Is There Really a 'Size Effect' in Acquirer Returns? Evidence from Serial and Non-Serial Acquisition Announcements

Hang Li, Nicholas F. Carline, and Hisham Farag*

Birmingham Business School, University of Birmingham, Birmingham B15 2TY, UK

Abstract

Unobservable factors that affect acquirer returns are positively correlated with those that affect firms' decisions to announce acquisitions. Failure to control for this correlation creates downward bias in announcement returns for larger acquirers. Firms become serial and non-serial acquirers for different reasons. The 'size effect' in announcement returns persists for serial acquisitions after accounting for these differences. This finding holds for block and non-block serial acquisitions, and after controlling for invariably good and bad serial acquirers. However, because of tendency for the 'size effect' to increase with announcement returns larger serial acquirers are not systematically associated with lower shareholder wealth.

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Keywords: Non-serial acquisition; Serial acquisition; Firm size; Selection bias; Acquirer shareholder returns

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* Corresponding author: Nicholas F. Carline; Tel.: (+44) 121-41-46704; Email: n.carline@bham.ac.uk.
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1. Introduction

The seminal paper done by Moeller, Schlingemann, and Stulz (2004) and a series of subsequent studies[1] observe a materially inverse relationship between the acquiring firm sizes and shareholders' abnormal returns when pooling serial and non-serial deals together. By design, these studies censor firm samples that choose not to participate in acquisitions as acquirers, which may lead to a spurious observed firm size effect. Some other studies[2] demonstrate a persistent negative 'size effect' of deals announced by serial acquirers after highlighting the differences of deal performance and market entrance of serial acquirers. Similar to the underlying censoring effect for all deals, the studies based on non-serial and serial deals are subject to overlooking the impact from other acquirers and non-acquirer firms. To account for unobservable factors potentially determining firms' choice of being acquirers, we explore the 'size effect' by controlling for the self-selection of acquirers to explore if the prominent firm size impact is only a manifestation of censoring effect. Due to the distinctive serial deal performance identified by prior research, we further revisit the 'size effect' using subsamples.

[1] Billett and Qian (2008) account for the probability of making acquisitions and Phalippou, Xu, and Zhao (2015) incorporate the acquisitiveness of the acquired firm when examining the shareholder returns of acquirers. Humphery-Jenner and Powell (2011) use acquisitions in Australia where entrenchment provisions are prohibited to apply, while Harford, Humphery-Jenner, and Powell (2012) work on the acquisitions in the presence of entrenchment provisions. Both of their studies evidence the pervasively existing negative firm size effect. Ahern (2010) and Golubov, Yawson, and Zhang (2015) consistently support this negative firm size effect after controlling for the invariant firm fixed effects. Humphery-Jenner and Powell (2014) illustrate that this negative association only for deals happened in countries with sound institutionalized governance and where political connections matter.

[2] Fuller, Netter, and Stegemoller (2002) investigate the performance of acquirers with multiple acquisitions to control for the homogeneity of acquirers. On top of that paper, Golubov, Yawson, and Zhang (2015) work on the behaviour of acquirers with multiple acquisitions and demonstrate that firms are more likely to acquire repeatedly following positive bidding experience. Aktas, de Bodt, and Roll (2009; 2011) differentiate the incentives of being frequent acquirers from the general motivations of being acquirers when they examine how acquirers learn from their previous bidding experience.

In this paper, we begin by examining the prior research's findings that the firm size effect on acquirer shareholder returns does exist over an extended timespan 1989-2014. We test on this by using all deals and then separating them into non-serial deals and serial deals according to firm's acquisition frequency within three years to take account of the nature of acquirers that may influence the observable firm size effect. Subsequently, we consider the possibility that the size effect is overestimated because of overlooking the unobservable factors that cause firms to self-select into the acquisitions market. In doing so, we investigate the determinants of being an acquirer, and also demonstrate when and how firms are motived to be non-serial or serial acquirers respectively. Following this, by employing the Heckman two-stage selection method, we revisit the firm size effect on acquirer shareholder returns after controlling for the latent selection bias effectively based on whole samples and subsample groups.

This paper tests on the UK acquisitions market where anti-takeover provisions (ATPs) are not permitted under the UK company law. Previous literature has pointed out the distinguishing acquisition performances in countries allowing or prohibiting the application of ATPs (e.g. Masulis, Wang, and Xie, 2007; Harford, Humphery-Jenner, and Powell, 2012). Humphery-Jenner and Powell (2011) suggest that an absence of ATPs promotes more valuable acquisitions, although a negative firm size effect is still there. Without allowing to implement ATPs, the UK market is expected to provide ample randomness of firms' choices of bidding, which implies that without taking account of the sample selection, conventional estimates based on the UK market are less biased, compared with estimates using the US market. Hence, we are able to effectively generalize the necessity of considering acquirers' choices of being bidders when exploring the firm size puzzle.

To identify serial and non-serial acquisitions, we separate all 10,384 deals announced by UK public acquirers over the period 1989-2014 on the basis of the firm's acquisition frequency in three-year periods. This procedure yields 3,489 non-serial acquisitions and 6,895 serial acquisitions. Notwithstanding the CARs of these overall observations, larger acquirers gain significantly less extra wealth for their shareholders, and non-serial acquisitions perform much better than serial acquisitions. Using conventional regressions to explain the cross-sectional variation in announcement period returns, we affirm that acquirer shareholder wealth effects are significantly and negatively associated with firm size, and this association is applicable for both non-serial and serial groups. We observe that a natural log value of ten million dollars increase in firm size destructs the shareholder returns of non-serial acquirers and serial acquirers by roughly 1.174 percent and 0.967 percent respectively. The worse performance of larger acquirers can be attributed to the prevalent existence of agency conflicts and managerial hubris in larger firms (e.g. Roll, 1986; Mitchell and Lehn, 1990; Moeller, Schlingemann, and Stulz, 2004; Malmendier and Tate, 2008).

By employing the Heckman two-stage selection procedure to revisit the association between acquiring firm size and shareholder returns, in our case, the first-stage selection model should be a probit model exploring the incentives of being acquirers (Heckman, 1979). Therefore, we construct a series of likelihood models to investigate the drivers that underpin the decisions to enter the acquisitions market as acquirers in general, non-serial acquirers and serial acquirers respectively. We also notice that no existing research has differentiated firms' propensity of acquiring between serial and non-serial deals. The likelihood models contain 42,251 firm-year observations. We find that in general, acquirers are more likely to be larger firms with better prior operating performance and lower debt burdens. Focusing on the motivations

of becoming a non-serial acquirer, market entrance can be predicted to happen when larger firms become older with limited internal growth opportunities but massive cash reserves. In contrast, larger firms associated with sufficient internal growth opportunities but less liquidity are more likely to bid more frequently as serial acquirers. When comparing the marginal effects of firm size in the models using non-serial and serial deals respectively, we find that an increase in firm size by a natural log value of ten million dollars promotes the probability of being a serial acquirer by 5.872 percentage points, which is economically stronger than that (0.461 percentage points) of being a non-serial acquirer.

Through the likelihood models, we observe the intuitive drivers of participating in the acquisition activities of firms. However it is still ambiguous how other unobservable drivers promote or truncate the firms' willingness of entering the acquisitions market and how these unobservable drivers link to the performance of non-serial and serial acquisitions so that the observable association between acquiring firm sizes and shareholder returns. To capture the possible omitted effect leading by some unobservable factors, following the likelihood models, we treat the CARs regression models emphasizing the firm size impact as the second stage of the Heckman two-stage selection procedure.[3] We hypothesize that the prominent firm size effect may vanish by implementing the Heckman selection method. We also expect that the size effect may vary for non-serial and serial cases due to the heterogeneity of types of acquirers.

After effectively controlling for the selection bias, our empirical results show that large acquirers do not perform worse in their shareholder return in general, which is not consistent with the previous studies (e.g. Moeller, Schlingemann, and Stulz, 2004, 2005;

[3] Li and Prabhala (2007) provide a comprehensive discussion of the importance, and the application, of selection models in different corporate finance contexts.

Billett and Qian, 2008; Faccio, McConnell, and Stolin, 2006; Ahern, 2010). Our research addresses the fact that due to some unobservable factors of individual firms, acquirers are those firms that are capable of undertaking relatively outperforming deals. Economically, this self-selection inflates CARs by approximately 0.0410 percent on average. Our new findings seem not to support the agency problems or managerial hubris of large companies.

For subsample analyses, we offer new evidence on the different effects of firm sizes on the stockholder returns of serial and non-serial acquirers. When exclusively looking at the non-serial acquisitions subset, the significant contribution of the inverse mill ratios (IMRs) and the insignificant impact of firm size represent that without controlling for the firm's choice of being non-serial acquirers, the firm size effect on CARs is overestimated. In contrast, the moderately explanatory power of IMRs in the CARs regression using the serial acquisitions subset indicates that the selection bias does not distort the interpretation of firm size effect on shareholder returns for serial cases when employing the conventional cross-sectional linear CARs regression. Serial acquirers' returns are lowered prominently by larger acquiring firms. Our findings are robust for two firm size proxies: book value of total assets and market value of total assets. The inconsistent results of the 'size effect' for non-serial acquirers and serial acquirers raise questions on how and why serial firms bid repeatedly though they are underperforming. We address these issues through several aspects.

First, we hypothesize that regarding serial acquisitions homogenously may be problematic. Macias, Rau, and Stouraitis (2016) take account of the heterogeneities of types of serial acquirers by splitting serial acquirers into three categories according to three attributes: the total number of deals of a serial bidder, the number of acquisition clusters experienced by a serial bidder, and the highest number record of deals within

each cluster. They find that the operating performance and the economic consequence of serial acquirers engaging in intensive acquisition activities in a shorter period is distinct from those with less frequency in a certain timespan. However, although they have limited explanations of the deal announcement returns, they point that serial acquirers in all types seem rarely concern about the deal announcement returns. Motived by the possible behavioral difference, we classify serial acquisitions into block acquisitions and non-block acquisitions, and our results show a consistency: irrespective of whether acquisitions are announced by non-block or block bidders, firm size still materially and negatively contributes to the acquirer's wealth gain.

Second, we hypothesize that the deal announcement returns can be explained by a natural persistency of being good or bad acquirers. Golubov, Yawson, and Zhang (2015) control for firms with outstanding acquisition performance when investigating the deal announcement returns and then conclude that acquirers with extraordinary bidding experience consistently outperform in later deals. This implies a persistency of firm's acquisition performance at the firm level. To take account of the persistency of firm being a good acquirer or a bad acquirer, we control for the firm fixed-effect in CARs regressions and still observe a negative 'size effect.'

Third, we focus on whether large firm size is an essential attribute of leading to bad serial acquisition performances. Schneider and Spalt (2016) interpret the bidder shareholder returns using a scaling framework. The bidder shareholder returns depend on a net present value (NPV) yielded from each dollar paid by the bidder and the ratio of total consideration and bidder firm size value. According to Schneider and Spalt (2016), the sign of NPV determines the deal is value-created or value-destructed, while bidder firm sizes only contribute to a scaling effect in the first place. To further document the prediction that the sign of firm size changes within certain type of deals,

Schneider and Spalt (2016) run simultaneous-quantile regressions using deals assigned in each percentile in terms of CARs of deals. Their results show that the sign of firm size variable varies across groups of deals with different CARs, which provides an additional evidence on the scaling effect of bidding firm size effect. In our paper, we also incorporate simultaneous-quantile regressions to examine if the negative relationship between acquiring firm size and shareholder returns is consistent for deals in different CARs cohorts. Unlike Schneider and Spalt's (2016) work, our test is based on CARs quartile range. Generally, our results support Schneider and Spalt's (2016) findings by demonstrating different roles of firm size in value-destructing and value-creating deals. Larger firms less weaken their shareholder returns through bad deal announcements compared with good deals, which proves that for serial acquisitions, larger acquiring firms do not systematically underperform.

This paper contributes to a number of series of mergers and acquisitions research by showing the importance of differentiating between non-serial deals and serial deals when revisiting the firm size effect on acquirer stockholder returns. We underline the economic impact of selection bias on shareholder returns and provide a detailed analysis of how unobservable determinants lead firms to enter the market drive the concomitant 'size effect' on shareholder wealth change, which has been overlooked by corporate finance research on topics such as M&As. Our research also adds to the limited work on market entrance incentives (e.g. Owen and Yawson, 2010; Maksimovic, Phillips, and Yang, 2013; Arikan and Stulz, 2016) by distinguishing the motivations for bidding as a non-serial acquirer and a serial acquirer. Another key contribution of this paper is that we provide complementary evidence on a series of studies targeting on serial deals' performances by exploring the possible sources of the 'size effect' and the

reasons for why serial acquirers bid continuously (e.g. Golubov, Yawson, and Zhang, 2015; Macias, Rau, and Stouraitis, 2016; Schneider and Spalt, 2016).

The rest of the paper is organized as follows. Section 2 examines the firm size effect by differentiating between non-serial acquisitions and serial acquisitions. Section 3 discusses the determinants of making acquisitions that have been theoretically shown in the earlier literature. The results of the acquisition likelihood models are also presented and discussed. Section 4 revisits the 'size effect' on shareholder returns after taking acquirer self-selection into consideration. An expanded discussion of why firm size matters in serial acquisitions comes in Section 5. Section 6 demonstrates the relevant robustness tests. Finally, Section 7 concludes.

