.127) and statistically significant at 1% level. This suggests that a unit deviation from a firm's current target leverage ratio is, on average, associated with a 12.7% reduction in the probability of making an acquisition in the future (i.e. within the next 5 years). An important implication of this finding is that *the target leverage ratio is important*, in that, deviating from it creates financing and investment constraints in the form of a reduced ability to undertake future acquisitions. The finding presented in Column (a), however, does not distinguish between the investment constraint associated with extreme overleveraging and extreme underleveraging. As a result, the leverage deviation effect is further examined, with special attention given to the constrained (Q4 and Q1) firms. The results Column (b) suggest that the investment constraint is limited to extremely overleveraged (Q4) firms. To be specific, the dummy variable for extremely overleveraged firms is negative (-0.051) and statistically significant (p-value of 0.000), while the extremely underleveraged dummy is negative (-0.014) but lacks statistical significance at conventional levels (p-value of 0.280). This finding is consistent with the view that the cost of being overleveraged is greater than the cost of being underleveraged (see Byoun, 2008) because extreme overleveraging appears to constrain acquisitions more than extremely underleveraging. In general, these findings are largely consistent with the US study by Uysal (2011). However, the present study's results indicate that the leverage deviation/overleverage effect is ***stronger*** in the UK than in the US. For instance, for the overleverage effect, we report a marginal effect of 5.1% compared with the

0.9% documented by Uysal (2011). This suggests that a UK overleveraged firm is almost 6 times less likely to make an acquisition compared with a US overleveraged firm. The difference in the overleverage effect may be due to the choice of the sample period. The sample period for the present study includes acquisitions during the period 2006-2011, which coincides with the recent credit crunch brought about by the financial crisis of 2008. It must also be emphasised that the difference in the research designs and the sample compositions of the two studies might contribute to explaining the difference in the magnitude of the overleveraged effect.

I now turn attention on the results for the industrial diversification (H2) tests presented in Columns (c)-(f) of Table 2. These results suggest that investment constraint is smaller in diversifying acquisitions compared to related acquisitions. Specifically, the negative association between leverage deviation and the probability of making a diversifying acquisition is small (-5.2%) and insignificant (p-value of 0.215). In comparison, the association between leverage deviation and the probability of undertaking related acquisitions is larger (-16.8%) and statistically significant at 1% level. This suggests that the financing and investment constraints associated with leverage deviation are restricted to firms undertaking related acquisitions. In other words, extreme deviation firms that choose to undertake diversifying acquisitions do ***not*** face any significant financing and investment constraints. These results imply that by committing to undertake new projects that have the potential to diversify corporate cash flows across different industries, firms that deviate from their target leverage ratios are able to undo, at least, part of the costs associated with leverage deviation. Similarly, the analysis based on the indicator variable for extreme overleveraging supports hypothesis H1. Specifically, overleveraging reduces the probability of undertaking a diversifying acquisition (-2.3%, significant at 10% level) less than the probability of undertaking a related acquisition (-5.6%, significant at 1% level). I interpret these findings to be consistent with the notion that lenders view diversifying (related) acquisitions as carrying greater (little) potential to reduce the risk of overleveraged acquirers (Lewellen, 1971). Consequently, lenders are more (less) willing to supply funds for diversifying (related) acquisitions. These results are also economically significant because they suggest that an overleveraged firm attempting to undertake an acquisition is more likely to be successful in its attempts to secure funds from investors if it chooses to pursue a diversifying (cross-industry) rather than a related (within-industry) acquisition.

Finally, I present the results on the *geographic* diversification hypothesis (H3) in Columns (g)-(j). These results are mixed. Comparing results in Columns (g) and (i) show that leverage deviations constrain cross-border acquisitions less than domestic acquisitions. In particular, the coefficient on the leverage deviation variable is -13.9% (p-value of 0.001) in the domestic acquisition model, but it is only -3.9% and insignificant (p-value of 0.334) in the cross-border acquisition model. This is consistent with hypothesis H2 which suggests that those firms with leverage deviations that undertake cross-border acquisitions face less financing and investment constraints than their counterparts pursuing domestic acquisitions. However, a different conclusion is reached when the leverage deviation effect is separated into extreme overleverage and extreme underleverage effect (see Columns (h) and (j)). Specifically, extreme overleveraging reduces the probability of making domestic acquisitions by only 2.3% (significant at 10% levels) but has a much bigger effect (-4.5%, significant at 1% levels) in cross-border acquisitions.

