The effect of leverage deviation on a firm's decision on public versus non-public acquisitions: UK evidence*

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*I would like to thank Mark Clatworthy, Andrey Golubov, Jarrad Harford, Kirak Kim, Sandy Klasa, Piotr Korczak, Neslihan Ozkan, Nick Taylor, Jon Temple, Jon Tucker and Moqi Xu for their useful comments and constructive suggestions.

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Abstract

This paper extends the work of Uysal (2011) and Harford et al. (2009) by exploring whether over- or under-deviation from target leverage may predict the investment and financing decisions of public and non-public acquisitions. Using a sample of 3,416 completed domestic bids by UK acquirers from 1987 to 2012, we find that that over-deviated firms are more likely to make public acquisitions while, under-deviated firms prefer non-public acquisitions. We also observe that over-deviated (under-deviated) firms use less (more) cash financing for their public (non-public) acquisition deals. We show that over-deviated firms experience wealth gains (losses) when acquiring public (non-public) targets, whereas under-deviated firms create value gains (losses) when undertaking non-public (public) acquisitions. We further find that under-deviated firms outperform over-deviated firms following the acquisition of non-public targets. Overall, these findings confirm empirically that contrasting characteristics of over- and under-deviated firms produce reverse effects in their choices and outcomes of public versus non-public acquisitions.

Keywords: Over-deviation, Under-deviation, Payment method, Acquirers' performance and value

JEL classification: G30, G32, G34

1. Introduction

Trade-off theory states that firms' target leverage is determined by balancing tax shield benefits and bankruptcy frictions (Miller, 1977; Bradley, Jarrell & Kim, 1984). Graham and Harvey (2001) find that 55% of large US firms have strict leverage targets.[1] Nevertheless, many firms deviate from their targets as a result of various factors, including information asymmetries, market inefficiencies and transaction costs (Miller, 1977; Bradley, Jarrell, & Kim, 1984; Leary & Roberts, 2005). Consistent with the notion of deviation from target leverage, firms can thus be classified as over- or under-deviated.[2] In over-deviated firms, actual market leverage exceeds target leverage. Accordingly, these firms are exposed to high financial distress costs that generally impede their ability to raise capital at short notice and, in particular, constrain them from issuing new debt (Kayhan & Titman, 2007; Dang, Kim, & Shin, 2012). In contrast, in under-deviated firms, actual market leverage falls below target leverage. Thus, these firms are exposed to lower financial distress costs and are better able to raise funds from the capital market (Harford, Klasa, & Walcott, 2009). In brief, over- and under-deviated firms are exposed to different levels of financial risk that may drive their subsequent corporate decisions.

Previous literature has confirmed the effects of contrasting characteristics of over- and under-deviated firms on their financing and investment decisions. Harford et al. (2009) show that over-deviated firms have a lower propensity to finance large acquisitions with cash and even to raise more debt than under-deviated firms. Hovakimian, Opler, and Titman (2001) document that over-deviated firms engage in

[1] Brounen, De Jong and Koedijk (2006) report that 40% of the UK's chief financial officers seek to keep their leverage level around target.

[2] Leverage deviation is defined as the difference between actual and target leverage (Hovakimian et al., 2001). Over-deviated firms are those with leverage deviation in the highest quintile, and under-deviated firms are those with leverage deviation in the lowest quintile.

debt retirement activities, while under-deviated firms make equity repurchasing decisions. Similarly, Uysal (2011) shows that over-deviated firms are more inclined to issue equity, while under-deviated firms are unlikely to resort to equity issuing. Morellec and Zhdanov (2008) find that over-deviated firms are more likely to lose takeover bidding contests than under-deviated firms, due to their unfavourable financial conditions. Accordingly, this paper extends previous literature by examining whether the contrasting characteristics of over- and under-deviated firms may influence investment and financing decisions in public versus non-public acquisitions. It also explores the economic consequences of these acquisition deals on the value and performance of over- and under-deviated firms.

Over- and under-deviated firms' choices between public and non-public acquisitions might be explained by combing the contributions of information economics and strategic factor market. Information economics considers information asymmetry as a risk, while strategic factor market theory views it as an economic gain (Capron & Shen, 2007; Barney, 1986; Makadok & Barney, 2001). Officer (2007) argues that the information asymmetry problem is associated with all types of M&A deal; however, this problem is substantially more severe for non-public targets than public targets. In particular, the relaxed disclosure requirements of non-public firms lead to limited quality and quantity of information which, in turn, limits the breadth of a bidder's search and increases uncertainties in the proper evaluation of these kinds of investment (Officer, Poulsen & Stegemoller, 2009; Reuer & Ragozzino, 2008). However, the regulatory disclosure requirements, auditors' and analysts' coverage and associations with investment banks increase the visibility of public targets and minimise uncertainties about their value. Public firms are already priced by the market (Capron & Shen, 2007). Accordingly, this paper posits that over-deviated firms that are exposed to higher risk of default will prefer public acquisitions in order to avoid any additional risk arising from acquiring mis-evaluated non-public targets. In contrast, consistent with strategic factor market theory, the relaxed disclosures of non-public firms provide a value-creating opportunity for bidders through exploitation of private economic information (Makadok & Barney, 2001). Further, non-public targets cannot be traded as easily as public targets which minimises the competition for buying them, and maximises bidders' negotiating positions to extract further gains from transactions (Fuller et al., 2002). Officer (2007) reports that non-public targets are sold at an average 15 to 30% discount compared with similar public targets. Fuller, Netter and Stegemoller (2002) Ang and Kohers (2001) Moeller, Schlingemann, and Stulz (2004) find that unlike public acquisitions, non-public acquisitions achieve superior gains around bid announcements. Accordingly, this paper expects that that under-deviated firms that are exposed to lower risk of default will focus on value-enhancing deals and target non-public acquisitions.

Using a sample of 3,416 completed domestic acquisitions from 1987 to 2012, this paper investigates the research question of how does the position of leverage deviation, namely, over-deviation and under-deviation influence the likelihood, payment method and outcomes of public versus non-public acquisitions in the UK context. The UK is a key player in the world's M&A market, surpassing all other European Union (EU) countries (Sudarsanam, 2003). The value of domestic acquisitions by UK firms rose from approximately £31 billion in 1996 to around £107 billion in 2000 (ONS, 2013a). In terms of economic importance, investments in domestic acquisition deals represented around 8.5% and 2.4% of the UK's gross domestic product (GDP) in 2000 and 2008, respectively (ONS, 2013b). The paper further differentiates between non-public and public acquisitions, since such deals are quite pervasive and represent approximately 92% of the total volume of UK domestic acquisitions during this sample period.

The current paper finds that leverage deviation significantly affects the likelihood, payment method and economic consequences of both public and non-public acquisitions. It also shows interesting results that different deviated groups, namely, over- and under-deviated firms adopt different takeover strategies. In particular, it observes that, based on 23,165 firm-year observations, over-deviated firms are more likely to acquire public targets, while under-deviated firms are more often involved in non-public acquisitions. It also finds that over-deviated firms use less cash in public acquisition offers, and under- deviated firms use more cash in non-public acquisitions. In light of the economic consequences, it documents that public acquisitions are value-creating for over-deviated firms and value-destructive for under-deviated firms, whereas non-public acquisitions are wealth-loss decisions for over-deviated firms and wealth-gain decisions for under-deviated firms. It also shows that under-deviated firms outperform over- deviated firms after being involved in non-public acquisitions.

Our findings contribute to a strand of literature on the interaction between capital structure and acquisition decisions (e.g. Uysal, 2011; Harford et al., 2009) by exploring the link between corporate leverage deviation and acquisition types. Specifically, we present an interesting insight that firms take into account their target leverage when they choose between public and non-public acquisitions. We also add to the literature by providing novel evidence that a firm’s position of deviation, whether over or under target leverage, inversely changes its decision on which type of target to acquire. Previous work by Uysal (2011) finds that over-deviated firms are less likely to make acquisitions, but he does not observe any significant effect for under-deviated firms. We extend his work by providing strong evidence that contrasting characteristics of the two deviated groups significantly drive their acquisition choice. We document that over-deviated firms undertake public acquisitions, whereas under-deviated firms make non-public acquisitions.

This paper relates to studies on the inherent connection between sources of finance and financing decisions in acquisition bids. In particular, Uysal (2011) and Harford et al. (2009) document that corporate leverage deviation reduces firms' ability to pay cash for domestic and large acquisition deals. This paper goes further by investigating the effect of over- and under-deviation from target leverage on the means of payment for both public and non-public acquisitions. To the best of our knowledge, no previous study appears to provide empirical evidence that under-deviated firms employ their excess ability to raise debt to finance non-public acquisitions by cash, whereas over-deviated firms that have limited access to debt markets finance their public acquisitions from stock. In brief, the findings of this paper suggest that financing decisions in acquisition transactions are influenced by firms' levels of deviation from target leverage and the type of acquisition.

Our empirical findings articulate the link between leverage deviation and shareholder value following an acquisition. On contrary to the conventional view that non-public acquisitions enhance bidders' wealth compared with public acquisitions (Fuller et al., 2002; Faccio, McConnell & Stolin, 2006), our findings provide novel evidence that changes in firms' value following acquisition deals are strongly related to both the type of acquisition and the deviation position of the acquirer from target leverage. We note that over-deviated firms experience value creation (loss) following acquisition of public (non-public) targets, whereas under-deviated firms minimise (maximise) their shareholder's wealth after involvement in public (non-public) acquisitions. Our results also extend the literature by examining the interaction between leverage deviation and operating performance following public versus non-public acquisitions. We present strong evidence that leverage deviation is a core-determinant of post-acquisition performance. We further note that this relationship is affected by the position of deviated firms and the type of underlying deal. Specifically, non-public acquisitions enhance under-deviated firms' performance more than public acquisitions, but non-public acquisitions worsen over-deviated firms' performance, whereas public acquisitions do not have the same negative effect. Overall, our empirical findings extend the views of previous studies (e.g. Hovakimian, Opler & Titman, 2001; Morellec & Zhdanov, 2008) that the contrasting characteristics of over- and under-deviated firms lead to reversals in their corporate decisions by providing new evidence that they may even change choices and outcomes of public versus non-public acquisitions.