2. Firm size and acquirer shareholder returns

In this section, we examine the 'size effect' on shareholder returns for all acquisitions as many previous studies do. Subsequently, we explore the firm size effect from the perspectives of non-serial and serial acquisitions to identify any differentiation. Non-serial acquisitions follow no other acquisition by the same acquirer in the preceding three years, while serial acquisitions follow at least one other acquisition by the same acquirer in the preceding three years. The three-year requirement follows previous studies (e.g. Fuller, Netter, and Stegemoller, 2002; Billet and Qian, 2008; Golubov, Yawson, and Zhang, 2015). Fuller, Netter, and Stegemoller (2002) define frequent acquirers by requiring at least five deals are finished by the same acquirer within three-year timespan. In our paper, we do not require at least five deals, as for

defined serial acquirers, we want to track relatively complete history of deal performances of acquiring firms with multiple deals.[4]

For the model using all deals, we control for serial deals additionally, while for model exclusively using serial acquisitions, we control for block deals instead. The motive for controlling for the block deals is sourced by the findings from Macias, Rau, and Stouraitis (2016). They suggest that serial acquirers with different attributes behave variously with regards to acquisition performance and efficiency. They use a confounding methodology to identify four different categories of acquirers and they illustrate that 'sprinters' acquiring intensively in short intervals are subject to managerial overvaluation, while 'marathoners' acquiring occasionally learn from their acquisition experience more efficiently. We define a block deal as a deal following at least one other acquisition by the same acquirer in the preceding year, which captures the features of acquirers who bid intensively.

2.1. Sample description

We collect from the SDC Platinum database all of the acquisitions announced by UK public acquirers during the period 1989-2014. Our screening criteria follow closely those of Moeller, Schlingemann, and Stulz (2004). The acquired firms included in our sample are public, private, and subsidiary firms, but, unlike Moeller et al., we include both domestic and cross-border deals because acquiring domestically or not is an offerer's choice. As we demonstrated below in Section 2.2, cross-border deals make up roughly 31.1 percent of our total observations, which is a fairly crucial proportion. Additionally, as we are interested in tracking back the history of acquirers to assign

[4] The screening criterion of at least five deals completed by the same bidder leaves us 5,822 deals with 1,626 unique acquirers which is a relatively small set. We run the cross-sectional CARs regressions, the likelihood model and the Heckman selection CARs regression model using this small set, and we draw consistent results in terms of 'size effect'.

them in non-serial and serial groups, so it is important to incorporate both domestic and cross-border deals for further explorations. We require more than 50 percent of the acquired firm's share capital to be transferred through the deal, and after the acquisition the acquirer must hold 100 percent of the acquired firm's shares. Deals that take place in highly-regulated industries, such as the financial and utility industries[5], are dropped from our sample. Moreover, we also exclude transactions with a deal value of less than one million dollars in real (2014) terms. Consequently, 10,384 deals are identified as our samples. In line with the deal selection criteria, we download all active and dead UK firms from the Datastream database. We exclude firms classified as being in highly regulated industries. This process produces 42,251 firm-year samples during the timespan 1989-2014.

In Table 1, we present the sample by showing the frequencies, values and intensities of acquisitions announced by UK listed firms annually during the period 1989-2014. The yearly deal frequency distribution shows that the takeover peaks were reached in1997-2000 and 2006-2007 which is generally consistent with the fifth and sixth global merger waves. The number of unique acquirers varies accordingly with the deal frequency distribution. We observe that 6,895 out of 10,384 deals are made by serial acquirers, and 4,265 out of 7,171 unique acquiring firms are serial acquirers, which highlights the importance of exploring the reasons and performance of serial acquisitions (e.g. Fuller, Netter and Stegemoller, 2002; Billett and Qian, 2008; Ahern, 2010; Golubov, Yawson, and Zhang, 2015; Macias, Rau and Stouraitis, 2016). We also notice that non-serial deals which have not been widely investigated by literature take up a substantial proportion among all deals. Corresponding to the definitions of non-

[5] Industry Classification Benchmark (ICB) system is applied here to identify the financial and utility industries. Firms belong to the industries with ICB codes 7000 and 8000 are excluded from our study.

serial and serial acquisitions, serial acquirers are firms that have made at least one other acquisition in the preceding three years, while other acquirers are identified as non-serial acquirers. The final column shows the deal intensity. Some literature incorporates relative deal frequency or relative deal values as proxies of deal intensity (e.g. Rossi and Volpin, 2004; Netter, Stegemoller, and Wintoki, 2011). Here we use value-weighted relative acquisition frequency as a measure of deal intensity, and this measure makes a trade-off between the total value of deal transactions and the acquisition frequency. Hence, the deal intensity is calculated by the total number of deals divided by the number of listed firms multiplied by the aggregate size of all deals divided by the aggregate size of the listed firms. In our sample period, the deal intensity declines gradually from 1989 to 1993. Subsequently, it recovers and reaches another peak (0.624) by 1999. Following the year 2008, the acquisitions market has entered a recession reflected by unexpectedly low deal intensity.

2.2. Descriptive statistics

Table 2 presents descriptive statistics for acquirer and deal characteristics for the sample described in Table 1. Each of the variables included in Table 2 are defined in Table 1A of the Appendix, and are sourced from the SDC Platinum and Datastream databases. We indicate the significance of mean (median) differences in characteristics between non-serial and serial deals in the column presenting the mean and median values for serial deals. Most of the explanatory variables accord with those in Moeller, Schlingemann, and Stulz (2004).

Two proxies are applied to measure firm size: the market value of total assets and the book value of total assets, both of which measures are in real (2014) terms. We observe from Table 2 that for all acquisitions the mean market value of an acquiring

firm is $7,765.1 million and firms with serial deals are statistically significantly larger than firm with non-serial deals at one percent significance level. The firms in our sample have (or had) been active for an average of 16.6 years at the calendar year end of their deal announcement. Generally, firms are relatively more mature when they announce deals more frequently. In terms of variables proxying firms' operating performances, we see consistent results between raw variable measures and industry-adjusted measures when making the univariate analysis across serial and non-serial groups. The mean of the q ratios has no prominent distinction for serial and non-serial deals. Acquiring firms with high sales growth and return on assets (ROA) are more capable of bidding as serial acquirers. Interestingly, serial deals are made by acquirers with higher debt ratio and lower liquidity. Firms with an unstable operating performance presented by high ROA volatility tend to acquire less frequently.

On average, serial deals are larger than non-serial deals whilst their relative size measured by the deal size divided by the acquiring firm size is significantly smaller than that of non-serial deals. With regard to other deal characteristics, roughly 9.2 percent (56.9 percent) of non-serial deals in our samples are public-to-public (public-to-private) deals, which is significantly higher (lower) than that proportion of 6.1 percent (60.1 percent) of serial deals. Irrespective of non-serial and serial deals, about half of the deals in either group are diversifying (conglomerate) deals. For non-serial deals, about 27.3 percent of deal samples are cross-bordered and 39.4 percent of them are paid for entirely in cash, which is significantly lower than the percentages of 33.0 percent and 48.2 percent correspondingly for the serial group. In addition, 0.5 percent of non-serial deals are unsolicited which is statistically significantly higher than the proportion (0.3 percent) of serial deals.

Table 3 presents the descriptive statistics for the CARs sorted by firm size and acquisition sequence. We estimate the CARs using the market model over a three-day event window, centered on the announcement date, and with an estimation period from 302 to 43 trading days before the acquisition announcement date. This estimation window leaves roughly one calendar year before the potential running-up period of the deal announcement and leaves two months before the first day of the three-day event window. Overall, acquirers earn abnormal returns of 1.013 percent for their shareholders through deal announcement. From the bottom size quartile to the top size quartile, we observe that smaller acquirers consistently generate significantly more returns compared with larger acquirers. Acquiring firms assigned in the first quartile gain 3.137 percent abnormal returns on average for their stockholders. Correspondingly, acquirers assigned to the final quartile only gain 0.460 percent abnormal returns for their stockholders. This tendency is also generally followed when focusing on non-serial and serial acquisitions separately. By comparing the abnormal returns of non-serial and serial acquirers, we find that non-serial acquirers gain distinctly higher returns (1.760 percent) for their shareholders, especially those of smaller non-serial acquiring firms.

2.3. Regression results

Table 4 presents cross-sectional linear regression estimates for acquirer and deal characteristics on acquirer CARs for the sample described in Table 1. All firm-specific variables employed in the models are industry-adjusted, excluding size- and age-relevant variables. Year fixed-effect and industry fixed-effect are controlled for all models in this section. Industry is identified according to the ICB super-sector. In the regression based on all deals, we find that the serial deals dummy is negatively associated with shareholder returns in general. Interestingly, we find no evidence to

support the idea that intensive acquisitions within one year worse off serial acquirers' shareholders' returns more severely.

By implementing the conventional CARs regression model, our results using all bids support the negative firm size effect as previous studies demonstrate. After distinguishing non-serial and serial deals, we still observe a prominent firm size effect. An increase in firm size by a natural log value of ten million dollars pulls down 1.17 percentage points of the CARs of non-serial acquirer's shareholders and 0.97 percentage points of the CARs of serial acquirer's shareholders after controlling for the block cases.

3. Firm size and the likelihood of being an acquirer

Billett and Qian (2008) demonstrate the motivations of being acquirers in general are not in line with the motivations of being serial acquirers. Similarly, Macias, Rau, and Stouraitis (2016) address that certain type of acquirers has their unique reasons of bidding repeatedly. Therefore, in this section, following the analysis of the firm's propensity of entering the acquisitions market regarding all deals as a whole, we disaggregate deals into non-serial deals and serial deals to explore the possibility that different factors influence firms' market entrance frequency.

3.1. Determinants of being an acquirer

Many recent studies commonly share the incentives of announcing a deal or completing a deal in the likelihood models without giving a detailed explanation of why these determine firms' choices to participate in acquisition activities (e.g. Harford, 1999; Billett and Qian, 2008; Ahern and Harford, 2014). However, it is crucial to analyze theoretically why the firm-specific and industry-specific determinants motivate firms

to acquire other firms and how these determinants drive the market entrance probabilities of non-serial and serial acquirers in different ways.

Whether large firms are more likely to bid others has been discussed controversially. Trautwein (1990) explains the empire-building theory and states that due to agency conflicts between ownership and control in the corporates, managers maximize their own benefits rather than their stockholders'. Moeller, Schlingemann, and Stulz (2004) also affirm the empire-building-oriented acquisitions of large firms due to their managerial overconfidence. However, more recent research presents an inverse relationship between firm size and the likelihood of being an acquirer. Gorton, Kahl and Rosen (2009) develop a theory of 'eat or be eaten' by demonstrating that smaller companies are more likely to be acquirers as smaller firms use acquisitions to defend themselves against being acquired. On top of the 'eat or be eaten' theory, Phalippou, Xu, and Zhao (2014) analyze that early acquisitions happen as firms expect to increase the attractiveness of being acquired to create shareholder wealth gain later. Smaller firms may be hard to raise sufficient capital to bid others quite often. Hence, from the perspective of self-defense and firm value concern, smaller companies are more likely to offer deals as acquirers, but with less bidding intensity especially.

Gomes and Livdan (2004) predict that due to the advantages of economies of scale, mature or even old companies with fewer self-growth chances are more likely to participate in acquisition activities as acquirers to explore the potential external expansion, which follows the traditional agency theories (e.g. Jensen, 1986, 1988). Contrary to their findings, Celikyurt, Sevilir, and Shivdasani (2010) study the acquisition behavior of firms around the IPOs and identify that younger firms are more active in being acquirers. Miller and Friesen (1984) reveal that firms on different phases of firm's life cycle own distinct corporate structures and tactics and do different

decision-making correspondingly. Consistently, Arikan and Stulz (2016) demonstrate a "U-shape" association between firm age and the acquisition likelihood. Whereas for firms under the phase of recession, it is likely that although they are willing to bid, they bid less frequently as they may encounter the difficulty of financing for bidding.

Firm's operating performances also take crucial effect on the market entrance likelihood in accordance with prior literature. Tobin's q, on the one hand, representing firm growth opportunities may make firms more capable to bid other firms. Jovanovic and Rousseau (2002) develop a q-theory of mergers and they demonstrate that firms with high q ratio tend to make acquisitions more often as their efficient productivity is expected to be transferred to the acquired side. On the other hand, high q may represent over-evaluation and this misevaluation drives merger activities (e.g. Dong, Hirshleiferm, Richardson, and Teoh, 2006; Rhodes-Kropf, Robinson, and Viswanathan, 2005; Rhodes-Kropf and Viswanathan, 2004). It may be the situation that over-evaluated firms are more easily tempted to make acquisitions with systematically overpayment. Operating performance captured by ROA implies firm's managerial quality or corporate governance quality. Hence, due to the acquisition synergies, research shows that firm with higher ROA are more capable to acquire others, so stimulate the possibility of acquisitions (e.g. Billett and Qian, 2008), although they possibly are less necessary to achieve development through external acquisitions. In terms of the firm risk, it captures firm's information and operating structures (Core, Holthausen, and Larcker, 1999; Harford and Li, 2007) and Dechow and Dichev (2002) and Demerjian (2007) predict that high risk firms are expected to have less persistent further earnings. This uncertainty declines the firm's possibility of bidding others when their shareholders are active in protecting their interests.

Sale growth, liquidity and leverage are essential variables in the likelihood models of being acquirers or being taken over (e.g. Ambrose and Megginson, 1992; Powell, 1997). Firms with sufficient sales growth are expected to have less interests of participating in acquisition activities, though they seem to be more capable of doing so. Palepu (1986) and Powell (1997) illustrate that a firm's growth-resource imbalance determines its choice whether to bid. High sales growth companies with insufficient resources such as low liquidity and high debt burden may acquire firms with rich resources to reallocate the imbalanced resources. Correspondingly, firms with rich resources such as more spare debt capacity and cash reserves but low growth potential are more likely to acquire targets with an opposite growth-resource imbalance situation.