Table 2

Leverage deviation and the probability of undertaking different types of acquisitions

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	General		**Industrial diversification**				**Geographic diversification**			
Variables	**All M&As**		**Diversifying M&As**		**Related M&As**		**Domestic M&As**		**Cross-border M&As**	
Leverage deviation	**-0.127[a]**	..	**-0.052**	..	**-0.168[a]**	..	**-0.139[a]**	..	**-0.039**	..
	(0.003)	..	*(0.215)*	..	*(0.000)*	..	*(0.001)*	..	*(0.334)*	..
Overleverage effect (Q4)	..	**-0.051[a]**	..	**-0.023[c]**	..	**-0.056[a]**	..	**-0.023[c]**	..	**-0.045[a]**
	..	*(0.000)*	..	*(0.075)*	..	*(0.000)*	..	*(0.070)*	..	*(0.000)*
Underleverage effect (Q1)	..	**-0.014**	..	**-0.001**	..	**-0.011**	..	**0.005**	..	**-0.028[a]**
	..	*(0.280)*	..	*(0.962)*	..	*(0.394)*	..	*(0.722)*	..	*(0.010)*
Long-term leverage	-0.271[a]	-0.245[a]	-0.184[a]	-0.170[a]	-0.203[a]	-0.177[a]	-0.162[a]	-0.159[a]	-0.282[a]	-0.248[a]
	(0.000)	*(0.000)*	*(0.001)*	*(0.003)*	*(0.001)*	*(0.004)*	*(0.005)*	*(0.007)*	*(0.000)*	*(0.000)*
Growth opportunities	0.020[a]	0.019[a]	0.017[a]	0.017[a]	0.019[a]	0.018[a]	0.008[c]	0.008	0.016[a]	0.016[a]
	(0.000)	*(0.000)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.102)*	*(0.109)*	*(0.000)*	*(0.000)*
Firm size	0.063[a]	0.063[a]	0.048[a]	0.048[a]	0.055[a]	0.055[a]	0.038[a]	0.038[a]	0.053[a]	0.053[a]
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Profitability	0.036	0.033	0.001	-0.001	0.039	0.036	0.041	0.042	0.047	0.042
	(0.224)	*(0.263)*	*(0.981)*	*(0.973)*	*(0.227)*	*(0.266)*	*(0.173)*	*(0.163)*	*(0.127)*	*(0.172)*
Stock return	0.846[a]	0.862[a]	0.567[a]	0.560[a]	0.857[a]	0.885[a]	0.593[a]	0.633[a]	0.676[a]	0.673[a]
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Cash ratio	0.105[c]	0.100[c]	0.068	0.066	0.065	0.062	0.058	0.059	0.169[a]	0.163[a]
	(0.060)	*(0.072)*	*(0.239)*	*(0.254)*	*(0.241)*	*(0.263)*	*(0.306)*	*(0.298)*	*(0.002)*	*(0.003)*
Industry M&A liquidity	0.190[a]	0.191[a]	0.163[a]	0.164[a]	0.088	0.088	0.211[a]	0.210[a]	0.124[b]	0.124[b]
	(0.004)	*(0.004)*	*(0.008)*	*(0.008)*	*(0.173)*	*(0.176)*	*(0.001)*	*(0.001)*	*(0.024)*	*(0.024)*
Industry concentration	0.001	-0.002	-0.389[a]	-0.389[a]	0.356[a]	0.355[a]	-0.368[a]	-0.369[a]	0.211[b]	0.209[b]
	(0.990)	*(0.984)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.019)*	*(0.021)*
Diversification index	..	..	0.204[a]	0.204[a]	-0.079[b]	-0.078[b]	..	..	..	..

	..	..	*(0.000)*	*(0.000)*	*(0.033)*	*(0.034)*	..	..	..	..
Foreign sales ratio	..	..	..	..	..	..	-0.261[a]	-0.260[a]	0.416[a]	0.415[a]
	..	..	..	..	..	..	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
No. of Observations	**11,117**	**11,117**	**9,865**	**9,865**	**9,865**	**9,865**	**10,248**	**10,248**	**10,248**	**10,248**
Wald Chi-squared	**312.41**	**312.68**	**242.43**	**243.09**	**271.46**	**275.76**	**203.44**	**197.82**	**479.64**	**493.07**
P-value>Chi-squared	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Pseudo R-squared	**0.064**	**0.065**	**0.071**	**0.071**	**0.056**	**0.057**	**0.043**	**0.043**	**0.167**	**0.168**

This table presents results from a probit analysis. The reported parameter estimates are average marginal effects. In Columns (a) and (b), the dependent variable takes a value of one if the firm undertakes an acquisition in the next 5 years following deviation from target leverage. In Columns (c)-(f), the dependent variable takes a value of one if the firm undertakes a diversifying acquisition (or related acquisition) in the 5 years following deviation from target leverage. In Columns (g)-(j), the dependent variable takes a value of one if the firm undertakes a domestic acquisition (or cross-border acquisition) in the 5 years following deviation from target leverage. All the models from Columns (a)-(j) generally summarise results from the estimation of Eqs. (1). The p-values are reported in *italics and parentheses* and are adjusted for standard errors clustered by firm. All models include 10 year dummies. a, b, and c represent statistical significance at 1%, 5%, and 10%, respectively.