In addition to previous contributions to knowledge, this paper has direct implications for academics and practitioners. On contrary to previous studies (e.g. Erel et al., 2015; Moeller, Schlingemann & Stulz, 2004; Uysal, 2011) that have treated all domestic acquisitions as a single homogeneous group, the results of this paper suggest that distinguishing between public and non-public acquisitions is essential, as each type has its own characteristics, drivers and economic consequences. Similarly, our findings shed light on the importance of addressing heterogeneity in firms' leverage deviations, whether they acquire debt above or under target. Specifically, our results confirm that over- and under-deviated firms have contradictory characteristics that not only drive their acquisition choices, but also significantly affect economic gains from such investment deals. Identifying the economic gains of over- and under-deviated firms following public versus non-public acquisitions will enable managers to develop strategic plans for better acquisition decisions. This also will enable policy makers to develop codes of best practice in order to assess whether management boards are behaving in compliance with their fiduciary responsibilities, as defined in company laws. Our empirical findings call for a reform of some aspects of takeover codes by requiring non-public firms to disclose more information prior to acquisition, equivalent to that released by public counterparts. Such changes in the regulatory codes are essential in order to improve the efficient allocation of assets and to protect the investment environment, to the benefit of firms and the economy as a whole.

The remainder of this paper is organised as follows. Section 2 presents a literature review, and Section 3 describes the sample, main independent variables and empirical models. Section 4 reports the main empirical findings, Section 5 describes further robustness checks on the findings, and Section 6 draws conclusions and suggests areas for further research.

2. Literature review

2.1 Deviated firms' choice between public and non-public acquisitions

Hovakimian et al. (2001) document that leverage deviation, defined as the difference between actual and target leverage, is the main determinant of sources of new finance and subsequent investment decisions. Harford et al. (2009) show that leverage deviation is negatively related to the proportion of debt-financed cash rather than equity paid for large acquisition deals. Uysal (2011) finds that leverage deviation is an impediment to pursuing acquisition opportunities, observing that over- and under-deviated firms have different attitudes toward acquisitions. Specifically, while over-deviation from target leverage has a negative association with acquisition probability, under-deviation does not have the same effect. Thus, this paper extends the insights of Uysal (2011) by examining whether the two groups exhibit symmetric or different behaviours when they decide to make an acquisition.

Over-deviated firms have higher credit risk, which constrains their ability to raise additional financing from the capital market relative to under-deviated firms (Harford et al., 2009; Kayhan & Titman, 2007; Dang, Kim, & Shin, 2012). Previous literature confirms that contrasting characteristics of over- and under-deviated firms affect their corporate decisions, including those on issuing equity (Hovakimian et al., 2001), financing acquisitions (Uysal, 2011) and setting bidding limits in takeover contests (Morellec & Zhdanov, 2008). Accordingly, this paper extends the literature by questioning whether the contrasting characteristics of over- and under-deviated firms may drive their choices between public and non-public acquisitions.

The choice between investing in either public or non-public acquisitions might be explained by differences in information asymmetry. Non-public acquisitions are exposed to substantially greater information asymmetry regarding their value than public acquisition deals (Officer, Poulsen, & Stegemoller, 2009). The relaxed disclosure requirements of non-public firms trigger substantial increases in information asymmetry about their value relative to public firms (Officer, et al., 2009). Furthermore, the UK Companies Act 2006 exempts small and medium-sized non-public firms from filing audited accounts and from reporting their cash flows. It also allows them to lodge abbreviated accounts. Thus, non-public targets are more opaque than publicly-traded targets. However, the IPO process, stringent SEC disclosure requirements, analysts, the stock market and press coverage increase the quality and quantity of information available on public targets (Officer et al., 2009). Thus, consistent with the information economics view, information asymmetry around non-public acquisitions can be viewed as a friction in factor markets that increases uncertainty about their value and makes them more opaque than public targets (Capron & Shen, 2007). Based on this discussion, the assumption is that, motivated by information economics, over-deviated firms that face higher financial risk will engage in public acquisitions in order to avoid any additional risk associated with overpaying for a non-public target.

On the other hand, Fama (1991) argues that no bidders can gain above-normal returns from the market by trading on publicly-available information. In particular, bidders acquire similar information on public targets that will ultimately drive them to invest in and compete for the same ones. This competition for the same public target will drive up prices and minimise bidders' returns to zero (Capron & Shen, 2007). However, according to strategic factor market theory, information heterogeneity among potential bidders for non-public targets can be viewed as a source of value creation to the bidders (Makadok & Barney, 2001). Specifically, the non-public acquisition process may allow the release of private information between bidder and target, which is impossible in contested public acquisitions (Conn, Cosh, Guest, & Hughes, 2005). Fuller et al. (2002) report that firms experience, on average, 2.08% and 2.75% abnormal returns when buying a private or subsidiary target, respectively. They also experience a 1% stock loss when acquiring a public target. Faccio et al. (2006) find that, on average, bidders earn 1.48% cumulative abnormal returns (CAR) when undertaking non-public acquisitions and insignificant -0.38% CAR when making public acquisitions. Furthermore, a liquidation effect provides another explanation of acquirers' gains from non-public acquisitions. Specifically, non-public targets cannot be traded as easily as public targets, and the latter also have the alternative of cashing out their shares in the market rather than being acquired (Capron & Shen, 2007). Officer (2007) documents average acquisition discounts for non-public targets of 15% to 30% relative to acquisition for comparable public targets, owing to the value of providing liquidity to owners of non-public targets: "*Here, the acquirer pays a lower acquisition premium to compensate for the illiquidity of the asset, to compensate for the opacity of the target, and because the* *unlisted target takes liquidity as a form of nonpecuniary payment*" (Harford, Humphery-Jenner, & Powell, 2012, p.249).Based on this discussion, the assumption is that, following strategic factor market theory, under-deviated firms with lower risk of default will focus on value-enhancing deals and undertake non-public acquisitions.

2.2 Financing decisions of deviated firms for public and non-public acquisitions

Having chosen a specific target for acquisition, the next decision facing deviated firms is how to finance the deal, in particular deciding on the proportion of the deal that is paid in cash rather than equity. Previous literature documents that leverage deviation is the main driver of acquisition financing decisions (Harford et al., 2009; Uysal, 2011). In particular, over-deviated firms with debt ratios higher than the target are constrained in their ability to issue further debt (Kayhan & Titman, 2007; Dang et al., 2012). Bharadwaj and Shivdasani (2003) observe that issuing debt is the main means of raising the cash required to undertake acquisitions. Thus, owing to their debt constraints, over-deviated firms will use less cash in acquisition bids. In contrast, under-deviated firms have lower financial distress costs, which enhances their ability to take on cheaper debt (Hovakimian, et al., 2001). Thus, under-deviated firms will use more cash than stock in acquisition offers. Previous studies confirm these expectations. Harford et al. (2009) find that over-deviated firms use stock financing for large domestic acquisition deals, and Uysal (2011) shows that over-deviated firms are unlikely to pay for domestic acquisitions with cash. Accordingly, this paper extends the literature by addressing which means of payment over- and under-deviated firms choose when they acquire public or non-public targets.

2.3 Value and performance of deviated firms around public vs. non-public acquisitions

Makadok and Barney (2001) and Capron and Shen (2007) show that information asymmetry around non-public acquisitions may create more wealth for bidders than public targets. Another potentially substantial source of wealth gain in non-public acquisitions is liquidity discount. Generally, non-public firms are less visible and transparent to the bidding community than public firms (Fuller et al., 2002). Non-public targets also do not have sufficient financial resources or good ties with investment banks to enable them to create a competitive bidding process (Koeplin, Sarin & Shapiro, 2000; Conn et al., 2005). Compared with public targets, which are required by takeover codes to create bidding contests, these factors minimise the competition around non-public targets and enhance the barraging power of bidders who can capture the best price when acquiring them (Fuller et al., 2002, Conn et al., 2005). Officer (2007) documents the existence of the liquidity discount effect on non-public acquisitions, finding that bidders acquire non-public targets at an average 15 to 30% discount compared with publicly-held targets.

Accordingly, the previous literature confirms superior gains from acquiring non-public targets relative to acquiring public targets (Fuller et al., 2002; Faccio et al., 2006; Moeller et al., 2004). This raises the question of why not all firms undertake non-public acquisitions. Capron and Shen (2007) document that acquirers who choose public targets because of favourable conditions enjoy superior gains to those from non-public targets. Specifically, according to information economics and strategic factor market theory, over-deviated (under-deviated) firms should avoid (exploit) the information asymmetry of non-public targets. Furthermore, Capron and Shen (2007) argue that bidders must expend considerable financial resources on addressing problems arising from information asymmetry around the value of non-public targets' assets. Thus, it might be argued that under-deviated firms with better access to capital markets are able to raise sufficient financial resources to seek and collect information on valuable non-public targets, while over-deviated firms with high risk of default may avoid the information asymmetry risk of such targets. In brief, this paper extends the literature by exploring whether over- and under-deviated firms make gains when their choice between public and non-public acquisitions fits the view of both information economics and strategic factor market theory. In particular, it examines changes in the value and performance of the two types of firm following public and non-public acquisitions.

3. Methodology

3.1 Sample

The initial sample comprises all completed domestic mergers and acquisitions (M&A) deals, collected from the Thomson One database for the period 1 January 1987 to 31 December 2012.[3] The following inclusion criteria are employed (Uysal, 2011; Harford et al., 2009; Conn et al., 2005). The target could be a public, private or subsidiary firm. The payment method should be cash, stock or a combination of both. Financial firms (SIC 6000–6999) and utilities (SIC 4900–4999) are excluded from the sample, since they are subject to regulatory constraints and different accounting considerations (Ozkan, 2001). A cut-off point of a minimum deal value of one million dollars is employed in order to avoid the results being affected by very small targets (Uysal, 2011). All deals labelled as minority stake purchases, acquisitions of remaining interest, privatisations, leveraged buyouts, spinoffs, recapitalisations, self-tenders or exchange offers and repurchases are excluded (Alexandridis, Fuller, Terhaar, & Travlos, 2013). Accordingly, the final sample comprises 3,416 domestic acquisition deals. For each firm in the sample, all financial data are collected from the Datastream database.