Higher liquidity firms are less subject to external financing pressure and underinvestment problems, so firms with excessive cash are more interested in bidding for other firms, which supports the free cash flow hypothesis (Harford, 1999). A relatively low debt burden gives firms more spare financing capability (Owen and Yawson, 2010). Similarl, for low debt burden companies, the monitoring from debt holders is relatively loose. Hence, it becomes easier and cheaper to absorb extra financing for acquisition purposes at corporate level, so that these firms are more encouraged to offer an acquisition.

Peer effect has been widely discussed by prior research (e.g. Andrade, Mitchell, and Stafford, 2001; Harford, 2005). This hypothesizes that acquiring firms pursue targets when other firms in the same industry do like this rather when acquiring is necessary. Hence, industry wave dummy is incorporated in our models. In addition, aggregative merger wave intuitively contributes to the firm's probability and behavior of participating in the acquisition activities (e.g. Servaes, 1996; Harford, 2005).

3.2. Descriptive statistics

Table 5 presents descriptive statistics for the characteristics of listed firms and deals for the sample described in Table 1. The statistical significances of mean and median differences between non-acquirers and acquirers groups are identified by the column showing the mean and median values of acquirers. The mean of the acquirer sizes is 5,271.4 million dollars in real (2014) term, which is materially larger, on average, compared with sizes of other firms. Acquirers are relatively older than other firms without acquisition experience. Moreover, acquiring firms have significantly higher industry-adjusted q ratio, better prior operating performance captured by higher ROA, more predictable earnings and less debt burden. Surprisingly, the mean of liquidity shows firms without sufficient cash are more likely to offer a deal as bidders.

With regard to industry-related instrumental variables, we show that acquirers are from industries with more mature firms, while industry firm age dispersion does not show strong difference between bidders and non-bidders. More competitive industry environment motives firms in that industry to acquire other firms. As expectation, acquirers are more likely to be from industry with longer large acquisition duration prior the current acquisition announcement. Finally, the industry wave indicator is assigned to one if the acquisition intensity in a firm's corresponding industry is at least one standard deviation above the average industry intensity for all ICB super-sectors. Analogously, the merger wave year[6] is identified when the acquisition intensity of a year is at least one standard deviation above the mean value of that across the whole sample period. We present that a firm is more likely to announce deals when its

[6] The identified merger wave years are 1989, 1990, 1995, and 1997-2000.

corresponding industry is experiencing acquisition wave or when the aggregative acquisitions market is swept by a relatively intensive acquisition frequency.

3.3. Likelihood models

Table 6 presents the results for the pooled cross-sectional probit models investigating the influence of the above factors on the likelihood of being acquirers, non-serial acquirers and serial acquirers respectively. All control variables are soured from research discussed in Section 3.1. To provide more intuitive economic understandings, instead of showing the coefficients of variables, we demonstrate the average marginal effect and corresponding standard error for each variable incorporated in the likelihood models. We also test equality of coefficients between the models of being non-serial and serial acquirers and note the significance of difference in the column showing the average marginal effects of the model of being serial acquirers. All accounting information is collected from the Datastream, we notice that around 15 percentage of the raw data are missed, while this percentage of data missing is quite smooth year by year. Therefore, we believe it has tiny and slight influence on our following analyses.

We find that irrespective of their being non-serial or serial acquirers, larger firms are more likely to be acquirers. An increase in firm size by a natural log value of ten million dollars increases the probability of becoming an acquirer by 6.286 percentage points. This is an economically significant change compared with the probability of being acquirers (Table 1) defined as the number of total acquisitions scaled by the number of total listed firms over the sample period is 16.972 percent. The average marginal effect of size is significant at the one percent level in all three models.

We find that on average firm age does not significantly contribute to the possibility of the firm announcing a deal. However, relatively younger firms are more likely to be non-serial acquirers, and by controlling for the firm being constantly and actively listed no later than 1964 (the earliest base year in Datastream), we illustrate that old firms possibly at the final stage of their lifecycle stage, still have an interest in bidding for other firms, but with a low bidding frequency. This implies that in line with Arikan and Stulz's (2016) 'U-shape' analysis, on the one hand, younger firms are interested in growing and developing through external development as they need to be larger to occupy a larger market share and avoid being taken over; on the other hand, older companies are also interested in bidding as they are exhausted in terms of internal growth, but they tend to bid less often, probably due to financial constraints. Our findings support Owen and Yawson's (2010) research stating that firms gradually use up internal growth opportunities when they become old due to 'organizational inertia.' The statistically significant and positive coefficients ahead of q ratio, sales growth and ROA variables indicate that firms with more growth opportunities and better prior operating performance have stronger incentives for acquiring, which is supported by the q-theory developed by Jovanovic and Rousseau (2002) and the findings from Wang and Xie's (2009) work. The positive sign before Tobin's q also implies that over-evaluation of a firm facilitates the probability of that firm announcing a deal as an acquirer (e.g. Dong, Hirshleifer, Richardson, and Teoh, 2006; Rhodes-Kropf and Viswanathan, 2004). Surprisingly, we observe that earning uncertainty is positively associated with the likelihood of acquisition. It seems that volatile and unpredictable earnings do not alter a firm's choice regarding bidding. In addition, firms with lower debt burdens are more interested in participating in acquisitions as acquiring firms. Liquidity seems not to determine firms' acquisition decisions in general.

We notice that the incentives of being non-serial acquirers and serial acquirers are not always consistent with each other. The Wald tests on difference of coefficients in the two subsample models demonstrate that many factors leading firms to be non-serial or serial acquirers are substantially different. The effect of firm size applies to both series, but is especially pronounced for the serial group. In addition, growth opportunities or misevaluation measured by Tobin's q do not contribute to the acquisition likelihood when splitting acquirers based on acquisition frequency. Better sales growth records only stimulate serial acquirers to bid continuously. Interestingly, we find that in line with Harford (1999), firms with sufficient liquidity are more likely to bid as non-serial acquirers. A one-point standard deviation increase in industry-adjusted liquidity ratio raises the likelihood of a non-serial acquisition by 0.079 percentage points. In contrast, firms with lower liquidity are more likely to bid with high frequency in a certain time period (serial acquirers). Specifically, a one-point standard deviation increase in the industry-adjusted liquidity ratio decreases the likelihood of launching a serial deal by approximately 0.054 percentage points. The distinctive effects of serial acquirers' market entrance incentives imply that firms with performance credentials are more capable of bidding more intensively. It seems that for serial bidders, acquisition is not a channel of wasting extra cash, and low-liquidity firms may seek resource-growth balance by bidding for more liquid firms. Non-serial deals are more agency-problem-oriented: firms do not necessarily have outperformance but excess cash stimulates a firm's interests in acquiring. The results for the instrumental variables below reinforce this conclusion.

Because the likelihood models in this section are also treated as the first stage of the Heckman selection, we incorporate five industry-specified instrumental variables in the models, and at least one of the exclusively determining the possibility of being

an acquirer, rather than shareholder returns.[7] Gorton, Kahl, and Rosen (2009) specify that firms in industries with a larger proportion of median-size firms are more likely to make acquisitions. Hence, the size structure differentiation between industries influences the individual firm's choice of entering the market. Similar to the industry median size, industries with different median firm age breakdowns may have unobservable acquisition features which strikingly impact the individual firm's choice. We show that the average median firm size in an industry does not have a significantly explanatory power at a one percent or five percent significance level in all three likelihood models, although the positive sign for non-serial deals is contrary to those for the other two models. We demonstrate that inter-industry age structure measured by the Thiel index prominently and positively facilitates firms' incentives for acquiring as serial acquirers or acquirers in general. In addition, the significant coefficient before the proxy of intra-industry competition, Herfindahl Index (HHI)[8] indicates that firms allocated to high competition industries are more likely to participate in acquisition activities as acquirers, but high competition does not cause a surge in firms' interests in bidding as a non-serial acquirer. Another instrumental variable, 'Industry Duration' is the time elapsed since the last material deal announcement in an industry.[9] It refers to the research done by Cai, Song, and Walkling (2011) stating that a period of time without intensive acquisitions might imply that some reasons have altered acquisition intensity in the industry, which could stimulate the likelihood of future industry

[7] We test that for all CARs regression models using all samples or subsamples by incorporating these five instrumental variables, at least one of them is exclusively significantly related to the market entrance likelihood.
[8] Following Karpoff, Schonlau, and Wehrly (2015), we calculate HHI by summing the squared market shares of firms in the same industry.
[9] For durations that are longer than 730 days, we winsorize them to 730 days.

acquisitions. We find that the industry duration only affects the likelihood of bidding infrequently (being non-serial acquirers).

Finally, serial deals are more likely to be announced in an industrial or aggregate merger wave, while non-serial deal announcements are more spread in terms of the announcement year. This implies that non-serial acquirers without sufficient bidding experience or resources are less willing to bid inside a merger wave, presumably because higher acquisition competition inflates the costs of acquiring.

4. Heckman Selection Procedure: Revisiting the firm size effect on acquirer shareholder returns

In Section 2, we affirm that the firm size effect applies to the UK acquisitions market when using cross-sectional linear CARs regression models. In Section 3, we show that larger firms are more likely to pursue acquisitions and it is essential to differentiate the drivers for becoming non-serial and serial acquirers. However, we only intuitively observe how observable determinants contribute to the market entrance. Other unobservable factors undermining or stimulating the firm's willingness to bid potentially introduce a censoring effect in the CARs regressions as non-acquirer firms are censored from our observation. These unobservable factors to some extent contribute to a firm's capability to bid as a good acquirer or a bad acquirer. We calculate the IMRs for all deals and two subgroups based on the corresponding likelihood models in Section 3. Subsequently, following the Heckman two-stage selection procedure (1979), IMRs are employed in the original CARs regression models.

Table 7 presents the Heckman selection cross-sectional linear regression estimates for acquirer and deal characteristics on acquirer CARs for the sample described in Table 1. Corresponding to the models in Table 4, three models in Table 7

are based on all acquisitions, non-serial acquisitions, and serial acquisitions, respectively. Year fixed-effect and industry fixed-effect are controlled. In the first stage of Heckman selection method, we look at the possibility of bidding at firm level, while in the second stage we explore the association of firm size and shareholder wealth change at deal level. Hence we follow Warusawitharana's (2008)[10] work, bootstrapping the standard errors in both stages (probit models and CARs regressions) with 2,000 replications and clustering at the level of the listed firm or acquirer. The standard errors are also robust to heteroskedasticity across firms and the bootstrap critical values are applied for the t-statistics (Efron and Tibshirani, 1993; Warusawitharana, 2008).[11]

For the model using all acquisitions, the significant and positive IMRs coefficient signifies that the traditional CARs regression model is subject to the potential selection bias, and acquirers are able to have higher deal announcement returns than non-acquiring firms standing outside the acquisition market *ceteris paribus*. Referring to the interpretations of Heckman selection procedure in Mulligan and Rubinstein's (2008) research, the material positive sign implicates that acquirers have higher unobservable qualities, such as confounding bidding capability on average. Economically, the average truncation effect[12] caused by the selection bias is 0.040, which tells us the amount by which the conditional CARs are shifted up owing to the selection effect. Based on the average truncation effect, we finally draw out that a listed firm with sample-average characteristics that self-selects into the acquisitions market has a 0.041

[10] The author implements an endogenous selection model to link corporate asset purchases and sales to some properties of the firm. In two stages, their models are at firm level and at deal level respectively.
[11] To make the regression results comparable, the regression results (non-Heckman selection) in Tables 4, 8, 9 and 11 are also generated by 2,000 bootstrap replications for each sample group. The slight differentiations between the results we show in the tables and the results using the original sample set do not alter our findings and understandings.
[12] The average truncation effect is computed as the coefficient of the IMRs multiplied by mean of the IMRs. The mean values of the IMRs are 1.325, 1.891 and 1.549 for three models using all acquisitions, non-serial acquisitions, and serial acquisitions accordingly.

percent[13] higher CAR than a listed firm with a comparable set of characteristics drawn randomly from the population. This can be interpreted irrespective of acquiring firm sizes, some unobservable reasons lead more capable firms that are able to gain relatively higher returns to participate in acquisitions, which results in downwarded conditional CARs. In Table 7, the effect of firm size on the CARs of acquiring firms is statistically insignificant. Compared with the prominent firm size effect shown in Table 4, we suggest that a failure to account for self-selection in the acquisitions market induces an overestimation of 'size effect' on returns.

Moreover, the significantly negative association between the serial deal dummy and CARs reveals that serial acquirers earn less wealth for their shareholders even after taking account of the potential selection bias of being acquirers.[14] Previous studies investigating the returns of serial or repeat acquirers commonly show a monotonic declining tendency in CARs from deal to deal announced by the same acquirer, which presumably lowers the average CARs of serial deals (e.g. Fuller, Netter and Stegemoller, 2002; Ahern, 2010; Aktas, de Bodt, and Roll, 2011, 2013). Our finding above provides supplemental evidence to this series of studies. The coefficient of industry-adjusted liquidity switches to be significantly negative implying that excess cash significantly lowers their shareholders' returns. Although we do not find that firms owning excess cash have a higher willingness to participate in acquisitions, the fact that owning excess cash lowers their shareholders' returns through the deal announcement also supports the free cash flow hypothesis. The sign and significance of the coefficients of other control variables remain the same as shown in Table 4. Turning to the deal

[13] It is equal to [exp(average truncation effect)-1] ×100%

[14] We observe consistent results when following Fuller, Netter, and Stegemoller (2002) to define serial acquirers as acquirers undertake at least five acquisitions in three years. The coefficient of IMRs is insignificant at one percent or five percent significance level, and the 'size effect' still exists.

characteristics, and consistent with most of the prior literature, we find that large and public-to-private acquisitions are value-enhancing while hostile acquisitions significantly lower shareholder returns.