These results are inconsistent with hypothesis H2 but support the univariate analysis. They suggest that geographic diversification does not reduce the risk of extremely overleveraged firms. The results are rather consistent with the view that the additional risks such as foreign exchange and political risks (see Reeb et al., 1998) associated with foreign business make cross-border acquisitions potentially more risky than domestic deals. Therefore, overleveraged acquirers seem to face more financing and investment constraints when they engage in cross-border acquisitions than when they pursue domestic acquisitions. It is quite puzzling for the leverage deviation effect and the overleveraging effect to reach different conclusions on the issue of the impact of geographic diversification. Perhaps, the relation between geographic diversification and leverage deviation is non-monotonic, in that, there may be a threshold level of deviation after which debtholders are not willing to provide capital to finance foreign acquisitions. It must also be noted that it is possible for leverage deviation to produce a greater effect for domestic acquisitions if domestic acquirers, on average, deviate *more* from their leverage targets than the average deviations observed for cross-border acquirers. The implications of these mixed results are that firms that deviate from their target leverage ratios generally stand a better chance in initiating and completing cross-border acquisitions than undertaking domestic acquisitions. However, those firms that *extremely* go beyond their target leverage ratios are rather more successful in their acquisition attempts when they pursue domestic acquisitions than when they pursue cross-border acquisitions.

5. Conclusions and managerial implications

This study contributes to the literature on the link between capital structure and investment decisions by documenting a negative association between a firm's deviations from its target leverage ratio and its ability to initiate and successfully complete acquisitions. I find the association between leverage deviation and the probability of undertaking an acquisition to be ***over twice larger*** than that reported in a related US study by Uysal (2011). This suggests that the cost for extreme deviation firms (in terms of forgone acquisition deals) is much higher than was previously suggested in the literature. Another plausible interpretation of the finding is that the cost associated with leverage deviation is greater for UK acquiring firms than for US acquiring firms. These results also suggest that it is not sufficient for firms to have target leverage ratios, but corporate managers must strive to keep their leverage levels close to their leverage targets. Thus, the results provide evidence in support of the existence and relevance of the trade-off theory of capital structure. More importantly, the paper shows that acquiring firms that have deviated from their target leverage ratios face different financing and investment constraints depending on the type of acquisitions they propose to undertake. Both firms that generally deviate from their leverage targets and those that extremely go beyond their leverage targets tend to face *lower* (*greater*) constraints when they pursue diversifying (related) acquisitions, implying that corporate industrial diversification *moderates* the financing and investment constraints associated with leverage deviation. This suggests that investors foresee the co-insurance benefits of reduced cash flow volatility associated with diversification, and thus act favourably towards financially-constrained firms proposing diversifying (cross-industry) investments.

Finally, the results regarding geographic diversification are mixed. I find firms that deviate from their target leverage to generally face *lesser* financing and investment constraints when they propose cross-border deals than when they propose domestic deals. This finding is consistent with the view that international diversification also makes corporate cash flow less volatile for firms with leverage deviation. However, a contrary conclusion emerges when I consider firms that ***extremely go beyond*** their leverage targets. I find the financing and

investment constraints faced by these firms to be *greater* in cross-border deals relative to domestic deals. This implies that when an already overleveraged firm diversifies geographically, investors view that move as potentially risk-increasing rather than being risk-reducing. Another plausible implication is that the relation between geographic diversification and the leverage deviation effect is non-monotonic. Thus, when a certain upper threshold of deviation is reached, debtholders are no longer willing to fund foreign acquisitions.

Although this paper contributes to the literature in this area by suggesting that the diversification characteristics of a proposed merger deal influences the financing and investment constraints associated with leverage deviation, it does not consider how the *pre-acquisition level of diversification of the acquiring firm itself* could influence the financing and investment constraints related to leverage deviation. Future studies can further inquire into this matter. It may also be interesting to investigate the link between leverage deviation and investments in emerging economies with less developed capital markets.

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