[3] M&A data were available from 1984. However, data coverage on UK M&A deals before 1987 was very limited (Antoniou, Petmezas & Zhao, 2007).

3.2 Estimation of leverage deviation

Following Harford et al. (2009), leverage deviation is measured as the difference between actual market leverage and target leverage. Target leverage is estimated using the entire data available in Datastream from 1980 to 2012. Data are collected using a list of both "live" and "dead" firms in order to avoid survivorship bias. Then, following Kayhan and Titman (2007) this paper runs a pooled tobit analysis of market leverage ratios on lagged values of main determinants of capital structure to estimate the target market leverage. Tobit model is employed, since the dependent variable is truncated between zero and one. Lagged values of all explanatory variables are used to increase the probability that the causality runs from the explanatory factors to market leverage ratios and not vice versa (Harford et al., 2009).The main determinants of capital structure include ROA (return on assets) ratio, firm size, market to book (MTB) ratio, asset tangibility, non-debt tax shield, liquidity ratio, industry and year fixed effects (Ozkan, 2001; Rajan & Zingales, 1995; Dang, 2013).[4] **Appendix B** reports the results of target market leverage estimation model for UK non-financial public firms from 1980 to 2012. It finds, consistent with the prior literature, that ROA, MTB, NDTS and liquidity variables have negative association with target market leverage. In contrast, firm size and liquidity variables have a positive significant relationship with the estimated target leverage.

[4] These variables represent the most common variables used in UK studies (i.e. Ozkan, 2001; Dang, 2013). However, other US studies employ other factors including research and development (R&D) expenses and selling expenses to estimate target leverage. Basically, the coverage of these data in Datastream is very limited. For example, using R&D data lead to a loss of almost 58% of sample observations. Similarly, using selling expense variable reducing the sample by around 20%. In addition, Hovakimian et al. (2001) confirm that MTB variable that used in the paper can capture the same effect of both R&D and selling expense variables. In the robustness section using R&D and selling expenses variables yield consistent results.

According to Harford et al. (2009), leverage deviation is defined as actual market leverage ratio minus target leverage ratio. To estimate target leverage, we used firms listed on the London Stock Exchange from 1980 to 2012. This period represents all data available for UK non-financial public firms from Datastream. We then ran a Tobit regression model of market leverage ratios on lagged values of the main determinants of capital structure to estimate the target market leverage (Kayhan & Titman, 2007). We used a Tobit analysis since the dependent variable is restricted between zero and one. The main determinants of UK market leverage include the return on assets (ROA) ratio, the market-to-book (MTB) ratio, firm size, asset tangibility, non-debt tax shield, liquidity ratio, and industry and year fixed effects (Ozkan, 2001; Drobetz & Wanzenried, 2006; Rajan & Zingales, 1995; Dang, 2013).[5] Appendix C reports the coefficient estimates of a Tobit model of target market leverage.

Next, we used the estimated target market leverage to calculate the leverage deviation variable. We then used this variable to construct an over-deviated firm proxy that takes the value of one if the firm has a positive leverage deviation and zero otherwise.

3.3 Empirical models

The estimated leverage deviation described in the previous section is employed to explore its effect on both the likelihood and type of acquisition. To address this question, acquisitions data collected for the period 1987 to 2012 are combined with data for the same period for all UK quoted firms available from Datastream. Then, a dependent variable is constructed with three different categories: firms that made public acquisitions, firms that undertook non-public acquisitions and firms not engaged in an

[5] We followed UK papers (Ozkan, 2001; Dang, 2013) in identifying the main determinants of UK firms' target leverage. Other US studies (Harford et al., 2009; Kayhan & Titman, 2007) suggest using variables such as R&D expenses and selling expenses to estimate target leverage. However, the coverage of these data in Datastream is low. For example, using R&D data led to a 52% reduction in our sample due to missing data. Similarly, we lost around 20% of our sample when we included the selling expense variable. In addition, Hovakimian et al. (2001) confirm that our MTB variable captures the same effect as both R&D and selling expense variables. In the robustness section we use these variables and obtain the same results.

acquisition. These three categories are considered as alternatives without implicit order. Accordingly, the following multinomial logit model is employed and non-public acquisitions are chosen as a reference group.

$$P\ (an\ acquisition=j) = \Phi\ (\beta_0 + \beta_1\ Leverage\ deviation_{i,t-1} + \sum \beta_i\ Controls_{i,t-1});\ j=1,2,3 \quad (1)$$

This model controls for various factors that affect the likelihood of making an acquisition. Firm size variable is used, since large firms are less prone to default risk than small firms; thus, they have a greater ability to raise finance, at an attractive cost, required to undertake an acquisition deal (Titman & Wessels, 1988; Ferri & Jones, 1979). According to managerial hubris, large firms may undertake many M&A transactions as a result of overconfidence in their ability rather than the economic gains to be made from these deals (Roll, 1986). Harford (1999) argues that better-performing firms are more able to acquire other firms. Thus, ROA is used to control for the effect of past performance. Consistent with Harford et al. (2009), it is essential to control for market leverage in order to ease interpretation and disentangle its effect from the leverage deviation variable. Controlling for market leverage also confirms that leverage deviation is not a proxy for pre-acquisition market leverage but only estimates the deviation effect. The stock return and MTB variables capture the effect of firms' overpricing and growth opportunities, respectively. Arguably, firms' market values increase with potential growth opportunities. Thus, firms with higher stock returns and MTB may be very active in the takeover market in order to reap the benefit of their overvaluation (Uysal, 2011). The Herfindahl index is used to control for industry concentration (Uysal, 2011). Following Schlingemann, Stulz and Walkling (2002), the industry M&A liquidity index captures corporate asset liquidity in each industry. Fama and French's 12-industry classification is also employed to account for industry effect. Finally, the year fixed effect captures macroeconomic changes in the time series.

Next, the following Tobit model is run to examine the effect of leverage deviation on the payment method for public and non-public acquisitions. A Tobit analysis is employed because the dependent variable, being the percentage of cash paid in the M&A offer, is truncated at zero and one (Harford et al., 2009).

$$\%\ of\ cash = \alpha_i + \beta 1\ leverage\ deviation_{\ i,t-1} + \sum \beta i\ controls_{\ i,t-1} + \mathcal{E}_{\ i,t}\ (2)$$

This model also contains a number of control variables that affect the payment method of an acquisition. It includes firm size, since large firms are likely to be less financially distressed and have a higher debt capacity than small firms; thus, they are more inclined to finance their acquisitions with cash (Harford et al., 2009). The stock return and MTB variables account for the effect of firms' overvaluation and growth opportunities. Specifically, acquirers prefer cash financing when they believe that their shares are undervalued, but they use stock financing during periods of abnormal run-up in their stock prices (Malmendier & Tate, 2008; Faccio & Masulis, 2005). Furthermore, greater growth opportunities may entail higher R&D expenditure, which works as an NDTS that minimises the attractiveness of debt financing and increases the likelihood of stock financing. Moreover, targets' willingness to accept stock financing increases when bidders have promising growth opportunities (Faccio & Masulis, 2005). The ROA variable captures firms' performance. According to Uysal (2011), better-performing firms are more likely to make cash acquisitions. The value of an acquisition relative to the acquirer's total assets accounts for the likelihood that bidders will use their own equity to acquire large targets in order to share with them the risk of potential mis-evaluation (Eckbo, 2009). It may also be infeasible to raise cash to finance targets larger than the bidder (Moeller et al., 2004). The market leverage variable is used to ease interpretation and disentangle its effect from the leverage deviation variable. Capturing the effect of market leverage is essential to confirm that leverage deviation is not a proxy for pre-acquisition market leverage but only estimates the deviation effect (Harford et al., 2009). The Herfindahl index, industry liquidity and Fama and French's (1997) 12-industry classification are employed to control for industry concentration, industry M&A liquidity and industry fixed effects respectively (Uysal, 2011). The year fixed effects variable is used to remove time effects. Finally, in order to control for unobserved heterogeneity, random-effects estimation is adopted.[6]

The following firm fixed-effects OLS models are also run to explore the effect of leverage deviation on a firm's value and performance after involvement in public and non-public acquisitions.[7]

$$\Delta\ (Tobin's\ q) = \beta 0 + \beta\ 1\ Leverage\ deviation_{\ i,t-1} + \sum \beta i\ Controls_{\ i,t-1} + \mathcal{E}_{\ i,t} \quad (3)$$

$$\Delta\ (ROA) = \beta 0 + \beta\ 1\ Leverage\ deviation_{\ i,t-1} + \sum \beta i\ Controls_{\ i,t-1} + \mathcal{E}_{\ i,t} \quad (4)$$

The change in Tobin's q variable in Model 3 is measured as Tobin's q one year after minus Tobin's q one year before the effective year of an acquisition. Similarly, the change in ROA variable in Model 4 is measured as ROA one year after minus ROA one year before the effective year of an acquisition.

All the previous models are then re-run after replacing the leverage deviation variable with both over-deviation and under-deviation variables. This is carried out in order to test whether the potential impact of leverage deviation on the previous issues is identical for both over- and under-deviated firms. Over-deviation is a dummy variable that takes a value of one if the firm lies in the highest quintile for leverage deviation, and under-deviation is a dummy variable that takes a value of one if the firm lies in the lowest

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[6] Fixed-effects estimations of coefficients of Tobit analysis are not allowed, since Tobit is a non-linear model and its maximum estimates are biased.

[7] Firm fixed effects control for endogeneity problems resulting from unobserved heterogeneity of a firm-specific and/or time-invariant nature.

quintile for leverage deviation. Before running the previous empirical models, the issue of multicollinearity among explanatory variables must be examined. The mean variance inflation factor (VIF) for each model is reported in the regression tables. The results reveal that the VIF statistic for each explanatory variable is below the traditional benchmark of 10, indicating that multicollinearity does not exist (Gujarati & Porter, 2009). In all the estimations, all continuous variables are winsorised at the 1st and 99th percentiles to avoid the impact of outliers.

all continuous variables in the empirical models are winsorised at the 1st and 99th percentiles to avoid the impact of outliers.