Comparing the IMRs coefficients for models using non-serial deals and serial deals, we observe that firm self-selection bias is only a concern for non-serial acquisitions. That is, in the presence of the significant coefficient of the IMRs and insignificant coefficient of the firm size, non-serial acquirers do not weaken their shareholders' wealth and have higher CARs through deal announcements conditional on being infrequent acquirers. The average truncation effect in this model is 0.350. By converting this into the inflation of CARs, we draw out that a listed firm with sample-average characteristics that self-selects into the acquisitions market as a non-frequent acquirer has a 0.419 percent higher CARs than a listed firm with a comparable set of characteristics drawn randomly from the population. Compared with the mean value of CARs of non-serial acquirer shareholder is 1.760 percent according to Table 3, we conclude that the overestimation leaded by overlooking the sample selection bias is also economically significant. For serial deals, because of the insignificant coefficient on the IMRs, we infer that on average, serial acquirers do not have more extraordinary unobservable qualities in bidding than other non-acquiring firms. Simultaneously, we can interpret the effect of the acquiring firm size leaning on the earlier regression results drawn from the conventional CARs regression model in Table 4.

To sum up, it is crucial to take account of the possibility that the firm size effect is over-estimated due to ignoring some underlying factors that cause firms to endogenously choose to enter the acquisitions market. On average, acquirers are firms with a higher unobservable capability of acquiring, and large firms do not make their shareholder returns worse off in nature. Furthermore, we suggest that the observable

insignificant firm size effect and selection effect on shareholder returns are dominated by the performance of acquirers with less frequent bids (non-serial acquirers). When shedding light on the serial deals, our results indicate that serial acquirers bid more randomly and large firms still pull down their shareholder returns materially through deal announcements.

5. Why do large serial acquirers undertake bad acquisitions?

In this section, we are interested in understanding how and why large serial acquirers undertake bad acquisitions continuously. Firstly, we raise an attention on the potential heterogeneity of types of serial acquirers. To solve this question, we re-examine the 'size effect' for non-block and block serial deals. We then control for the firms' invariant characteristics in CARs regression. Finally, to figure out if large size really matters for bad acquisition performance, we investigate the persistency of the firm size effect on CARs conditional on the cohorts of shareholder returns.

5.1. Non-block and block serial acquisitions

In a departure from previous research (e.g. Fuller, Netter, and Stegemoller, 2002; Aktas, de Bodt, and Roll, 2011,2013) treating serial acquirers as a whole, Macias, Rau, and Stouraitis (2016) sort serial acquirers into four categories upon on three features: the total number of deals, the number of acquisition blocks, and the highest record of acquisitions within each block. Particularly, they use the top quartile of the distribution of time elapsed since the latest deal announced by a same acquirer as the baseline for identifying two deals assigned in the same block. After explaining the reasons of bidding continuously of different types of acquirers and testing the role of time in the likelihood of continuing bidding, Macias, Rau, and Stouraitis (2016) find that comparing with other types of bidders, firms acquiring continuously with lower

frequency for a longer haul ('Marathoners') have higher post-deal operating performance and learn from prior bidding experience. They state that intrinsic heterogeneity among these four types of acquirers causes their different post-bid performances. They do not test on how intrinsic difference among types of deals drive shareholder returns. Given by what they illustrate, we incorporate a relatively simplified method to split serial deals into non-block and block deals based on the acquisition frequency in one-year interval and shed light on the possible distinctions between them with regard to the relationship between firm sizes and stockholder returns of acquirers.

We observe that 2,408 firms offer 4,877 identified block deals according to our definition. Table 8 presents pooled cross-sectional probit regression estimates for listed firm characteristics on non-block and block serial acquisition likelihood. The results demonstrate that the sign and the significance of the determinants of market entrance in both models are largely consistent with each other. Distinctively, we find that high q firms are more likely to be block acquirers implying that over-evaluation may facilitate firms to bid intensively in a short period. Firms belonging to industry with older median firm age are more likely to bid in a higher frequency. Following the same process we have demonstrated for all deal samples, we derive IMRs from the likelihood models for non-block and block cases, and then incorporate the IMRs in the CARs regressions. Table 9 presents (Heckman selection) cross-sectional linear regression estimates for acquirer and deal characteristics on non-block and block serial acquirer CARs. The insignificant coefficients of IMRs at the second stage of the Heckman selection procedure indicate that the potential selection bias is not the issue for either type of serial deals. In Table 9, we underpin that irrespective of controlling for the selection bias, larger serial acquiring firms are systematically underperforming and this prominent impact does not vary with firm's bidding frequency *ex ante*.

5.2. Firm fixed-effect: The persistency of being good or bad acquirers

When Golubov, Yawson, and Zhao (2015) explain the outstanding acquisition performance of extraordinary serial acquirers, firm fixed-effect is controlled to capture the firm's persistency of deal performance. Their study illustrates that firm fixed-effect takes a substantial role in explaining deal performance variation through announcements. Therefore, in this section, we shed light on the firm-specific heterogeneity in the shareholder returns of serial acquirers to investigate if the firm size effect is diluted after controlling for the firm's intrinsic persistency of being good or bad acquirers.

On top of the CARs regressions in Table 4, the firm fixed-effect is controlled in Table 10 additionally. Interestingly, we find that firm size is still significantly and negatively associated with CARs. An increase in firm size by a natural log value of ten million dollars drops down the CARs by 1.589 percent, which is even more economically severe compared with the effect shown in the model without taking account of the firm-specific heterogeneity. Therefore, taken the empirical analyses together by far, our research supports the possible existence of agency problems and managerial hubris in larger serial firms.

5.3. Simultaneous-quantile regressions

To argue that acquiring firm size determines the extent to which value is created or destructed through an acquisition, rather than determines whether a deal is value-created or not, Schneider and Spalt (2016) apply a scaling framework to interpret shareholder returns as a product of a NPV and a ratio of total consideration and acquiring firm size. Underlying this framework, only a NPV yield on each dollar that bidder invests determine a deal is value-generated or not whilst bidder size just

contributes to a scaling effect. Subsequently, they employ simultaneous-quantile regressions to further document their analysis of the scaling effect. Therefore, we run simultaneous-quantile regressions of three-day CARs around the announcement in our study and the results are shown in Table 11. Unlike Schneider and Spalt's (2016) paper, we disaggregate CARs for a quartile range rather than a percentile range. Comparing the coefficients of the firm size variable in the regressions using deals assigned in the first quartile range and the third quartile range of CARs, we observe that large size undermines acquirer shareholder returns for deals less in the first quartile of CARs statistically and economically. For deals with positive returns, larger firms perform worse prominently compared with smaller firms, but in reality, they do not deteriorate their shareholders wealth gain. Therefore, we cannot simply assert that large firms are bad acquirers.

We employ the F-statistics test to examine whether firm size has a distinct effect on shareholder returns for deals assigned in each quartile range. The result evidences that firm size effect is prominently different in the first quartile regression and the third quartile regression.[15] The significance level changes of firm size coefficients in the models explicitly demonstrate how size relates to stockholders' returns in each CARs cohort, which generally fits the tendency shown in Schneider and Spalt's (2016) work. Hence, we conclude that for serial acquisitions, the negative firm size effect may be a manifestation of scaling. We evidence that size is not a simple proxy for a value driver, and managerial hubris or overconfidence may not be a decent reason to explain the nature behind the acquisition behavior of large firms.

[15] If we follow Schneider and Spalt (2016) on percentile deals, we find that firm size is positively associated with shareholder returns in the first two percentiles (unreported).

6. Robustness tests

The results presented in this paper are robust when several alterations are made in the research design. The insignificant association between firm size and acquirer shareholder returns still holds when CARs are estimated by five-day event window around the announcement date or calculated by the market-adjusted model. When firm size and size relevant variables are measured by the book value of total assets in real (2014) terms instead of the market value of total assets in real terms, all main findings demonstrate a conformance. In the main tests, we construct the firm-year likelihood models using all listed firms in each year. Alternatively, as a robustness test, for subsample analyses (non-serial, serial, non-block, and block acquirers), the sample pool of the likelihood models are constructed by the type of acquirers we are addressing and other non-acquirer firms in corresponding acquisition announcement year. To be more specific, this means we exclude other types of acquirers from the firm-year samples when constructing the likelihood model of being one group of acquirers, so that it provides a strict situation where only firms are assigned outside the acquisitions market and assigned in a specific group are incorporated in the likelihood analysis.

7. Conclusion

In this paper, we take account of the potential sample selection bias caused by the firms' choices of being acquirers when revisiting the association between acquiring firm sizes and shareholder returns. We suggest that large firms do not worse off their shareholder returns in general. The results of the CARs regressions after controlling for the sample selection bias reveal that acquirers are more qualified firms that own some unobservable features (e.g. ability and skills) causing firms to head for acquisitions with presumably better performances than non-acquirers. We recognize that non-serial

acquirers and serial acquirers do not largely share the same incentives for entering the acquisitions market. By splitting all deals into non-serial and serial deals, we show that without accounting for the firms' choices of entering the market, the concomitant effect of firm size on shareholder returns is overestimated for non-serial acquisitions. However, it seems that larger serial acquirers systematically underperform smaller serial acquirers and the selection bias does not distort the interpretation of managerial hubris for large serial companies. Hence our empirical analyses highlight the importance of distinguishing non-serial and serial deals when investigating the firm size effect.

As we observe that a failure to account for firms' propensity to enter the acquisitions market does not induce a bias in the returns to serial acquirers and the 'size effect' is still there, we further test on the query 'Should we attribute bad performance of large serial acquirers to large firm size?' We eventually evidence that after taking account of firm heterogeneity, large serial acquirers still disadvantage their shareholder returns. Combined with the fact that there is no difference between non-block and block acquirers in terms of the 'size effect', our empirical results support the existence of potential agency problem or managerial hubris of larger serial acquirers. However, when separating CARs in quartile ranges and employing simultaneous-quantile regressions to investigate the contribution of firm size on shareholder returns, we observe a gradually stronger and negative firm size effect from low CARs cohort to high CARs cohort. It shows that the impact of firm size is conditional on the CARs breakdown. To conclude, we cannot exclusively attribute the relatively worse performance of serial acquisitions to large firm size, so as managerial hubris and overconfidence in large firms.

References

Ahern, K.R. (2010). Q-theory and acquisition returns. *Working paper*.

Ahern, K.R. and Harford J. (2014). The importance of industry links in merger waves. *Journal of Finance*, 69 (2), 527-576.

Aktas, N., de Bodt, E., and Roll, R. (2009). Learning, hubris and corporate serial acquisitions. *Journal of Corporate Finance*, 15 (5), 543-561.

Aktas, N., de Bodt, E., and Roll, R. (2011). Serial acquirer bidding: An empirical test of the learning hypothesis. *Journal of Corporate Finance*, 17 (1), 18-32.

Aktas, N., de Bodt, E., and Roll, R. (2013). Learning from repetitive acquisitions: Evidence from the time between deals. *Journal of Financial Economics*, 108 (1), 99-117.

Ambrose, B.W. and Megginson, W.L. (1992). The role of assets structure, ownership structure and takeover defenses in determining acquisition likelihood. *Journal of Financial and Quantitative Analysis*, 27 (4), 575-589.

Andrade, G., Mitchell, M.L. and Stafford, E. (2001). New evidence and perspectives on mergers. *Working paper*.

Arikan, A.M. and Stulz, R.M. (2016). Corporate acquisitions, diversification, and the firm's lifecycle. *Journal of Finance*, 71 (1), 139-194.

Billett, M.T. and Qian, Y. (2008). Are overconfident CEOs born or made? Evidence of self-attribution bias from frequent acquirers. *Management Science*, 54 (6), 1037-1051.

Cai, J., Song, M.H., and Walkling, R.A. (2011). Anticipation, acquisitions, and bidder returns: Industry shocks and the transfer of information across rivals. *Review of Financial Studies*, 24 (7), 2242-2285.

Celikyurt, U., Sevilir, M., and Shivdasani, A. (2010). Going public to acquire? The acquisition motive in IPOs. *Journal of Financial Economics*, 96 (3), 345-363.

Core, J.E., Holthausen, R.W., and Larcker, D.F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics*, 51 (3), 371-406.

Dechow, P.M. and Dichev, D.I. (2002). The quality of accruals and earnings: the role of accrual estimation errors. *The Accounting Review*, 77, 35-59.

Demerjian, R.P. (2007). Financial ratios and credit risk: the selection of financial ratio covenants in debt contracts. *Working paper*.

Dong, M., Hirshleifer, D., Richardson, S., and Teoh, S.H. (2006). Does investor misevaluation drive the takeover market? *Journal of Finance*, 61 (2), 725-762.

Efron, B. and Tibshirani, R. (1993). An introduction to the bootstrap. *Chapman & Hall*, New York.

Faccio, M., McConnell, J.J., and Stolin, D. (2006). Returns to acquirers of listed and unlisted targets. *Journal of Financial and Quantitative Analysis*, 41 (1), 197-220.

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

Golubov, A., Yawson, A., and Zhang, H. (2015). Extraodinary acquirers. *Journal of Financial Economics*, 116 (2), 314-330.

Gorton, G., Kahl, M., and Rosen, R.J. (2009). Eat or be eaten: A theory of mergers and firm size. *Journal of Finance*, 64 (3), 1291-1344.

Gomes, J. and Livdan, D. (2004). Optimal diversification: reconciling theory and evidence. *Journal of Finance*, 59 (2), 507-535.

Harford, J. (1999). Corporate cash reserves and acquisitions. *Journal of Finance*, 54 (6), 1969-1997.

Harford, J. (2005). What drives merger waves? *Journal of Financial Economics*, 77 (3), 529-560.

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

Harford, J. and Li, K. (2007). Decoupling CEO wealth and firm performance: The case of acquiring CEOs. *Journal of Finance*, 62 (2), 917-949.