4. Empirical Findings

4.1 Descriptive statistics

Panel A of Table 1 reports descriptive statistics for the dependent variables used in the empirical models. It shows that, over the sample period of 27 years from 1987 to 2012, around 85% of UK public firms decided not to make any acquisitions, 1.2% were involved in public acquisitions and around 13.5% engaged in non-public acquisitions. Approximately 71% of acquisition deals were financed by cash, lending support to Faccio and Masulis' (2005) empirical finding that cash is the primary medium of payment for UK acquisition transactions. The results also show that UK public firms experience on average a 0.251 reduction in the mean value of the change in Tobin's q around an acquisition deal. Furthermore, the mean value of the change in ROA, as a measure of operating performance, declines by 0.014 after engaging in an acquisition.

[Insert Table 1]

Panel B shows descriptive statistics for firm-specific characteristics in the sample, showing a mean value of 0.012 and standard deviation of 0.195 for leverage deviation. The standard deviation around the mean indicates the existence of sub-groups of firms that deviate from their target leverage. Panel B reports that, consistent with Antoniou, Guney and Paudyal (2008), market leverage constitutes on average 21% of UK firms' capital structure mix. This evidence is also in line with the finding of Rajan and Zingales (1995), who apply both book value and market value proxies, that UK firms have lower leverage than US firms. The ROA shows that UK quoted firms generate on average 7.1% profit before tax and interest on their total assets. The MTB, consistent with Guney, Ozkan and Ozkan (2007), indicates that, on average, the market value of UK quoted firms exceeds their book value by 1.8 times. The average firm size of UK non-financial firms equal 10.2, measured as the natural logarithm of sales.

4.2 Does leverage deviation affect an acquisition decision?

This section explores the effect of leverage deviation on both the likelihood and type of acquisition. Table 2 reports the coefficient estimates of the multinomial logit models relative to the baseline group, namely non-public acquisitions.

[Insert Table 2]

As shown in Columns 1 and 2, firms choose between two alternatives: not making an acquisition or making a non-public acquisition. Column 1 shows that leverage deviation increases the likelihood of non-acquisition relative to the reference group. In other words, firms with leverage deviation prefer not to invest in an acquisition transaction. These results are in line with the finding of Uysal (2011) and Opler, Pinkowitz, Stulz, & Williamson (1999) that corporate leverage deviation impedes firms' ability to raise financing from the capital market; thus, they are less likely to make acquisitions. Column 2 explores whether the previous effect of leverage deviation on the likelihood of an acquisition is identical for both over- and under-deviated firms. The results show that over-deviated firms are more likely to undertake no acquisitions than to undertake non-public acquisitions, whilst for under-deviated firms the relationship is not statistically significant. These findings are in line with the intuition that over-deviated firms have less ability to raise financing than under-deviated firms, which in turn constrains them from making acquisitions (Uysal, 2011; Harford et al., 2009).

Columns 3 and 4 show the results of testing the effect of leverage deviation on a firm's choice between public and non-public acquisitions. Column 3 shows that leverage deviation increases the likelihood of making public acquisitions relative to the baseline group. These findings are significant when controlled for firm characteristics, especially bidders' stock return and MTB ratios. This provides clear evidence that the impact of leverage deviation is not driven by either an overpricing effect or the growth opportunities of a firm. However, it confirms that leverage deviation itself is a core determinant of firms' decisions on whether to undertake public acquisitions. Column 4 shows that over-deviated firms have a greater tendency to acquire public targets than the baseline group. It also shows that under-deviated firms are less likely to make public acquisitions than non-public acquisitions. These findings confirm the notion that contrasting characteristics between over- and under-deviated firms affect their behaviour (Hovakimian et al., 2001; Morellec & Zhdanov, 2008). These results also lend support to the premises of both information economics and strategic factor market theories that over-deviated firms may avoid the uncertainty associated with mis-evaluation of non-public targets (Officer et al., 2009; Fuller et al., 2002), while under-deviated firms may prefer non-public targets (Makadok & Barney, 2001; Ang & Kohers, 2001; Moeller et al., 2004).

4.3 Does leverage deviation affect the payment method of an acquisition?

This section investigates the effect of leverage deviation on a firm's choice of source of finance for full acquisitions sample. It then addresses the same effect using two different sub-samples, namely public and non-public acquisitions.

[Insert Table 3]

Table 3 presents the estimates of random effects Tobit analysis of leverage deviation on the percentage of cash financing in domestic, public and non-public acquisitions respectively. It documents that leverage deviation is negatively associated with the proportion of an acquisition deal paid for with cash. Column 1 reports that leverage deviation decreases by 0.957 the percentage of cash in domestic acquisition deals. Column 3 shows a negative association between leverage deviation and cash financing for public targets, but this lacks statistical significance. Column 5 shows that leverage deviation reduces by 0.705 the cash used in non-public bid offers. These results lend support to the view that leverage deviation impedes firms' ability to access debt markets, which in turn dilutes the cash component of acquisition offers (Harford et al., 2009).

In Column 2, no significant relationship is observed between the percentage of cash used in domestic acquisitions and either over- or under-deviated firms. Surprisingly, after dividing the full acquisitions sample between public and non-public, the effect becomes clear. Column 4 reports that the over-deviation variable decreases by 0.624 the proportion of cash paid for public targets. It also shows that there is no significant link between under-deviated firms and their payment method for public acquisitions. These results are in line with the notion of Uysal (2011) that over-deviated firms face constraints on their form and level of financing and are inclined to use less cash in their acquisition bids. Column 6 reveals that there is an insignificant relationship between over-deviation and the extent to which a non-public acquisition is paid for with cash. However, under-deviated firms increase by 0.078 the percentage of cash in non-public acquisition offers. In brief, Table 3 documents that over-deviated firms have a lower propensity to pay cash for public acquisitions, and under-deviated firms have a higher propensity to pay cash for non-public acquisitions.

With regard to the control variables, a significant positive relationship exists between ROA and the percentage of cash paid for domestic targets. Furthermore, Moeller et al. (2004) argue that it is hard to offer cash for a target larger than the acquirer. Similarly, Table 3 shows a significant negative relationship between the relative size variable and the percentage of cash in domestic acquisition bids. It also reveals that larger firms offer higher proportions of cash to acquire domestic targets.

4.4 Does leverage deviation affect a firm's value around an acquisition?

This section gauges changes in Tobin's q around public versus non-public acquisitions by over- and under-deviated firms.

[Insert Table 4]

Table 4 presents the firm fixed effects of leverage deviation on changes in firms' value around an acquisition. Column 1 shows that leverage deviation has a significant negative influence on changes in Tobin's q after involvement in domestic acquisitions. Interestingly, this relationship differs with different types of acquisitions. In particular, Column 3 reports that leverage deviation has a significant positive association with changes in Tobin's q following public acquisitions. However, Column 5 shows that leverage deviation has a significant negative association with changes in Tobin's q after acquiring non-public targets. Collectively, these findings show that leverage deviation has a significant impact on changes in firms' value around an acquisition, and this effect changes adversely according to the type of target, whether public or non-public.

Table 4 explores whether the impact of leverage deviation on acquirers' value is identical for under- and over-deviated firms. Column 2 reports that over-deviated (under-deviated) have a negative (positive) association with changes in Tobin's q subsequent to domestic acquisitions. Surprisingly, this effect differs according to the type of target. Specifically, over-deviated firms experience positive changes in their Tobin's q following public acquisitions, while under-deviated firms face a loss in their Tobin's q after making public acquisitions, as reported in Column 4. Column 6 reveals that over-deviated (under-deviated) firms experience negative (positive) changes in Tobin's q after involvement in non-public acquisitions. Overall, Table 4 documents that public acquisitions are value-creating for over-deviated firms and value-destructive for under-deviated firms, whereas non-public acquisitions are wealth-loss decisions for over-deviated firms and wealth-gain decisions for under-deviated firms. These findings are in line with Capron and Shen's (2007) view that firms experience wealth gains when their choice between public and non-public acquisitions is consistent with theoretical prediction. In particular, consistent with strategic factor market theory, under-deviated firms with less financial risk should seize the superior gains associated with exploiting the information asymmetry of non-public targets (Barney, 1986; Makadok & Barney, 2001; Ang & Kohers, 2001). These results are also robust after controlling for firm fixed effects, confirming that the positive valuation effect of foreign acquisitions does not arise from unobserved firm-specific factors.

With regard to the other control variables, Table 4 shows that the MTB variable has a negative association with changes in Tobin's q subsequent to domestic, public and non-public acquisitions. This finding is consistent with Fu et al.'s (2013) view that acquisitions driven by overvaluation effects are value-destructive. Table 4 also documents that industry liquidity and capital expenditure face negative changes in

Tobin's q after involvement in domestic acquisitions, and that firms with higher stock returns acquire wealth gains from domestic targets. Finally, domestic and non-public acquisitions are value-added deals for firms with higher market leverage.

4.5 *Does leverage deviation affect a firm's performance around an acquisition*?

This section studies the effect of acquisitions on the ROA of deviated firms. In particular, it examines changes in the operating performance of over- and under-deviated firms following public and non-public acquisitions.

[Insert Table 5]

Table 5 presents the coefficient estimates of the firm fixed effects of leverage deviation on changes in ROA around domestic, public and non-public acquisitions, respectively. Column 1 reports that leverage deviation has a significant negative influence on changes in ROA following domestic acquisitions. Column 3 shows that leverage deviation has a positive association with changes in ROA after public acquisitions, but this lacks significance. Column 5 reveals that leverage deviation has a negative relationship with changes in ROA following non-public acquisitions.

Table 5 also examines changes in the ROA of over- and under-deviated acquirers. Column 2 reports that over-deviated firms experience negative changes in ROA after making domestic acquisitions. No significant link is observed between under-deviation and ROA following domestic acquisitions. However, after splitting the full domestic acquisition sample between public and non-public targets, the effect of under-deviation on operating performance becomes apparent. Column 4 shows that under-deviated firms have a negative association with changes in ROA following public acquisition. Column 6 shows that over-deviated (under-deviated) firms face negative (positive) changes in ROA following involvement in non-public acquisitions. In brief, Column 6 documents that under-deviated firms outperform over-deviated firms after acquiring non-public targets. These findings also suggest that the negative (positive) valuation effects of non-public acquisitions on over-deviated (under-deviated) firms, as reported in the previous section, may be attributable to changes in operating performance following such acquisitions.