Humphery-Jenner, M. and Powell, R. (2011). Firm size, takeover profitability, and the effectiveness of the market for corporate control: Does the absence of anti-takeover provisions make a difference? *Journal of Corporate Finance*, 17 (3), 418-437.

Humphery-Jenner, M. and Powell, R. (2014). Firm size, sovereign governance, and value creation: Evidence from the acquirer size effect. *Journal of Corporate Finance*, 26, 57-77.

Heckman, J.J. (1979). Sample selection bias as a specification error. *Econometrica*, 47 (1), 153-161.

Jensen, M.C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*,76 (2), 323-329.

Jensen, M.C. (1988). Takeovers: Their causes and consequences. *Journal of Economic Perspectives*, 2 (1), 21-48.

Jovanovic, B. and Rousseau, P.L. (2002). The Q-theory of mergers. *American Economic Review*, 92 (2), 198-204.

Karpoff, J.M., Schonlau, R., and Wehrly, E. (2015). Do takover defenses deter takeovers? *Working paper*.

Li, K. and Prabhala, N.R. (2007). Self-selection models in corporate finance. *Handbook of Corporate Finance*, 1, 37-86.

Macias, A.J., Rau, P.R., and Stouraitis, A. (2016). Can serial acquirers be profiled? *Working paper*.

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

Maksimovic, V., Phillips, G., and Yang, L. (2013). Private and public merger waves. *Journal of Finance*, 68 (5), 2177-2217.

Masulis, R.W., Wang, C., and Xie, F. (2007). Corporate governance and acquirer returns. *Journal of Finance*, 62 (4), 1851-1889.

Miller, D. and Friesen P.H. (1984). A longitudinal study of the corporate life cycle. *Management Science*, 30 (10), 1161-1183.

Mitchell, M.L. and Lehn, K. (1990). Do bad bidders become good targets? *Journal of Political Economy*, 98 (2), 372-398.

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

Moeller, S.B., Schlingemann, F.P., and Stulz, R.M. (2005). Wealth destruction on a massive scale?A study of acquiring-firm returns in the recent merger wave. *Journal of Finance*, 60 (2), 757-782.

Mulligan, B.C. and Rubinstein, Y. (2008). Selection, Investment, and Women's relative wages over time, *Quarterly Journal of Economics*, 123 (3), 1061-1110.

Netter, J., Stegemoller, M., and Wintoki M.B. (2011). Implications of data screens on merger and acquisition analysis: A large sample study of mergers and acquisitions from 1992 to 2009. *Review of Financial Studies*, 24 (7), 2242-2285.

Owen, S. and Yawson, A. (2010). Corporate life cycle and M&A activity. *Journal of Banking and Finance*, 34 (2), 427-440.

Palepu, G.K. (1986). Predicting takeover targets: A methodological and empirical analysis. *Journal of Accounting and Economics*, 8 (1), 3-35.

Phalippou, L., Xu, F., and Zhao, H. (2014). Acquiring acquirers. *Review of Finance*, 19 (4), 1489-1541.

Powell, G.R. (1997). Modelling takeover likelihood. *Journal of Business Finance and Accounting*, 24 (7) & (8), 1009-1030.

Rhodes-Kropf, M., and Viswanathan, S. (2004). Market valuation and merger waves. *Journal of Finance*, 59 (6), 2685-2718.

Rhodes-Kropf, M., Robinson, D.T., and Viswanathan, S. (2005). Valuation waves and merger activity: the empirical evidence. *Journal of Financial Economics*, 77 (3), 561-603.

Roll, R. (1986). The hubris hypothesis of corporate takeovers. *Journal of Business*, 59 (2), 197-216.

Rossi, S. and Volpin, F.P. (2004). Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics*, 74 (2), 277-304.

Schneider, C. and Spalt, O.G. (2016). Why does size matter so much for bidder announcement returns? *Working paper*.

Servaes, H. (1996). The value of diversification during the conglomerate merger wave. *Journal of Finance*, 51 (4), 1201-1225.

Trautwein, F. (1990). Merger motives and merger prescriptions. *Strategic Management*, 11 (4), 283-295.

Wang, C. and Xie, F. (2009). Corporate governance transfer and synergistic gains from mergers and acquisitions. *Review of Financial Studies*, 22 (2), 829-858.

Warusawitharana, M. (2008). Corporate asset purchases and sales: Theory and evidence. *Journal of Financial Economics*, 87 (2), 471-497.

Appendix

Table A1: Definitions for acquirer and deal and listed-firm characteristics

This table presents definitions for acquirer and deal and listed-firm characteristics for the sample described in Table 1.

Acquirer and deal and listed-firm characteristics	Definition
SIZE (book value)	Firm size. Book value of total assets. For the reporting period end before the (latent) acquisition announcement year from the Datastream database. In million dollar units and real (2014) terms. 99 percent winsorized.
SIZE (market value)	Firm size. Market value of equity minus book value of equity plus SIZE (book value) in nominal terms and non-winsorized. For the reporting period end before the (latent) acquisition announcement year from the Datastream database. In million dollar units and real (2014) terms. 99 percent winsorized.
AGE	Firm age. (Latent) acquisition announcement year minus base year in the Datastream database (minimum 1964) plus one.
AGE_PRE1964	Maximum firm age. Binary variable for AGE equal to (latent) acquisition announcement year minus 1964 plus one.
Q_RATIO	Market to book ratio. SIZE (market value) non-winsorized divided by SIZE (book value) non-winsorized. For the reporting period end before the (latent) acquisition announcement year from the Datastream database. 99 percent winsorized.
Q_RATIO (industry-adjusted)	Industry-adjusted market to book ratio. Q_RATIO minus median Q_RATIO for the Industry Classification Benchmark super-sector.
SALES_GROWTH	Growth rate of sales. Average growth rate of sales for a maximum of three and a minimum of two reporting period ends before the (latent) acquisition announcement year from the Datastream database. Sales are annualized and in real (2014) terms. In decimal units. 99 percent winsorized.
SALES_GROWTH (industry-adjusted)	Industry-adjusted growth rate of sales. SALES_GROWTH minus median SALES_GROWTH for the Industry Classification Benchmark super-sector.
ROA	Return on assets. Operating income plus depreciation (annualized) divided by SIZE (book value) in nominal terms and non-winsorized. For the reporting period end before the (latent) acquisition announcement year from the Datastream database. 99 percent winsorized.
ROA (industry-adjusted)	Industry-adjusted return on assets. ROA minus median ROA for the Industry Classification Benchmark super-sector.
ROA_VOLATILITY	Volatility of return on assets. Standard deviation of ROA for a maximum of three and a minimum of two reporting period ends before the (latent) acquisition announcement year.
ROA_VOLATILITY (industry-adjusted)	Industry-adjusted volatility of return on assets. ROA_VOLATILITY minus median ROA_VOLATILITY for the Industry Classification Benchmark super-sector.
LEVERAGE	Leverage ratio. Book value of total debt divided by SIZE (book value) in nominal terms and non-winsorized. For the reporting period end before the (latent) acquisition announcement year from the Datastream database. 99 percent winsorized.
LEVERAGE (industry-adjusted)	Industry-adjusted leverage ratio. LEVERAGE minus median LEVERAGE for the Industry Classification Benchmark super-sector.
LIQUIDITY	Liquidity ratio. Cash and marketable securities divided by SIZE (book value) in nominal terms and non-winsorized. For the reporting period end before the (latent) acquisition announcement year from the Datastream database. 99 percent winsorized.

Table A1 (cont.): Definitions for acquirer and deal and listed-firm characteristics

This table presents definitions for acquirer and deal and listed-firm characteristics for the sample described in Table 1.

Acquirer and deal and listed-firm characteristics	Definition
LIQUIDITY (industry-adjusted)	Industry-adjusted liquidity ratio. LIQUIDITY minus median LIQUIDITY for the Industry Classification Benchmark super-sector.
DEAL_SIZE	Deal size. Deal value multiplied by $\frac{1}{1 - \text{toehold}}$ from the SDC Platinum database. In million dollar units and real (2014) terms. 99 percent winsorized.
RELATIVE_SIZE	Deal size to acquirer size ratio. DEAL_SIZE non-winsorized divided by SIZE (market value) for the reporting period end in the acquisition announcement year and non-winsorized. 99 percent winsorized.
PUBLIC_DEAL	Public deal. Binary variable for an acquisition of a public firm from the SDC Platinum database.
PRIVATE_DEAL	Private deal. Binary variable for an acquisition of a private firm from the SDC Platinum database.
SUBSIDIARY_DEAL	Subsidiary deal. Binary variable for an acquisition of a subsidiary firm from the SDC Platinum database.
DIVERSIFYING_DEAL	Diversifying deal. Binary variable for a cross-industry acquisition from the SDC Platinum database.
XBORDER_DEAL	Cross-border deal. Binary variable for a cross-country acquisition from the SDC Platinum database.
STOCK_DEAL	Stock deal. Binary variable for an acquisition paid for all in stock from the SDC Platinum database.
CASH_DEAL	Cash deal. Binary variable for an acquisition paid for all in cash from the SDC Platinum database.
MIXED_DEAL	Mixed payment deal. Binary variable for an acquisition paid for in any combination of stock and cash and other forms from the SDC Platinum database.
UNSOLICITED_DEAL	Unsolicited deal. Binary variable for an unsolicited acquisition from the SDC Platinum database.
RIVAL_DEAL	Rival deal. Binary variable for an existing rival acquisition attempt from the SDC Platinum database.
SERIAL_DEAL	Serial deal. Binary variable for a deal following in the preceding three years at least one other acquisition in the SDC Platinum database (meeting criteria as for the sample acquisitions) with the same acquirer Datastream database code.
BLOCK_DEAL	Block deal. Binary variable for a deal following in the preceding year at least one other acquisition in the SDC Platinum database (meeting criteria as for the sample acquisitions) with the same acquirer Datastream database code.
SIZE_MEDIAN (market value)	Industry median listed firm size. Median SIZE (market value) for the Industry Classification Benchmark super-sector.
SIZE_MEDIAN (book value)	Industry median listed firm size. Median SIZE (book value) for the Industry Classification Benchmark super-sector.
CONCENTRATION	Industry listed firm concentration. Herfindahl index for the shares of sales (annualized and in decimal units) for the Industry Classification Benchmark super-sector. For reporting period ends before the (latent) acquisition announcement year from the Datastream database.

AGE_MEDIAN	Industry median listed firm age. Median AGE for the Industry Classification Benchmark super-sector.

Table A1 (cont.): Definitions for acquirer and deal and listed-firm characteristics

This table presents definitions for acquirer and deal and listed-firm characteristics for the sample described in Table 1.

Acquirer and deal and listed-firm characteristics	Definition
AGE_DISPERSION	Industry dispersion of listed firm age. Thiel index for AGE for the Industry Classification Benchmark super-sector.
INDUSTRY_DURATION	Industry deal duration. Number of days (maximum 730) before the (latent) acquisition announcement year to an acquisition in the SDC Platinum database (meeting criteria as for the sample acquisitions except deals with DEAL_SIZE less than ten million dollars are excluded) for the Industry Classification Benchmark super-sector.
INDUSTRY_INTENSITY	Industry deal intensity. Total number of deals divided by number of listed firms multiplied by aggregate DEAL_SIZE divided by aggregate SIZE (market value) for reporting period ends in the (latent) acquisition announcement year and Industry Classification Benchmark super-sector.
INDUSTRY_WAVE	Industry deal wave. Binary variable for INDUSTRY_INTENSITY at least one standard deviation above the average INDUSTRY_INTENSITY for Industry Classification Benchmark super-sectors.
DEAL_INTENSITY	Deal intensity. Total number of deals divided by number of listed firms multiplied by aggregate DEAL_SIZE divided by aggregate SIZE (market value) for reporting period ends in the (latent) acquisition announcement year.
DEAL_WAVE	Deal wave. Binary variable for DEAL_INTENSITY at least one standard deviation above the average DEAL_INTENSITY.

Table 1: Sample

This table describes the sample by showing annual frequencies and values and intensities of acquisitions announced by UK listed firms during the period 1989-2014. Acquisitions are from the SDC Platinum database and comprised of domestic and cross-border deals for public and private and subsidiary firms that involve the purchase of at least 50 percent of the share capital and end in outright ownership. Deals with a value (multiplied by $\frac{1}{1 - \text{toehold}}$) less than one million dollars in real (2014) terms and acquisitions by or for firms in financial and utility industies are excluded. Acquisitions are merged with annual populations of listed firms reconstructed from live and dead constituents of the Datastream database after excluding financials and utilities. Serial deals follow in the preceding three years at least one other acquisition (meeting criteria as for the sample acquisitions) with the same acquirer Datastream code. Listed firms/ acquirers can do non-serial and (multiple) serial deals in the same (latent) acquisition announcement year. Listed firm size is defined as market value of equity minus book value of equity plus book value of total assets for the reporting period end in the (latent) acquisition announcement year. Sizes of deals and listed firms are in trillion dollar units and real terms and 99 percent winsorized. Deal intensity is the total number of deals divided by number of listed firms multiplied by aggregate size of all deals divided by aggregate size of listed firms.

Year	No. of non-serial deals/ acquirers	Aggregate size of non-serial deals	No. of serial deals	No. of serial acquirers	Aggregate size of serial deals	Total no. of deals	Total no. of acquirers	Aggregate size of all deals	No. of listed firms	Aggregate size of listed firms	Deal intensity
1989	332	32.5	156	81	6.7	488	324	39.2	1,128	2,745.2	0.618
1990	171	20.2	229	137	18.3	400	278	38.5	1,153	3,179.4	0.421
1991	93	7.8	179	114	20.5	272	194	28.3	1,161	2,791.8	0.238
1992	83	7.2	188	115	18.1	271	184	25.3	1,169	3,668.9	0.160
1993	120	3.8	213	138	13.4	333	242	17.2	1,248	3,812.2	0.120
1994	131	13.0	275	175	14.3	406	279	27.4	1,338	3,754.2	0.221
1995	127	8.0	271	172	27.7	398	283	35.6	1,465	3,896.1	0.248
1996	161	14.2	305	196	9.7	466	334	23.9	1,624	4,265.1	0.161
1997	203	16.5	441	253	34.5	644	418	51.0	1,730	4,553.9	0.417
1998	190	21.4	500	288	31.9	690	444	53.4	1,762	5,135.5	0.407
1999	156	22.3	486	297	66.5	642	414	88.8	1,726	5,293.6	0.624
2000	178	17.8	483	282	43.2	661	429	61.0	1,797	5,643.8	0.398
2001	138	9.0	334	217	34.8	472	336	43.7	1,765	5,548.0	0.211
2002	111	15.1	245	164	39.5	356	262	54.6	1,760	5,165.9	0.214
2003	89	7.0	199	130	33.2	288	209	40.1	1,736	4,841.6	0.138
2004	123	6.8	260	169	41.3	383	266	48.1	1,837	5,195.8	0.193

Table 1 (cont.): Sample

This table describes the sample by showing annual frequencies and values and intensities of acquisitions announced by UK listed firms during the period 1989-2014. Acquisitions are from the SDC Platinum database and comprised of domestic and cross-border deals for public and private and subsidiary firms that involve the purchase of at least 50 percent of the share capital and end in outright ownership. Deals with a value (multiplied by $\frac{1}{1 - \text{toehold}}$) less than one million dollars in real (2014) terms and acquisitions by or for firms in financial and utility industies are excluded. Acquisitions are merged with annual populations of listed firms reconstructed from live and dead constituents of the Datastream database after excluding financials and utilities. Serial deals follow in the preceding three years at least one other acquisition (meeting criteria as for the sample acquisitions) with the same acquirer Datastream code. Listed firms/ acquirers can do non-serial and (multiple) serial deals in the same (latent) acquisition announcement year. Listed firm size is defined as market value of equity minus book value of equity plus book value of total assets for the reporting period end in the (latent) acquisition announcement year. Sizes of deals and listed firms are in trillion dollar units and real terms and 99 percent winsorized. Deal intensity is the total number of deals divided by number of listed firms multiplied by aggregate size of all deals divided by aggregate size of listed firms.

Year	No. of non-serial deals/ acquirers	Aggregate size of non-serial deals	No. of serial deals	No. of serial acquirers	Aggregate size of serial deals	Total no. of deals	Total no. of acquirers	Aggregate size of all deals	No. of listed firms	Aggregate size of listed firms	Deal intensity
2005	189	14.2	284	170	39.5	473	331	53.7	2,040	5,505.9	0.226
2006	180	19.2	333	212	26.7	513	360	46.0	2,114	6,593.8	0.169
2007	131	6.7	403	239	32.9	534	346	39.6	2,100	6,591.8	0.153
2008	86	10.7	222	144	20.1	308	219	30.8	1,982	7,386.8	0.065
2009	60	3.8	120	81	12.1	180	135	16.0	1,789	7,098.8	0.023
2010	87	9.8	165	99	24.9	252	175	34.7	1,658	5,581.4	0.095
2011	102	19.5	146	92	15.0	248	184	34.5	1,580	6,355.6	0.085
2012	72	3.1	132	89	13.5	204	155	16.6	1,532	6,229.8	0.036
2013	82	3.4	153	97	13.8	235	171	17.3	1,517	6,305.5	0.042
2014	94	10.8	173	114	10.5	267	199	21.2	1,540	6,554.4	0.056
Total	3,489	324.0	6,895	4,265	662.6	10,384	7,171	986.6	42,251	133,694.3	0.181

Table 2: Descriptive statistics for acquirer and deal characteristics

This table presents descriptive statistics for acquirer and deal characteristics for the sample described in Table 1. The descriptive statistics are presented at the level of the deal. Acquirer and deal characteristics are defined in Table A1 of the Appendix. $^{\$\$, \$}$ indicate significance of mean (median) differences in acquirer and deal characteristics between non-serial and serial deals at the one and five percent levels respectively.

	All deals			Non-serial deals			Serial deals		
Acquirer and deal characteristics	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**
SIZE (market value)	7,765.1	30,875.1	9,251	5,946.0	27,115.3	2,818	8,561.9$^{\$\$}$	32,354.7	6,433
	(596.1)			(237.6)			(806.4)$^{\$\$}$		
SIZE (book value)	3,958.4	16,911.7	9,520	3,320.9	15,303.6	3,002	4,252.0$^{\$}$	17,596.4	6,518
	(286.8)			(128.4)			(382.3)$^{\$\$}$		
AGE	16.6	13.1	10,302	13.8	12.4	3,453	17.9$^{\$\$}$	13.2	6,849
	(12.0)			(9.0)			(14.0)$^{\$}$		
AGE_PRE1964	0.003	0.053	10,384	0.002	0.048	3,489	0.003	0.055	6,895
Q_RATIO	2.070	1.867	9,251	2.079	2.071	2,818	2.067	1.770	6,433
	(1.546)			(1.447)			(1.586)$^{\$\$}$		
Q_RATIO (industry-adjusted)	0.473	1.894	9,251	0.520	2.092	2,818	0.452	1.801	6,433
	(0.042)			(-0.021)			(0.073)$^{\$\$}$		
SALES_GROWTH	0.511	1.619	8,846	0.412	1.469	2,637	0.553$^{\$\$}$	1.676	6,209
	(0.165)			(0.119)			(0.182)$^{\$\$}$		
SALES_GROWTH (industry-adjusted)	0.359	1.616	8,846	0.251	1.464	2,637	0.405$^{\$\$}$	1.674	6,209
	(0.025)			(-0.026)			(0.046)$^{\$\$}$		
ROA	0.067	0.183	9,452	0.031	0.235	2,959	0.084$^{\$\$}$	0.151	6,493
	(0.093)			(0.083)			(0.097)$^{\$\$}$		
ROA (industry-adjusted)	-0.001	0.186	9,452	-0.039	0.236	2,959	0.016$^{\$\$}$	0.155	6,493
	(0.016)			(0.001)			(0.021)$^{\$\$}$		
ROA_VOLATILITY	0.085	0.202	8,229	0.113	0.248	2,389	0.073$^{\$\$}$	0.179	5,840
	(0.027)			(0.034)			(0.025)$^{\$\$}$		
ROA_VOLATILITY (industry-adjusted)	0.041	0.202	8,229	0.071	0.247	2,389	0.030$^{\$\$}$	0.180	5,840
	(-0.007)			(0.000)			(-0.009)$^{\$\$}$		

Table 2 (cont.): Descriptive statistics for acquirer and deal characteristics

This table presents descriptive statistics for acquirer and deal characteristics for the sample described in Table 1. The descriptive statistics are presented at the level of the deal. Acquirer and deal characteristics are defined in Table A1 of the Appendix. $^{\$\$, \$}$ indicate significance of mean (median) differences in acquirer and deal characteristics between non-serial and serial deals at the one and five percent levels respectively.

	All deals			Non-serial deals			Serial deals		
Acquirer and deal characteristics	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**
LEVERAGE	0.194	0.171	9,514	0.176	0.183	3,000	0.202$^{\$\$}$	0.165	6,514
	(0.164)			(0.131)			(0.177)$^{\$\$}$		
LEVERAGE (industry-adjusted)	0.043	0.180	9,514	0.026	0.190	3,000	0.052$^{\$\$}$	0.174	6,514
	(0.014)			(-0.015)			(0.023)$^{\$\$}$		
LIQUIDITY	0.141	0.165	9,320	0.175	0.208	2,931	0.125$^{\$\$}$	0.138	6,389
	(0.085)			(0.093)			(0.082)$^{\$\$}$		
LIQUIDITY (industry-adjusted)	0.045	0.173	9,320	0.082	0.213	2,931	0.028	0.148	6,389
	(0.000)			(0.012)			(-0.004)		
DEAL_SIZE	101.192	327.936	10,384	100.871	332.055	3,489	101.354	325.856	6,895
	(15.714)			(14.288)			(16.600)$^{\$\$}$		
RELATIVE_SIZE	0.145	0.337	9,251	0.230	0.446	2,818	0.107$^{\$\$}$	0.268	6,433
	(0.035)			(0.067)			(0.027)$^{\$\$}$		
PUBLIC_DEAL	0.071	0.258	10,384	0.092	0.289	3,489	0.061$^{\$\$}$	0.239	6,895
PRIVATE_DEAL	0.590	0.492	10,384	0.569	0.495	3,489	0.601$^{\$\$}$	0.490	6,895
SUBSIDIARY_DEAL	0.338	0.473	10,384	0.339	0.474	3,489	0.338	0.473	6,895
DIVERSIFYING_DEAL	0.511	0.500	10,384	0.503	0.500	3,489	0.515	0.500	6,895
XBORDER_DEAL	0.311	0.463	10,384	0.273	0.445	3,489	0.330$^{\$\$}$	0.470	6,895
STOCK_DEAL	0.306	0.461	10,384	0.333	0.471	3,489	0.292$^{\$\$}$	0.455	6,895
CASH_DEAL	0.453	0.498	10,384	0.394	0.489	3,489	0.482$^{\$\$}$	0.500	6,895
MIXED_DEAL	0.156	0.363	10,384	0.174	0.379	3,489	0.147$^{\$\$}$	0.355	6,895
UNSOLICITED_DEAL	0.003	0.059	10,384	0.005	0.072	3,489	0.003$^{\$}$	0.051	6,895
RIVAL_DEAL	0.005	0.074	10,384	0.005	0.074	3,489	0.006	0.074	6,895

Table 3: Descriptive statistics for acquirer cumulative abnormal returns

This table presents descriptive statistics for acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The descriptive statistics are presented at the level of the deal. CARs (in percentage units and 99 percent winsorized) are continuously compounded for the three trading days centred on the acquisition announcement date and estimated with a market model and FTSE All Share benchmark from the Datastream database. Market model parameters are estimated for the period from 302 to 43 trading days before the acquisition announcement date. CARs are shown for acquirer size quartiles based on SIZE (market value) defined in Table A1 of the Appendix. **, * indicate significance of CARs at the one and five percent levels respectively. $$, $ indicate significance of mean (median) differences in CARs between non-serial and serial deals at the one and five percent levels respectively.

Acquirer size quartiles	All deals			Non-serial deals			Serial deals		
	Mean (Med.)	Std dev.	No. of obs.	Mean (Med.)	Std dev.	No. of obs.	Mean (Med.)	Std dev.	No. of obs.
All	1.013**	7.924	9,454	1.760**	11.202	2,953	0.674**,$$	5.828	6,501
	(0.252)**			(0.342)**			(0.230)**		
First quartil (46.7)	3.137**	15.981	859	4.900**	19.580	502	0.659$$	8.094	357
	(0.545)**			(0.621)**			(0.342)**		
Second quartil (168.3)	1.704**	9.353	1,580	1.940**	12.099	640	1.544**	6.886	940
	(0.482)**			(0.531)**			(0.446)**		
Third quartil (848.8)	0.771**	5.447	2,566	1.066**	5.921	700	0.661**	5.256	1,866
	(0.230)**			(0.239)**			(0.228)**		
Fourth quartil	0.460**	4.437	3,860	0.635**	4.854	818	0.413**	4.317	3,042
	(0.194)**			(0.155)**			(0.202)**		
Second minus First	-1.433**			-2.960**			0.885*		
	(-0.062)			(-0.091)			(0.105)		
Third minus First	-2.366**			-3.834**			0.001		
	(-0.315)*			(-0.382)*			(-0.114)		
Fourth minus First	-2.678**			-4.265**			-0.246		
	(-0.351)*			(-0.467)			(-0.139)		

Table 4: Cross-sectional linear regression estimates for acquirer cumulative abnormal returns

This table presents cross-sectional linear regression estimates for acquirer and deal characteristics on acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The cross-sectional linear regression estimates are presented at the level of the deal. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are bootstrapped (with 2,000 replications) and clustered at the level of the acquirer. **, * indicate significance of coefficients and Wald statistics at the one and five percent levels respectively.