5. Robustness

5.1 Multinomial logit for M&A payment method

Another way to examine the financing decisions of over- and under-deviated firms when they acquire public versus non-public targets is to run a multinomial logit model. The dependent variable in this model has three categories: pure cash, pure stock and mixed payment method. Pure cash and pure stock take a value of one if the entire deal is financed by cash/stock and zero otherwise. The mixed payment method takes a value of one if the deal is financed by both cash and stock and zero otherwise.

In Appendix C, pure stock is used as a reference group. Columns 1 and 5 document that under-deviated firms are more inclined to finance entire domestic and non-public acquisition transactions only by cash. Column 3 shows that over-deviated firms are more likely to finance their public acquisition deals by stock alone. In brief, Appendix C confirms the results of Section 4.3 that not only does leverage deviation affect financing decisions for acquisitions, but also the position of this deviation, whether over or under target, determines the means of payment for such acquisitions.

5.2 Shareholders' wealth around the announcement of public versus non-public acquisitions

The efficient market hypothesis states that stock investors respond accurately and in a timely manner to news releases such as announcements of acquisitions (Fama, 1991). Thus, another way to examine the effect of public versus non-public acquisitions on deviated firms' value is to explore how the market perceives the quality of such deals. In order to do this, an event study is run, as shown in Appendix D, using cumulative abnormal returns (CAR) estimated by a market adjusted model one day before and one day after (three-day event window) the announcement date of an acquisition. Aw and Chatterjee (2004) advocate that it is essential to include days before the event in order to take into account any leakages of information into the market. Similarly, including days after the event is recommended to capture any delays or frictions in the price adjustment process due to the time needed for the market to fully understand the impact of the deal. Arnold and Parker (2007) confirm that using a three-day event window minimises the likelihood of encompassing abnormal returns arising from events unrelated to the acquisition itself.

Appendix D shows that leverage deviation and over-deviation have no significant effect on market reactions around the announcement of either public or non-public acquisitions. It also reveals that under-deviated firms experience positive stock returns when acquiring non-public targets. These results confirm that non-public acquisitions are valuable investments for under-deviated firms.

5.3 New proxy for under-deviated firms

Conceptually, under-deviation from target leverage can be defined as any firm that has a leverage level below target. Using this definition, a new proxy is created for under-deviated firms, and all models reported in Section 4 are retested. Specifically, Columns 1 and 2 of Appendix E show under-deviated firms' choices between public and non-public acquisitions using a sample of firms involved only in domestic acquisitions.[8] Columns 3 to 5 of Appendix E explore the financing decisions and economic

[8] The relationship between the new proxy for under-deviation and the likelihood of making public acquisitions was also retested using all 23,165 observations of all listed firms in Datastream from 1987 to 2012, and similar results were obtained.

consequences of public acquisitions when carried out by under-deviated firms. Columns 6 to 8 of Appendix E investigate the financing decisions and economic consequences of non-public acquisitions. Appendix E reveals that under-deviated firms are less likely to make public acquisitions than over-deviated firms. It also shows that under-deviated firms offer more cash than equity for non-public targets, and that these deals enhance their value and performance. Overall, these results support the previous empirical findings.

5.4 New estimation of target leverage

Previous studies have estimated target leverage using other variables, including R&D and selling expenses. In particular, Harford et al. (2009) employ R&D over sales ratio to account for firms' growth opportunities. They also control for product uniqueness using a variable of selling expenses over sales. Uysal (2011) creates a dummy variable that takes a value of one for any missing observations of the R&D variable and zero otherwise. This paper adds the same variables to the model described in Section 3.2 to estimate a new target leverage, which is used to estimate leverage deviation, over-deviation and under-deviation variables. Appendix F shows the results of running a multinomial-logit model using non-public acquisitions as a reference group. Similarly to the previous results, the results reveal that leverage deviation affects the likelihood and type of an acquisition, and that over-deviated (under-deviated) firms are more inclined to undertake public (non-public) acquisitions.

6. Conclusion

This paper combines the contributions of information economics and strategic factor market theory to extend the literature on the link between leverage deviation and takeover activity. Previous work by Uysal (2011) investigates how deviations from target leverage affect the likelihood of making a domestic acquisition. This paper goes further to explore the effect of leverage deviation on a firm's choice between public and non-public acquisitions. Arguably, information economics and strategic factor market theory view information asymmetry around an acquisition as a double-edged sword for both over- and under-deviated firms. In particular, while over-deviated firms should avoid the uncertainty risk arising from the information asymmetry of non-public targets, under-deviated firms should capture wealth gain opportunities associated with exploiting the information asymmetry of such acquisitions. Lending support to these views, the results of this paper reveal that over-deviated firms tend to undertake public acquisitions, while under-deviated firms tend to undertake non-public acquisitions.

This paper also examines the association between capital structure and the payment method for acquisitions. Specifically, it examines the effect of leverage deviation on the percentage of cash financing in M&A bids. This provides interesting evidence that UK firms take into account their target leverage when they decide on a form of financing for public and non-public targets. It also shows that there is a significant difference in financing decisions between over- and under-deviated firms. This paper is thought to be one of the first to find a significant link between under-deviated firms and cash payment for a non-public target.

This paper also explores the economic gains and operating synergies of public versus non-public acquisitions when carried out by over- and under-deviated firms. It finds that these firms experience value gains when their choice of acquisition type matches the expectations of both information economics and strategic factor market theories. It also shows that under-deviated firms out-perform over-deviated firms subsequent to involvement in non-public acquisitions. In summary, the findings described in this paper imply that the position of deviation from target leverage has essential implications for firms' acquisition policies. The paper finds that leverage deviation affects the type, form of payment for, value and performance of the chosen acquisition. In practice, this paper sheds light on the importance of improving disclosure requirements for non-public firms in a similar way to their public counterparts.

This paper finds that leverage deviation significantly affects the likelihood, payment method and economic consequences of both public and non-public acquisitions. In particular, firms with leverage deviation are less likely to acquire and less likely to use cash financing for non-public targets. These firms also experience lower value and performance subsequent to such acquisitions. In addition, this paper documents that this effect of leverage deviation on public versus non-public acquisitions varies for differently deviated groups. Specifically, it shows that over-deviated firms prefer public acquisitions, whereas under-deviated firms prefer non-public acquisitions. Over-deviated firms use less cash in financing their public acquisitions, while under-deviated firms offer more cash for their non-public targets. Interestingly, in terms of economic consequences, these firms have contradictory valuation effects for public and non-public targets. Public acquisitions result in value gains (losses) for over-deviated (under-deviated) firms, however, non-public acquisitions are value-destructive (creation) for over-deviated (under-deviated) firms. Furthermore, non-public acquisitions impair the operating performance of over-deviated firms and enhance that of under-deviated firms. Overall, these findings confirm that the effect of leverage deviation on public versus non-public acquisitions derives mainly from the effect of over-deviated firms.

References

Alexandridis, G., Fuller, K. P., Terhaar, L., & Travlos, N. G. (2013). Deal size, acquisition premia and shareholder gains. *Journal of Corporate Finance*, 20, 1-13.

Ang, J., & Kohers, N. (2001). The take-over market for privately held companies: the US experience. *Cambridge Journal of Economics*, *25*(6), 723-748.

Antoniou, A., Guney, Y., & Paudyal, K. (2008). The determinants of capital structure: capital market-oriented vs. bank-oriented institutions. *Journal of Financial and Quantitative Analysis*, *43*(01), 59-92.

Antoniou, A., Petmezas, D., & Zhao, H. (2007). Bidder gains and losses of firms involved in many acquisitions. *Journal of Business Finance & Accounting*, *34*(7-8), 1221-1244.

Arnold, M., & Parker, D. (2007). UK competition policy and shareholder value: The impact of merger inquiries. *British Journal of Management*, *18*(1), 27-43.

Aw, M. S. B., & Chatterjee, R. A. (2004). The performance of UK firms acquiring large cross-border and domestic takeover targets. *Applied Financial Economics, 14*(5), 337-349.

Barney, J. B. (1986). Strategic factor markets: Expectations, luck, and business strategy. *Management Science*, *32*(10), 1231-1241.

Bharadwaj, A., & Shivdasani, A. (2003). Valuation effects of bank financing in acquisitions. *Journal of Financial Economics, 67*(1), 113-148.

Bradley, M., Jarrell, G. A., & Kim, E. (1984). On the existence of an optimal capital structure: Theory and evidence. *The Journal of finance*, 39(3), 857-878.

Brounen, D., De Jong, A., & Koedijk, K. (2006). Capital structure policies in Europe: Survey evidence. *Journal of Banking & Finance, 30*(5), 1409-1442.

Capron, L., & Shen, J. C. (2007). Acquisitions of private vs. public firms: Private information, target selection, and acquirer returns. *Strategic Management Journal*, *28*(9), 891-911.

Conn, R. L., Cosh, A., Guest, P. M., & Hughes, A. (2005). The impact on UK acquirers of domestic, cross-border, public and private acquisitions. *Journal of Business Finance & Accounting, 32(5-6),* 815-870.

Dang, V. A. (2013). Testing capital structure theories using error correction models: evidence from the UK, France and Germany. *Applied Economics*, *45*(2), 171-190.

Dang, V. A., Kim, M., & Shin, Y. (2012). Asymmetric capital structure adjustments: New evidence from dynamic panel threshold models. *Journal of Empirical Finance*, *19*(4), 465-482.

Duchin, R. (2010). Cash holdings and corporate diversification. *The Journal of Finance, 65*(3), 955-992.

Eckbo, B. E. (2009). Bidding strategies and takeover premiums: A review. *Journal of Corporate Finance*, *15*(1), 149-178.

Faccio, M., & Masulis, R. W. (2005). The choice of payment method in European mergers and acquisitions. *The Journal of Finance, 60*(3), 1345-1388.