Acquirer and deal characteristics	CARs					
	All deals		Non-serial deals		Serial deals	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
Constant	-0.0060	(0.0021)	-0.0106	(0.0187)	-0.0044	(0.0084)
SERIAL_DEAL	-0.0093**	(0.0021)				
BLOCK_DEAL					-0.0011	(0.0015)
ln(SIZE) (market value)	-0.0043**	(0.0009)	-0.0051*	(0.0021)	-0.0042**	(0.0007)
AGE	0.0002*	(0.0001)	0.0003	(0.0002)	0.0001	(0.0001)
AGE_PRE1964	-0.0050	(0.0087)	-0.0300	(0.0212)	0.0014	(0.0091)
Q_RATIO (industry-adjusted)	0.0014	(0.0015)	0.0024	(0.0038)	0.0002	(0.0010)
SALES_GROWTH (industry-adjusted)	-0.0015	(0.0011)	0.0005	(0.0021)	-0.0018	(0.0012)
ROA (industry-adjusted)	-0.0181	(0.0149)	-0.0405	(0.0243)	0.0057	(0.0133)
ROA_VOLATILITY (industry-adjusted)	-0.0069	(0.0086)	-0.0189	(0.0230)	-0.0037	(0.0055)
LEVERAGE (industry-adjusted)	-0.0026	(0.0069)	0.0097	(0.0180)	-0.0067	(0.0057)
LIQUIDITY (industry-adjusted)	-0.0163	(0.0083)	-0.0369	(0.0190)	-0.0065	(0.0068)
ln(DEAL_SIZE)	0.0028**	(0.0008)	0.0019	(0.0020)	0.0035**	(0.0008)
RELATIVE_SIZE	0.0087	(0.0103)	0.0263	(0.0191)	-0.0128*	(0.0059)
PRIVATE_DEAL	0.0248**	(0.0042)	0.0261**	(0.0072)	0.0215**	(0.0043)
SUBSIDIARY_DEAL	0.0252**	(0.0041)	0.0195**	(0.0074)	0.0251**	(0.0042)
DIVERSIFYING_DEAL	0.0014	(0.0015)	0.0021	(0.0042)	0.0009	(0.0014)
XBORDER_DEAL	0.0021	(0.0018)	0.0041	(0.0046)	0.0010	(0.0017)
CASH_DEAL	0.0007	(0.0017)	0.0021	(0.0044)	0.0005	(0.0015)
MIXED_DEAL	0.0018	(0.0036)	0.0088	(0.0100)	0.0001	(0.0026)
UNSOLICITED_DEAL	-0.0279*	(0.0123)	-0.0073	(0.0145)	-0.0400	(0.0211)
RIVAL_DEAL	-0.0068	(0.0084)	-0.0013	(0.0181)	-0.0075	(0.0104)
Wald statistics	276.88**		148.33**		204.46**	
Adjusted-R^2	0.039		0.059		0.0335	
No. of obs.	7,589		2,124		5,465	

Table 5: Descriptive statistics for listed firm characteristics

This table presents descriptive statistics for listed firm characteristics and deal charactristics for the sample described in Table 1. The descriptive statistics are presented at the level of the listed firm/ acquirer for the (latent) acquisition announcement year. Listed firm characteristics are defined in Table A1 of the Appendix. $^{\$\$, \$}$ indicate significance of mean (median) differences in listed firm characteristics between non-acquirers and acquirers at the one and five percent levels respectively.

	All listed firms			Non-acquirers			All acquirers		
Listed firm characteristics	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**
SIZE (market value)	3,849.0	16,425.9	34,735	3,527.2	15,748.2	28,327	5,271.4$^{\$\$}$	19,072.6	6,408
	(168.5)			(137.7)			(421.0)$^{\$\$}$		
SIZE (book value)	2,539.4	10,915.3	36,573	2,351.7	10,548.8	29,963	3,390.2$^{\$\$}$	12,407.5	6,610
	(108.2)			(91.5)			(240.4)$^{\$\$}$		
AGE	14.0	12.5	42,251	13.5	12.3	35,080	16.4$^{\$\$}$	13.0	7,171
	(9.0)			(9.0)			(12.0)$^{\$\$}$		
AGE_PRE1964	0.1	0.3	42,251	0.094	0.292	35,080	0.167$^{\$\$}$	0.373	7,171
Q_RATIO	2.040	2.264	34,731	2.045	2.334	28,323	2.019	1.919	6,408
	(1.371)			(1.339)			(1.501)$^{\$\$}$		
Q_RATIO (industry-adjusted)	0.571	2.175	34,731	0.583	2.250	28,323	0.516$^{\$}$	1.805	6,408
	(0.000)			(-0.010)			(0.071)$^{\$\$}$		
SALES_GROWTH	0.411	1.403	29,866	0.458	1.663	26,999	0.446	1.473	6,115
	(0.118)			(0.116)			(0.149)$^{\$\$}$		
SALES_GROWTH (industry-adjusted)	0.320	1.617	33,114	0.323	1.650	26,999	0.303	1.461	6,115
	(0.000)			(-0.003)			(0.020)$^{\$\$}$		
ROA	-0.038	0.393	36,049	-0.058	0.414	29,499	0.050$^{\$\$}$	0.262	6,550
	(0.061)			(0.053)			(0.090)$^{\$\$}$		
ROA (industry-adjusted)	-0.082	0.378	36,049	-0.098	0.398	29,499	-0.011$^{\$\$}$	0.255	6,550
	(0.000)			(-0.004)			(0.015)$^{\$\$}$		
ROA_VOLATILITY	0.151	0.394	32,089	0.162	0.410	26,365	0.102$^{\$\$}$	0.304	5,724
	(0.039)			(0.043)			(0.028)$^{\$\$}$		
ROA_VOLATILITY (industry-adjusted)	0.100	0.387	32,089	0.110	0.403	26,365	0.057$^{\$\$}$	0.298	5,724
	(0.000)			(0.001)			(-0.004)$^{\$\$}$		

Table 5 (cont.): Descriptive statistics for listed firm characteristics

This table presents descriptive statistics for listed firm characteristics and deal charactristics for the sample described in Table 1. The descriptive statistics are presented at the level of the listed firm/ acquirer for the (latent) acquisition announcement year. Listed firm characteristics are defined in Table A1 of the Appendix. $^{\$\$, \$}$ indicate significance of mean (median) differences in listed firm characteristics between non-acquirers and acquirers at the one and five percent levels respectively.

	All listed firms			Non-acquirers			All acquirers		
Listed firm characteristics	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**
LEVERAGE	0.192	0.211	36,526	0.192	0.218	29,919	0.190	0.179	6,607
	(0.143)			(0.139)			(0.158)$^{\$\$}$		
LEVERAGE (industry-adjusted)	0.049	0.205	36,526	0.052	0.212	29,919	0.033$^{\$\$}$	0.168	6,607
	(0.000)			(0.000)			(0.002)$^{\$}$		
LIQUIDITY	0.169	0.209	35,853	0.174	0.215	29,396	0.147$^{\$\$}$	0.178	6,457
	(0.089)			(0.091)			(0.084)$^{\$\$}$		
LIQUIDITY (industry-adjusted)	0.063	0.196	35,853	0.066	0.201	29,396	0.049$^{\$\$}$	0.170	6,457
	(0.000)			(0.000)			(0.000)		
SIZE_MEDIAN (market value)	416.5	1,441.1	42,244	400.1	1,398.3	35,073	497.1$^{\$\$}$	1,632.2	7,171
	(172.1)			(160.2)			(195.8)$^{\$\$}$		
SIZE_MEDIAN (book value)	300.6	1,115.0	42,247	287.0	1,076.8	35,076	367.2$^{\$\$}$	1,283.8	7,171
	(107.2)			(105.7)			(119.2)$^{\$\$}$		
CONCENTRATION	0.142	0.133	42,251	0.147	0.136	35,080	0.121$^{\$\$}$	0.118	7,171
	(0.089)			(0.093)			(0.080)$^{\$\$}$		
AGE_MEDIAN	9.6	2.5	42,251	9.6	2.4	35,080	9.9$^{\$\$}$	2.8	7,171
	(10.0)			(10.0)			(10.0)		
AGE_DISPERSION	0.340	0.094	42,251	0.340	0.094	35,080	0.339	0.095	7,171
	(0.336)			(0.334)			(0.336)		
INDUSTRY_DURATION	527.2	303.4	42,251	522.4	304.9	35,080	550.4$^{\$\$}$	295.0	7,171
	(730.0)			(730.0)			(730.0)		
INDUSTRY_INTENSITY	2.612	12.646	42,251	2.402	11.984	35,080	3.641 $^{\$\$}$	15.440	7,171
	(0.317)			(0.291)			(0.620)$^{\$\$}$		
INDUSTRY_WAVE	0.180	0.384	42,251	0.166	0.372	35,080	0.247$^{\$\$}$	0.431	7,171

Table 5 (cont.): Descriptive statistics for listed firm characteristics

This table presents descriptive statistics for listed firm characteristics and deal charactristics for the sample described in Table 1. The descriptive statistics are presented at the level of the listed firm/ acquirer for the (latent) acquisition announcement year. Listed firm characteristics are defined in Table A1 of the Appendix. $^{\$\$, \$}$ indicate significance of mean (median) differences in listed firm characteristics between non-acquirers and acquirers at the one and five percent levels respectively.

	All listed firms			Non-acquirers			All acquirers		
Listed firm characteristics	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**	**Mean (Med.)**	**Std dev.**	**No. of obs.**
DEAL_INTENSITY	0.215	0.158	42,251	0.206	0.154	35,080	0.259$^{\$\$}$	0.169	7,171
	(0.169)			(0.169)			(0.214)$^{\$\$}$		
DEAL_WAVE	0.255	0.436	42,251	0.233	0.423	35,080	0.361$^{\$\$}$	0.480	7,171

Table 6: Pooled cross-sectional probit regression estimates for acquisition likelihood

This table presents pooled cross-sectional probit regression estimates for listed firm characteristics on acquisition likelihood for the sample described in Table 1. The pooled cross-sectional probit regression estimates are presented at the level of the listed firm/ acquirer for the (latent) acquisition announcement year. The likelihood model for non-serial acquirers includes listed (control) firms that are serial acquirers for the (latent) acquisition announcement year and vice versa. Listed firm characteristics are defined in Table A1 of the Appendix. Standard errors are bootstrapped (with 2,000 replications) and clustered at the level of the listed firm/ acquirer. **, * indicate significance of average marginal effects (AMEs) and Wald statistics at the one and five percent levels respectively.$^{\$\$,\$}$ indicate significance of the coefficient difference in models of being non-serial and serial acquirers at the one and five percent levels respectively.

Listed firm characteristics	**Acquisition likelihood**					
	All acquirers		**Non-serial acquirers**		**Serial acquirers**	
	AME	**Std error**	**AME**	**Std error**	**AME**	**Std error**
Constant	0.1892**	(0.0037)	0.0686**	(0.0013)	0.1238**,$\$\$$	(0.0035)
ln(SIZE) (market value)	0.0273**	(0.0021)	0.0020**	(0.0007)	0.0255**,$\$\$$	(0.0020)
AGE	0.0000	(0.0004)	-0.0003	(0.0001)	0.0002	(0.0003)
AGE_PRE1964	0.0149	(0.0139)	0.0174**	(0.0045)	-0.0010	(0.0125)
Q_RATIO (industry-adjusted)	0.0045*	(0.0019)	0.0011	(0.0009)	0.0029	(0.0018)
SALES_GROWTH (industry-adjusted)	0.0047**	(0.0017)	-0.0025	(0.0013)	0.0077**,$\$\$$	(0.0014)
ROA (industry-adjusted)	0.0936**	(0.0140)	0.0259**	(0.0062)	0.0966**,$\$\$$	(0.0179)
ROA_VOLATILITY (industry-adjusted)	0.0185*	(0.0093)	0.0100*	(0.0046)	0.0024	(0.0097)
LEVERAGE (industry-adjusted)	-0.1018**	(0.0177)	-0.0272**	(0.0081)	-0.0798**,$\$$	(0.0169)
LIQUIDITY (industry-adjusted)	-0.0244	(0.0191)	0.0402**	(0.0090)	-0.0859**,$\$\$$	(0.0197)
ln(SIZE_MEDIAN) (market value)	-0.0015	(0.0047)	0.0023	(0.0017)	-0.0015	(0.0044)
CONCENTRATION	-0.1673**	(0.0321)	-0.0104	(0.0111)	-0.1765**,$\$\$$	(0.0342)
AGE_MEDIAN	0.0027**	(0.0009)	0.0006	(0.0004)	0.0023**	(0.0008)
AGE_DISPERSION	0.2003**	(0.0472)	0.0125	(0.0216)	0.2006**,$\$\$$	(0.0434)
INDUSTRY_DURATION	0.0000	(0.0000)	0.0000*	(0.0000)	0.0000	(0.0000)
INDUSTRY_WAVE	0.0384**	(0.0071)	0.0020	(0.0043)	0.0348**,$\$\$$	(0.0061)
DEAL_WAVE	0.0671**	(0.0062)	0.0297	(0.0035)	0.0410**	(0.0054)
Wald statistic	740.28**		275.7**		599.06**	
Pseudo-R^2	0.056		0.016		0.077	
No. of obs.	28,633		28,633		28,633	

Table 7: Heckman selection cross-sectional linear regression estimates for acquirer cumulative abnormal returns

This table presents Heckman selection cross-sectional linear regression estimates for acquirer and deal characteristics on acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The Heckman selection cross-sectional linear regression estimates are presented at the level of the deal. Mills ratios for the acquisition announcement year are predicted from the corresponding pooled cross-sectional probit regression estimates in Table 6. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are bootstrapped (with 2,000 replications) and clustered at the level of the acquirer. **, * indicate significance of coefficients and Wald statistics at the one and five percent levels respectively.