Faccio, M., McConnell, J. J., & Stolin, D. (2006). Returns to acquirers of listed and unlisted targets. *Journal of Financial and Quantitative Analysis*,*41*(01), 197-220.

Fama, E. F. (1991). Efficient capital markets: II. *The Journal of Finance*, *46*(5), 1575-1617.

Ferri, M. G., & Jones, W. H. (1979). Determinants of financial structure: A new methodological approach. *The Journal of Finance*, *34*(3), 631-644.

Frankel, J., & Saravelos, G. (2012). Can leading indicators assess country vulnerability? Evidence from the 2008–09 global financial crisis. *Journal of International Economics*, *87*(2), 216-231.

Fuller, K., Netter, J., & Stegemoller, M. (2002). What do returns to acquiring firms tell us? Evidence from firms that make many acquisitions. *The Journal of Finance*, *57*(4), 1763-1793.

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: evidence from the field. *Journal of Financial Economics, 60*(2), 187-243.

Grave, K., Vardiabasis, D., & Yavas, B. (2012). The global financial crisis and M&A. *International Journal of Business and Management*, *7*(11), 56-66.

Gujarati, D. and Porter, D. (2009) *Basic Econometrics*, (5th ed.), New York, McGraw-Hill.

Guney, Y., Ozkan, A., & Ozkan, N. (2007). International evidence on the non-linear impact of leverage on corporate cash holdings. *Journal of Multinational Financial Management*, *17*(1), 45-60.

Harford, J., Humphery-Jenner, M., & Powell, R. (2012). The sources of value destruction in acquisitions by entrenched managers. *Journal of Financial Economics*, *106*(2), 247-261.

Harford, J., Klasa, S., & Walcott, N. (2009). Do firms have leverage targets? Evidence from acquisitions. *Journal of Financial Economics, 93*(1), 1-14.

Hovakimian, A., Opler, T., & Titman, S. (2001). The debt-equity choice. *Journal of Financial and Quantitative Analysis, 36*(01), 1-24.

Kayhan, A., & Titman, S. (2007). Firms' histories and their capital structures. *Journal of Financial Economics*, *83*(1), 1-32.

Koeplin, J., Sarin, A., & Shapiro, A. C. (2000). The private company discount. *Journal of Applied Corporate Finance*, *12*(4), 94-101.

Leary, M. T., & Roberts, M. R. (2005). Do firms rebalance their capital structures?. *The Journal of Finance*, *60*(6), 2575-2619.

Makadok, R., & Barney, J. B. (2001). Strategic factor market intelligence: An application of information economics to strategy formulation and competitor intelligence. *Management Science*, *47*(12), 1621-1638.

Malmendier, U., & Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics, 89*(1), 20-43.

Miller, M. H. (1977). Debt and taxes. *The Journal of Finance, 32*(2), 261-275.

Moeller, S. B., Schlingemann, F. P., & Stulz, R. M. (2004). Firm size and the gains from acquisitions. *Journal of Financial Economics, 73*(2), 201-228.

Morellec, E., & Zhdanov, A. (2008). Financing and takeovers. *Journal of Financial Economics*, *87*(3), 556-581.

Officer, M. S. (2007). The price of corporate liquidity: Acquisition discounts for unlisted targets. *Journal of Financial Economics, 83(3),* 571-598.

Officer, M. S., Poulsen, A. B., & Stegemoller, M. (2009). Target-firm information asymmetry and acquirer returns. *Review of Finance, 13*(3), 467-493.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics, 52(1),* 3-46.

Ozkan, A. (2001). Determinants of capital structure and adjustment to long run target: evidence from UK company panel data. *Journal of Business Finance & Accounting, 28*(1-2), 175-198.

Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *The Journal of Finance, 50*(5), 1421-1460.

Reuer, J. J., & Ragozzino, R. (2008). Adverse selection and M&A design: The roles of alliances and IPOs. *Journal of Economic Behavior & Organization*, *66*(2), 195-212.

Schlingemann, F. P., Stulz, R. M., & Walkling, R. A. (2002). Divestitures and the liquidity of the market for corporate assets. *Journal of Financial Economics, 64*(1), 117-144.

Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *The Journal of Finance, 43*(1), 1-19.

Uysal, V. B. (2011). Deviation from the target capital structure and acquisition choices. *Journal of Financial Economics*, *102*(3), 602-620.

Tables

Table 1: Descriptive statistics of the sample

Panel A: Summary statistics of main dependent variables used in subsequent tables.

	Obs.	Mean	Median	Std. Dev	Min.	Max.
No-acquisitions	23,165	0.853	1.000	0.351	0.000	1.000
Public acquisition	23,165	0.012	0.000	0.110	0.000	1.000
Non-public acquisition	23,165	0.135	0.000	0.338	0.000	1.000
% of cash	3,416	0.705	0.963	0.374	0.000	1.000
ΔTobin's q	3,153	-0.251	-0.064	1.165	-6.369	2.870
ΔROA	3,177	-0.014	-0.008	0.156	-0.677	0.687

Panel B: Summary statistics of full sample

	Obs.	Mean	Median	Std. Dev	Min.	Max.
Leverage deviation	23,165	0.012	-0.034	0.195	-0.295	0.629
Over-deviation	23,165	0.200	0.000	0.400	0.000	1.000
Under-deviation	23,165	0.200	0.000	0.400	0.000	1.000
Firm size	23,165	10.200	10.184	2.181	4.034	15.307
ROA	23,165	0.071	0.117	0.234	-1.342	0.420
MTB	23,165	1.811	1.299	1.928	0.392	16.364
Market leverage	23,165	0.217	0.157	0.216	0.000	0.904
Stock return	23,165	0.073	0.000	0.564	-0.865	2.660
Herfindahl index	23,165	0.440	0.373	0.273	0.055	1.000
Industry liquidity	23,165	0.063	0.007	0.187	0.000	1.425

This table gives descriptive statistics of the sample as follows. Panel A reports summary statistics of the main dependent variables used in the paper. Panel B reports summary statistics for all UK public firms, involving 288 public acquisitions and 3,128 non-public acquisitions from 1987 to 2012. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level.

Table 2: Impact of leverage deviation on an acquisition decision

	No-acquisitions vs. non-public acquisitions		Public acquisitions vs. non-public acquisitions	
	(1)	(2)	(3)	(4)
Leverage deviation	1.410***		2.497***	
	(3.44)		(3.48)	
Over-deviation		0.443***		0.530**
		(3.87)		(2.14)
Under-deviation		0.063		-0.415**
		(0.66)		(-2.20)
Firm size	-0.111***	-0.126***	0.151***	0.131***
	(-4.67)	(-5.68)	(3.78)	(3.28)
ROA	-0.600***	-0.509***	-0.542	-0.486
	(-3.19)	(-2.75)	(-1.54)	(-1.40)
MTB	-0.036*	-0.027	-0.025	-0.012
	(-1.81)	(-1.32)	(-0.69)	(-0.35)
Market leverage	0.565	1.279***	-1.875**	-0.893
	(1.38)	(4.54)	(-2.42)	(-1.47)
Stock return	-0.313***	-0.323***	-0.130	-0.138
	(-6.80)	(-7.03)	(-1.17)	(-1.25)
Herfindahl index	0.602***	0.597***	0.190	0.186
	(3.55)	(3.52)	(0.61)	(0.60)
Industry liquidity	-0.677***	-0.667***	0.177	0.187
	(-5.43)	(-5.34)	(0.78)	(0.82)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	23,165	23,165	23,165	23,165
Pseudo R^2	0.091	0.091	0.091	0.091

This table reports the coefficient estimates of multinomial logit analysis. The dependent variable has three categories: no-acquisitions, public acquisitions and non-public acquisitions. The dependent variable takes a value of one if the firm does not make an acquisition, a value of two if the firm makes a public acquisition and a value of three if the firm makes a non-public acquisition. Columns 1 and 2 report the coefficient estimates for non-acquiring firms relative to the baseline group of non-public acquisitions. Columns 3 and 4 report the coefficient estimates for public acquisitions relative to the baseline group. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by firm. The estimates in the models are statistically significant at the 1(*)10%, (**)5%, and (***)1% levels.

Table 3: Impact of leverage deviation on payment method for public and non-public acquisitions

	Full domestic acquisitions		Public acquisitions		Non-public acquisitions	
	% of cash	% of cash	% of cash	% of cash	% of cash	% of cash
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage deviation	-0.957***		-1.723		-0.705***	
	(-3.84)		(-1.28)		(-2.89)	
Over-deviation		-0.038		-0.624**		0.007
		(-0.74)		(-2.09)		(0.13)
Under-deviation		0.070		-0.197		0.078*
		(1.60)		(-0.74)		(1.85)
Firm size	0.033***	0.047***	0.068	0.078	0.066***	0.078***
	(2.60)	(3.93)	(1.20)	(1.48)	(5.01)	(6.19)
ROA	0.538***	0.479***	2.072***	1.719**	0.489***	0.449***
	(4.86)	(4.37)	(2.71)	(2.26)	(4.55)	(4.22)
MTB	0.007	-0.007	0.033	0.041	-0.003	-0.013
	(0.53)	(-0.58)	(0.50)	(0.67)	(-0.28)	(-1.13)
Market leverage	0.585**	-0.082	0.768	0.310	0.449*	-0.076
	(2.40)	(-0.50)	(0.59)	(0.35)	(1.88)	(-0.46)
Relative size	-0.132***	-0.131***	-0.275***	-0.288***	-0.076***	-0.075***
	(-11.37)	(-11.27)	(-3.79)	(-3.96)	(-6.31)	(-6.17)
Stock return	0.013	0.017	0.002	0.006	0.012	0.014
	(0.50)	(0.68)	(0.01)	(0.03)	(0.50)	(0.59)
Herfindahl index	-0.074	-0.069	0.205	0.109	-0.101	-0.098
	(-1.07)	(-0.99)	(0.52)	(0.28)	(-1.48)	(-1.45)
Industry liquidity	-0.244***	-0.250***	-0.540	-0.482	-0.119	-0.121
	(-2.82)	(-2.88)	(-1.38)	(-1.24)	(-1.34)	(-1.36)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Random effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,416	3,416	288	288	3,128	3,128

This table reports the coefficient estimates of random-effects Tobit analysis. The dependent variable is percentage of cash paid in acquisition deals. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by firm. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.

Table 4: Impact of leverage deviation on a firm's value around an acquisition

	Full domestic acquisitions		Public acquisitions		Non-public acquisitions	
	ΔTobin's q	ΔTobin's q	ΔTobin's q	ΔTobin's q	ΔTobin's q	ΔTobin's q
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage deviation	-2.312**		2.881***		-2.670**	
	(-2.39)		(3.31)		(-2.32)	
Over-deviation		-0.300**		0.516**		-0.306**
		(-2.44)		(2.13)		(-2.31)
Under-deviation		0.147*		-0.647***		0.162*
		(1.65)		(-3.65)		(1.74)
Firm size	-0.097	-0.080	-0.076	-0.075	-0.113	-0.089
	(-1.16)	(-1.04)	(-0.56)	(-0.57)	(-1.24)	(-1.08)
ROA	0.746	0.596	-0.952	-1.866	1.032*	0.875*
	(1.44)	(1.18)	(-1.03)	(-1.59)	(1.87)	(1.67)
Liquidity	0.005	0.004	0.369***	0.406***	-0.059	-0.066
	(0.07)	(0.05)	(3.04)	(4.14)	(-0.83)	(-0.88)
Asset tangibility	-0.489	-0.377	1.816*	0.954	-0.533	-0.324
	(-1.21)	(-1.03)	(1.72)	(0.83)	(-1.30)	(-0.91)
MTB	-0.212***	-0.220***	-0.362***	-0.353***	-0.187***	-0.199***
	(-3.20)	(-3.24)	(-16.29)	(-15.72)	(-2.61)	(-2.68)
Market leverage	2.852***	1.544***	-1.858**	-1.160**	3.347***	1.740***
	(2.79)	(3.05)	(-2.43)	(-1.97)	(2.70)	(2.98)
Relative size	0.003	0.004	-0.138**	-0.113	-0.005	-0.002
	(0.23)	(0.29)	(-2.45)	(-1.64)	(-0.27)	(-0.09)
Stock return	0.586***	0.593***	-0.127	0.058	0.578***	0.592***
	(6.83)	(6.73)	(-0.77)	(0.42)	(6.55)	(6.52)
Herfindahl index	0.176	0.149	-0.460	-0.619*	0.202	0.191
	(0.85)	(0.75)	(-1.39)	(-1.97)	(0.94)	(0.92)
Industry liquidity	-0.660***	-0.691***	-0.608	-0.586	-0.652***	-0.692***
	(-2.87)	(-2.92)	(-1.54)	(-1.42)	(-2.61)	(-2.70)
RD expenses/sales	5.560	2.411	3.009***	2.801***	5.325	5.021
	(1.34)	(1.08)	(3.24)	(2.83)	(1.04)	(0.98)
Capital expenditure	-2.132*	-2.152*	1.035	3.546	-2.039*	-2.064*
/sales	(-1.86)	(-1.89)	(0.54)	(1.55)	(-1.66)	(-1.71)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,153	3,153	266	266	2,887	2,887
R-square	0.358	0.350	0.949	0.962	0.347	0.339

This table reports the coefficient estimates of firm fixed-effects OLS analyses. The dependent variable is Δ Tobin's q. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by firm. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.

Table 5: Impact of leverage deviation on a firm's operating performance around an acquisition

	Full domestic acquisitions		Public acquisitions		Non-public acquisitions	
	ΔROA	ΔROA	ΔROA	ΔROA	ΔROA	ΔROA
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage deviation	-0.470**		0.224		-0.692***	
	(-2.37)		(0.96)		(-3.22)	
Over-deviation		-0.038*		0.024		-0.043*
		(-1.73)		(0.51)		(-1.68)
Under-deviation		0.023		-0.145***		0.040**
		(0.91)		(-2.85)		(2.01)
Firm size	-0.080***	-0.077***	-0.056**	-0.057***	-0.070***	-0.064***
	(-6.02)	(-5.73)	(-2.52)	(-3.07)	(-5.63)	(-5.36)
Liquidity	-0.031	-0.031	-0.057**	-0.063**	-0.019	-0.019
	(-1.44)	(-1.45)	(-2.24)	(-2.57)	(-1.28)	(-1.23)
Asset tangibility	0.024	0.059	0.012	0.108	-0.091	-0.030
	(0.18)	(0.47)	(0.05)	(0.62)	(-1.17)	(-0.36)
MTB	0.011	0.006	-0.044***	-0.043***	0.019	0.012
	(0.74)	(0.45)	(-2.90)	(-3.49)	(1.18)	(0.77)
Market leverage	0.576***	0.258***	-0.127	-0.042	0.829***	0.339***
	(2.88)	(2.91)	(-0.65)	(-0.31)	(3.72)	(3.58)
Relative size	0.006*	0.007*	-0.024**	-0.024**	0.009**	0.010**
	(1.73)	(1.73)	(-2.29)	(-2.50)	(1.99)	(2.13)
Stock return	0.025*	0.027**	0.007	0.030*	0.023*	0.028**
	(1.92)	(2.06)	(0.21)	(1.71)	(1.71)	(1.99)
Herfindahl index	-0.005	-0.009	0.013	-0.003	-0.018	-0.020
	(-0.15)	(-0.25)	(0.16)	(-0.05)	(-0.56)	(-0.60)
Industry liquidity	0.005	-0.000	0.065	0.117*	0.008	0.002
	(0.12)	(-0.01)	(0.70)	(1.68)	(0.19)	(0.06)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,177	3,177	267	267	2,910	2,910
R-square	0.129	0.117	0.710	0.777	0.145	0.119

This table reports the coefficient estimates of firm fixed-effects OLS analyses. The dependent variable is Δ ROA. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by firm. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.

Appendices

Appendix A: Definitions of variables

Variable	Definition
Acquisition dummy	Takes a value of one if the firm makes an acquisition and zero otherwise.
Asset tangibility	Net property, plant and equipment divided by total assets.
Δ ROA	ROA one year after an acquisition minus ROA one year before the effective year of an acquisition.
Δ Tobin's q	Tobin's q one year after an acquisition minus Tobin's q one year before the effective year of an acquisition. Tobin's q equals (market value of equity + book value of liabilities) / (book value of equity + book value of liabilities).
Capital expenditure/sales	The ratio of capital expenditure to net sales.
CAR	Cumulative abnormal returns estimated over a 3-day event window (one day before and one day after the announcement date) estimated by the market adjusted model. The benchmark return is the UK FTSE all shares index on date t.
Cash flow/TA	Funds from operations divided by total assets.
Competed dummy	Takes a value of one if there is more than one bidder and zero otherwise.
During financial crisis	Takes a value of one for years 2008 and 2009 and zero otherwise.
Firm size	The natural logarithm of sales in 1980 pounds sterling.
Herfindahl index	The sum of the square of sales of a firm divided by the sum of sales of all firms sharing the same three-digit SIC.
Hostile dummy	Takes a value of one if the deal is a hostile acquisition and zero otherwise.
Industry M&A liquidity	Total acquisition value for each year and three-digit SIC code, scaled by total assets of all US firms that share the same year and three-digit SIC.
Leverage deviation	Actual market leverage ratio minus target leverage ratio.
Leverage deviation × public acquisitions	An interaction term between firm leverage deviation and public acquisitions.
Liquidity	Current assets over current liabilities.
Market leverage	Total debt divided by the sum of total debt plus market-value equity.
Mixed payment	Takes a value of one if the acquisition transaction is paid with both cash and stock and zero otherwise.
MTB	Market value over book value of total assets.
No-acquisitions	Takes a value of one if the firm does not make an acquisition and zero otherwise.
Non-debt tax shields	Annual depreciation expenses over total assets.

Non-public acquisition	Takes a value of one if the firm makes a non-public acquisition and zero if it makes a public acquisition.
Over-deviation	Takes a value of one if the firm falls in the highest quintile for leverage deviation.
Over-deviation × public acquisitions	An interaction term between over-deviated firm and public acquisitions.
% of cash	Percentage of cash financing in an M&A transaction.
Public acquisition	Takes a value of one if the firm makes a public acquisition and zero if it makes a non-public acquisition.
Pure cash	Takes a value of one if the whole acquisition transaction is paid with cash only and zero otherwise.
Pure stock	Takes a value of one if the whole acquisition transaction is paid with stock only and zero otherwise.
Relative size	Natural logarithm of the ratio of deal value to the acquirers' total assets prior to the announcement date.
R&D expenses/sales	The ratio of research and development expenses over net sales.
ROA	Earnings before interest, taxes and depreciation divided by total assets.
Stock return	Compounded total stock returns one year prior to a firm's fiscal year end.
Sum public acquisition/TA	Ratio of the sum of public acquisition value to the firm's total assets.
Under-deviation	Takes a value of one if the firm falls in the lowest quintile for leverage deviation.
Under-deviated firms	Takes a value of one if the firm has a negative leverage deviation and zero if it has a positive leverage deviation.
Under-deviation × public acquisitions	An interaction term between under-deviated firm and public acquisitions.

Appendix B: Target market leverage estimation model

	Market leverage
ROA	-0.176***
	(-16.48)
MTB	-0.027***
	(-21.38)
Firm size	0.016***
	(9.30)
Asset tangibility	0.155***
	(9.14)
Non-debt tax shield	-0.473***
	(-4.36)
Liquidity	-0.035***
	(-18.24)
Industry FE	Yes
Year FE	Yes
Observations	29,226
Pseudo R^2	1.586

This table shows the coefficient estimates of a Tobit model used to predict target market leverage using UK data from 1980 to 2012. The value of predicted leverage is restricted between 0 and 1. The dependent variable market leverage equals total debt/(total debt plus market value of equity). Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by firms. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.

Appendix C: Multinomial logit of leverage deviation on payment method for public and non-public acquisitions

	Full domestic acquisitions		Public acquisitions		Non-public acquisitions	
	Pure cash vs. pure stock (1)	Mixed payment vs. pure stock (2)	Pure cash vs. pure stock (3)	Mixed payment vs. pure stock (4)	Pure cash vs. pure stock (5)	Mixed payment vs. pure stock (6)
Over-deviation	-0.299	-0.276	-1.172*	-0.925	0.080	0.117
	(-1.21)	(-1.22)	(-1.78)	(-1.44)	(0.26)	(0.40)
Under-deviation	0.549**	0.179	-0.570	0.343	0.654**	0.200
	(2.36)	(0.83)	(-0.84)	(0.60)	(2.24)	(0.74)
Firm size	0.050	-0.026	0.178	0.300***	0.295***	0.216***
	(0.82)	(-0.46)	(1.46)	(2.91)	(3.56)	(2.86)
ROA	2.172***	1.053**	4.301	4.090**	2.271***	1.162**
	(3.79)	(2.35)	(1.64)	(2.56)	(3.38)	(2.07)
MTB	0.004	-0.017	0.087	-0.025	-0.030	-0.049
	(0.12)	(-0.62)	(1.30)	(-0.32)	(-0.67)	(-1.21)
Market leverage	0.536	-0.222	-0.580	2.935	0.003	-1.056
	(0.75)	(-0.34)	(-0.28)	(1.56)	(0.00)	(-1.33)
Relative size	-0.581***	-0.309***	-0.707***	0.188	-0.266***	-0.007
	(-7.86)	(-4.63)	(-3.77)	(1.16)	(-2.71)	(-0.08)
Stock return	0.009	0.036	0.048	0.108	-0.088	-0.069
	(0.06)	(0.29)	(0.14)	(0.24)	(-0.50)	(-0.44)
Herfindahl index	-0.638	-0.584*	0.448	0.905	-0.876*	-0.787*
	(-1.62)	(-1.66)	(0.47)	(1.16)	(-1.83)	(-1.86)
Industry	-0.974**	-0.254	-1.879	-1.425**	-0.554	0.126
liquidity	(-2.14)	(-0.69)	(-1.57)	(-1.99)	(-0.90)	(0.24)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,416	3,416	288	288	3,128	3,128

Pseudo R^2	0.120	0.120	0.285	0.285	0.116	0.116

This table reports the coefficient estimates of multinomial logit analysis. The dependent variable has three categories: pure cash, pure stock and mixed payment method. The dependent variable takes a value of one if the whole acquisition transaction is paid for in cash (pure cash), a value of two if the whole acquisition transaction is paid for in stock (pure stock) and a value of three if the acquisition transaction is paid for in both cash and stock (mixed payment). Columns 1, 2 and 3 report the coefficient estimates for pure cash relative to the baseline group of pure stock. Columns 4, 5 and 6 report the coefficient estimates for mixed payment methods relative to the baseline group. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by acquiring firms. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.

Appendix D: Impact of leverage deviation on market reaction to announcement of a public versus a non-public acquisition

	CAR (1)	CAR (2)
Leverage deviation	0.008	
	(0.15)	
Leverage deviation× non-public acquisitions	0.018	
	(0.49)	
Over-deviation		-0.001
		(-0.10)
Under-deviation		-0.016
		(-1.27)
Over-deviation × non-public acquisitions		0.009
		(0.69)
Under-deviation × non-public acquisitions		0.021*
		(1.66)
Firm size	0.000	0.000
	(0.01)	(0.09)
ROA	0.012	0.013
	(0.60)	(0.66)
MTB	-0.001	-0.001
	(-0.61)	(-0.55)
Market leverage	-0.006	0.009
	(-0.15)	(0.36)
Relative size	0.005***	0.005***
	(4.00)	(4.07)
Stock return	0.000	0.000
	(0.09)	(0.08)
Herfindahl index	0.008	0.007
	(0.94)	(0.85)
Industry liquidity	0.005	0.005
	(0.51)	(0.51)
Competed dummy	-0.022	-0.019
	(-1.17)	(-1.09)
Hostile dummy	-0.051**	-0.051**
	(-2.44)	(-2.42)
Pure cash	0.001	0.001
	(0.58)	(0.44)
Pure stock	-0.001	-0.001
	(-0.13)	(-0.13)
Non_public acquisitions	0.028***	0.022***
	(4.66)	(3.63)
Year FE	Yes	Yes

Firm FE	Yes	Yes
Observations	3,414	3,414
R-square	0.040	0.042

This table reports the coefficient estimates of fixed-effects OLS analyses. The dependent variable is the CAR (cumulative abnormal return) estimated over a three-day event window (from one day before to one day after the announcement date). The benchmark return is the FTSE all shares index of UK quoted firms. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by firm. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.

Appendix E: New under-deviated proxy

	Public dummy	Sum public acquisitions/TA	Public acquisitions sample			Non-public acquisitions sample		
			% of cash	ΔTobin's q	ΔROA	% of cash	ΔTobin's q	ΔROA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Under-deviated firms	-0.204**	-0.245**	0.073	0.108	0.004	0.046*	0.184*	0.040***
	(-2.07)	(-2.10)	(0.65)	(0.71)	(0.14)	(1.93)	(1.90)	(2.77)
Firm size	0.107***	0.084***	0.048*	-0.003	-0.014**	0.028***	0.021	-0.009***
	(4.72)	(3.36)	(1.78)	(-0.08)	(-2.05)	(4.11)	(1.21)	(-2.78)
ROA	-0.434*	-0.410	0.942***	0.062		0.353***	-0.345	
	(-1.85)	(-1.42)	(2.60)	(0.10)		(4.92)	(-0.86)	
MTB	-0.029	-0.022	0.003	-0.214***	-0.002	-0.002	-0.127***	0.006
	(-1.00)	(-0.65)	(0.20)	(-7.77)	(-0.22)	(-0.25)	(-3.11)	(0.80)
Market leverage	-0.410	-0.553	-0.123	0.607	-0.039	0.082	0.405	0.166***
	(-1.13)	(-1.29)	(-0.35)	(1.31)	(-0.34)	(1.02)	(1.33)	(3.25)
Stock return	-0.082	-0.118*	0.017	0.369**	0.016	0.004	0.541***	0.032***
	(-1.34)	(-1.66)	(0.23)	(2.55)	(0.59)	(0.25)	(7.25)	(2.78)
Herfindahl index	0.109	0.129	0.114	0.108	0.096**	-0.020	0.235**	0.019
	(0.75)	(0.76)	(0.63)	(0.47)	(2.07)	(-0.49)	(2.09)	(1.09)
Industry liquidity	1.122***	1.500***	-0.284	-0.184	-0.083**	-0.045	-0.544*	-0.053
	(6.53)	(7.15)	(-1.39)	(-0.77)	(-2.05)	(-0.72)	(-1.78)	(-1.48)
Relative size			-0.099***	0.014	0.011	-0.031***	-0.031*	0.003
			(-3.14)	(0.40)	(1.31)	(-4.29)	(-1.80)	(1.24)
Liquidity				0.043	-0.012		0.009	-0.012**
				(0.86)	(-0.75)		(0.19)	(-1.99)
Asset tangibility				0.134	0.089		0.285**	-0.014
				(0.56)	(1.55)		(2.06)	(-0.94)
RD expenses/sales				-0.986			-2.022	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				(-0.56)			(-1.45)	
Capital expenditure/sales				0.497			-0.783	
				(1.11)			(-1.46)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3416	3416	288	266	267	3128	2887	2910
Pseudo R^2	0.073	0.067	0.171	0.652	0.234	0.155	0.298	0.102

This table reports the coefficient estimates of the relationship between under-deviated firms and public versus non-public acquisitions. Column 1 estimates a probit analysis with a dependent variable that takes a value of one if the firm makes a public acquisition and zero otherwise. Column 2 estimates a Tobit analysis of the ratio of the sum of public acquisitions value to the firm's total assets. Columns 3 and 6 estimate a Tobit analysis of the percentage of cash paid in acquisition deals. Columns 4 and 7 estimate an OLS analysis of Δ Tobin's q. Columns 5 and 8 estimate an OLS analysis of Δ ROA. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by acquiring firms. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.

Appendix F: Robustness check on impact of leverage deviation on likelihood of acquisitions using new estimated target leverage

	No-acquisitions vs. non-public acquisitions		Public vs. non-public acquisitions	
	(1)	(2)	(4)	(5)
Leverage deviation	1.936***		2.758***	
	(4.07)		(3.10)	
Over-deviation		0.436***		0.497*
		(3.51)		(1.70)
Under-deviation		0.012		-0.368*
		(0.11)		(-1.73)
Firm size	-0.110***	-0.131***	0.152***	0.129***
	(-3.93)	(-4.99)	(3.41)	(2.93)
ROA	-0.599***	-0.501**	-0.398	-0.334
	(-2.89)	(-2.46)	(-0.95)	(-0.81)
MTB	-0.041*	-0.028	-0.021	-0.006
	(-1.80)	(-1.22)	(-0.53)	(-0.16)
Market leverage	0.054	1.151***	-2.042**	-0.753
	(0.11)	(3.67)	(-2.18)	(-1.07)
Stock return	-0.345***	-0.359***	-0.164	-0.177
	(-6.73)	(-7.04)	(-1.40)	(-1.51)
Herfindahl index	0.661***	0.649***	0.498	0.487
	(3.56)	(3.49)	(1.48)	(1.45)
Industry liquidity	-0.675***	-0.664***	0.248	0.255
	(-4.78)	(-4.71)	(0.98)	(1.01)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	18,610	18,610	18,610	18,610
Pseudo R^2	0.098	0.097	0.098	0.097

This table reports the coefficient estimates of multinomial logit analysis. The dependent variable has three categories: no-acquisitions, public acquisitions and non-public acquisitions. The dependent variable takes a value of one if the firm does not make an acquisition, a value of two if the firm makes a public acquisition and a value of three if the firm makes a non-public acquisition. Columns 1, 2 and 3 report the coefficient estimates for non-acquiring firms relative to the baseline group of non-public acquisitions. Columns 4, 5 and 6 report the coefficient estimates for public acquisitions relative to the baseline group. Variable definitions are given in **Appendix A**. All continuous variables are winsorised at the 1% level. *T*-statistics are reported in parenthesis. Standard errors are robust and clustered by firm. The estimates in the models are statistically significant at the (*)10%, (**)5%, and (***)1% levels.