	CARs					
Acquirer and deal characteristics	**All deals**		**Non-serial deals**		**Serial deals**	
	Coefficient	**Std error**	**Coefficient**	**Std error**	**Coefficient**	**Std error**
Constant	-0.0574*	(0.0242)	-0.3449**	(0.1048)	-0.0047	(0.0165)
Mills ratio	0.0303*	(0.0126)	0.1849**	(0.0547)	0.0001	(0.0067)
SERIAL_DEAL	-0.0090**	(0.0021)				
BLOCK_DEAL					-0.0011	(0.0016)
ln(SIZE) (market value)	-0.0020	(0.0013)	-0.0019	(0.0022)	-0.0042**	(0.0009)
AGE	0.0002*	(0.0001)	0.0004*	(0.0002)	0.0001	(0.0001)
AGE_PRE1964	-0.0051	(0.0084)	-0.0277	(0.0222)	0.0014	(0.0092)
Q_RATIO (industry-adjusted)	0.0017	(0.0015)	0.0025	(0.0039)	0.0002	(0.0010)
SALES_GROWTH (industry-adjusted)	-0.0011	(0.0011)	-0.0025	(0.0022)	-0.0018	(0.0012)
ROA (industry-adjusted)	-0.0061	(0.0129)	-0.0026	(0.0198)	0.0057	(0.0125)
ROA_VOLATILITY (industry-adjusted)	-0.0045	(0.0080)	-0.0015	(0.0212)	-0.0037	(0.0054)
LEVERAGE (industry-adjusted)	-0.0106	(0.0070)	-0.0140	(0.0169)	-0.0067	(0.0058)
LIQUIDITY (industry-adjusted)	-0.0194*	(0.0084)	0.0080	(0.0190)	-0.0066	(0.0070)
ln(DEAL_SIZE)	0.0029**	(0.0008)	0.0021	(0.0019)	0.0035**	(0.0008)
RELATIVE_SIZE	0.0079	(0.0102)	0.0267	(0.0189)	-0.0128*	(0.0058)
PRIVATE_DEAL	0.0252**	(0.0041)	0.0266**	(0.0075)	0.0215**	(0.0044)
SUBSIDIARY_DEAL	0.0255**	(0.0040)	0.0203**	(0.0076)	0.0251**	(0.0043)
DIVERSIFYING_DEAL	0.0017	(0.0016)	0.0032	(0.0043)	0.0009	(0.0014)
XBORDER_DEAL	0.0019	(0.0018)	0.0012	(0.0047)	0.0010	(0.0017)
CASH_DEAL	0.0007	(0.0016)	0.0017	(0.0044)	0.0005	(0.0015)
MIXED_DEAL	0.0019	(0.0037)	0.0086	(0.0097)	0.0001	(0.0026)
UNSOLICITED_DEAL	-0.0288*	(0.0118)	-0.0059	(0.0140)	-0.0400	(0.0205)
RIVAL_DEAL	-0.0073	(0.0086)	-0.0085	(0.0179)	-0.0075	(0.0103)
Wald statistic	283.8**		144.9**		209.2**	
Adjusted-R^2	0.041		0.070		0.033	

Table 7 (cont.): Heckman selection cross-sectional linear regression estimates for acquirer cumulative abnormal returns

This table presents Heckman selection cross-sectional linear regression estimates for acquirer and deal characteristics on acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The Heckman selection cross-sectional linear regression estimates are presented at the level of the deal. Mills ratios for the acquisition announcement year are predicted from the corresponding pooled cross-sectional probit regression estimates in Table 6. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are bootstrapped (with 2,000 replications) and clustered at the level of the acquirer. **, * indicate significance of coefficients and Wald statistics at the one and five percent levels respectively.

Acquirer and deal characteristics	CARs					
	All deals		Non-serial deals		Serial deals	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
No. of obs.	7,589		2,124		5,465	

Table 8: Pooled cross-sectional probit regression estimates for non-block and block serial acquisition likelihood

This table presents pooled cross-sectional probit regression estimates for listed firm characteristics on non-block and block serial acquisition likelihood for the sample described in Table 1. The pooled cross-sectional probit regression estimates are presented at the level of the listed firm/ acquirer for the (latent) acquisition announcement year. Block serial deals follow in the preceding year at least one other acquisition in the SDC Platinum database (meeting criteria as for the sample acquisitions) with the same acquirer Datastream database code. Listed firms/ acquirers can do non-block and (multiple) block serial deals in the same (latent) acquisition announcement year. Block serial deals (serial acquirers) number 4,877 (2,408). The likelihood model for non-block serial acquirers includes listed (control) firms that are block serial acquirers (and vice versa) and non-serial acquirers for the (latent) acquisition announcement year. Listed firm characteristics are defined in Table A1 of the Appendix. Standard errors are bootstrapped (with 2,000 replications) and clustered at the level of the listed firm/ acquirer. **, * indicate significance of average marginal effects (AMEs) and Wald statistics at the one and five percent levels respectively.

	Acquisition likelihood			
Listed firm characteristics	**Non-block serial acquirers**		**Block serial acquirers**	
	AME	**Std error**	**AME**	**Std error**
Constant	0.0577**	(0.0018)	0.0680**	(0.0024
ln(SIZE) (market value)	0.0111**	(0.0010)	0.0147**	(0.0014)
AGE	0.0001	(0.0002)	0.0002	(0.0002)
AGE_PRE1964	0.0039	(0.0061)	-0.0056	(0.0086)
Q_RATIO (industry-adjusted)	-0.0014	(0.0011)	0.0037**	(0.0012)
SALES_GROWTH (industry-adjusted)	0.0025**	(0.0009)	0.0051**	(0.0011)
ROA (industry-adjusted)	0.0375**	(0.0109)	0.0701**	(0.0143)
ROA_VOLATILITY (industry-adjusted)	0.0019	(0.0058)	0.0002	(0.0076)
LEVERAGE (industry-adjusted)	-0.0472**	(0.0094)	-0.0336**	(0.0121)
LIQUIDITY (industry-adjusted)	-0.0347**	(0.0117)	-0.0545**	(0.0145)
ln(SIZE_MEDIAN) (market value)	0.0004	(0.0024)	-0.0018	(0.0031)
CONCENTRATION	-0.0579**	(0.0178)	-0.1339**	(0.0246)
AGE_MEDIAN	0.0008	(0.0005)	0.0016**	(0.0006)
AGE_DISPERSION	0.0712**	(0.0258)	0.1366**	(0.0315)
INDUSTRY_DURATION	0.0000	(0.0000)	0.0000	(0.0000)
INDUSTRY_WAVE	0.0133**	(0.0042)	0.0207**	(0.0044)
DEAL_WAVE	0.0165**	(0.0037)	0.0263**	(0.0042)
Wald statistic	382.4**		470.4**	
Pseudo-R^2	0.046		0.073	
No. of obs.	28,633		28,633	

Table 9: (Heckman selection) cross-sectional linear regression estimates for non-block and block serial acquirer cumulative abnormal returns

This table presents (Heckman selection) cross-sectional linear regression estimates for acquirer and deal characteristics on non-block and block serial acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The (Heckman selection) cross-sectional linear regression estimates are presented at the level of the deal. Mills ratios for the acquisition announcement year are predicted from the corresponding pooled cross-sectional probit regression estimates in Table 8. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are bootstrapped (with 2,000 replications) and clustered at the level of the acquirer. **, * indicate significance of coefficients and Wald statistics at the one and five percent levels respectively.

	CARs							
	Without Heckman selection				With Heckman selection			
Acquirer and deal characteristics	Non-block serial deals		Block serial deals		Non-block serial deals		Block serial deals	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
Constant	-0.0096	(0.0146)	-0.0075**	(0.0103)	0.0021	(0.0486)	-0.0144	(0.0184)
Mills ratio					-0.0049	(0.0187)	0.0029	(0.0065)
ln(SIZE) (market value)	-0.0049**	(0.0013)	-0.0038**	(0.0008)	-0.0053**	(0.0020)	-0.0036**	(0.0009)
AGE	0.0001	(0.0001)	0.0000	(0.0001)	0.0001	(0.0001)	0.0000	(0.0001)
AGE_PRE1964	0.0045	(0.0149)	-0.0021	(0.0106)	0.0048	(0.0155)	-0.0021	(0.0105)
Q_RATIO (industry-adjusted)	-0.0010	(0.0014)	0.0004	(0.0012)	-0.0010	(0.0014)	0.0004	(0.0013)
SALES_GROWTH (industry-adjusted)	-0.0031	(0.0028)	-0.0014	(0.0013)	-0.0032	(0.0027)	-0.0013	(0.0014)
ROA (industry-adjusted)	0.0023	(0.0135)	0.0067	(0.0182)	0.0007	(0.0142)	0.0087	(0.0181)
ROA_VOLATILITY (industry-adjusted)	0.0063	(0.0104)	-0.0080	(0.0071)	0.0062	(0.0106)	-0.0080	(0.0072)
LEVERAGE (industry-adjusted)	-0.0034	(0.0101)	-0.0073	(0.0068)	-0.0018	(0.0118)	-0.0080	(0.0072)
LIQUIDITY (industry-adjusted)	-0.0076	(0.0128)	-0.0057	(0.0081)	-0.0062	(0.0136)	-0.0069	(0.0082)
ln(DEAL_SIZE)	0.0026*	(0.0012)	0.0041**	(0.0009)	0.0026*	(0.0012)	0.0041**	(0.0009)
RELATIVE_SIZE	-0.0117	(0.0086)	-0.0126	(0.0078)	-0.0115	(0.0087)	-0.0127	(0.0079)
PRIVATE_DEAL	0.0215**	(0.0072)	0.0218**	(0.0056)	0.0215**	(0.0071)	0.0219**	(0.0055)

Table 9 (cont.): (Heckman selection) cross-sectional linear regression estimates for non-block and block serial acquirer cumulative abnormal returns

This table presents (Heckman selection) cross-sectional linear regression estimates for acquirer and deal characteristics on non-block and block serial acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The (Heckman selection) cross-sectional linear regression estimates are presented at the level of the deal. Mills ratios for the acquisition announcement year are predicted from the corresponding pooled cross-sectional probit regression estimates in Table 8. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are bootstrapped (with 2,000 replications) and clustered at the level of the acquirer. **, * indicate significance of coefficients and F-statistics at the one and five percent levels respectively.

	CARs							
	Without Heckman selection				**With Heckman selection**			
Acquirer and deal characteristics	**Non-block serial deals**		**Block serial deals**		**Non-block serial deals**		**Block serial deals**	
	Coefficient	**Std error**	**Coefficient**	**Std error**	**Coefficient**	**Std error**	**Coefficient**	**Std error**
SUBSIDIARY_DEAL	0.0243**	(0.0072)	0.0258**	(0.0056)	0.0243**	(0.0072)	0.0258**	(0.0056)
DIVERSIFYING_DEAL	0.0024	(0.0028)	0.0003	(0.0016)	0.0024	(0.0029)	0.0003	(0.0017)
XBORDER_DEAL	0.0044	(0.0031)	-0.0009	(0.0020)	0.0044	(0.0030)	-0.0009	(0.0020)
CASH_DEAL	-0.0019	(0.0030)	0.0019	(0.0018)	-0.0019	(0.0029)	0.0020	(0.0018)
MIXED_DEAL	-0.0045	(0.0050)	0.0018	(0.0031)	-0.0044	(0.0050)	0.0019	(0.0031)
UNSOLICITED_DEAL	-0.0113	(0.0191)	-0.0522	(0.0290)	-0.0111	(0.0191)	-0.0522	(0.0282)
RIVAL_DEAL	-0.0110	(0.0226)	-0.0071	(0.0099)	-0.0109	(0.0224)	-0.0071	(0.0096)
Wald statistic	126.8**		167.7**		129.1**		157.4**	
Adjusted-R^2	0.044		0.027		0.043		0.027	
No. of obs.	1,746		3,719		1,746		3,719	

Table 10: Cross-sectional linear regression estimates after controlling firm fixed effects for serial acquirer

This table presents firm fixed effects cross-sectional linear regression estimates for acquirer and deal characteristics on serial acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The firm fixed effects cross-sectional linear regression estimates are presented at the level of the deal. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are clustered at the level of the acquirer. **, * indicate significance of coefficients and F-statistics at the one and five percent levels respectively.

Acquirer and deal characteristics	CARs			
	Serial deals			
	Coefficient	Std error	Coefficient	Std error
Constant	-0.0149	(0.0201)	-0.0143	(0.0201)
BLOCK_DEAL			-0.0013	(0.0018)
ln(SIZE) (market value)	-0.0069**	(0.0026)	-0.0069**	(0.0026)
AGE	0.0006	(0.0004)	0.0006	(0.0004)
AGE_PRE1964	-0.0022	(0.0099)	-0.0022	(0.0099)
Q_RATIO (industry-adjusted)	0.0028	(0.0016)	0.0029	(0.0016)
SALES_GROWTH (industry-adjusted)	-0.0008	(0.0022)	-0.0008	(0.0022)
ROA (industry-adjusted)	-0.0204	(0.0217)	-0.0202	(0.0217)
ROA_VOLATILITY (industry-adjusted)	0.0097	(0.0118)	0.0097	(0.0118)
LEVERAGE (industry-adjusted)	0.0061	(0.0148)	0.0060	(0.0148)
LIQUIDITY (industry-adjusted)	-0.0167	(0.0124)	-0.0165	(0.0124)
ln(DEAL_SIZE)	0.0034**	(0.0010)	0.0033**	(0.0010)
RELATIVE_SIZE	-0.0119	(0.0087)	-0.0118	(0.0087)
PRIVATE_DEAL	0.0239**	(0.0050)	0.0241**	(0.0050)
SUBSIDIARY_DEAL	0.0280**	(0.0051)	0.0282**	(0.0051)
DIVERSIFYING_DEAL	0.0030	(0.0019)	0.0030	(0.0019)
XBORDER_DEAL	0.0006	(0.0020)	0.0006	(0.0020)
CASH_DEAL	0.0014	(0.0019)	0.0014	(0.0019)
MIXED_DEAL	0.0021	(0.0034)	0.0022	(0.0034)
UNSOLICITED_DEAL	-0.0248	(0.0192)	-0.0246	(0.0190)
RIVAL_DEAL	-0.0066	(0.0133)	-0.0065	(0.0133)
F-statistic	1.9**		1.9**	
Adjusted-R^2	0.170		0.170	
No. of obs.	5,465		5,465	

Table 11: Simultaneous-quantile regression estimates for serial acquirer cumulative abnormal returns

This table presents simultaneous-quantile regression estimates for acquirer and deal characteristics on serial acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The quartile cross-sectional linear regression estimates are presented at the level of the deal. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are bootstrapped (with 2,000 replications). **, * indicate significance of coefficients at the one and five percent levels.

	CARs					
	Serial deals					
Acquirer and deal characteristics	**25th quartile (-1.468)**		**50th quartile (0.251)**		**75th quartile (2.548)**	
	Coefficient	**Std error**	**Coefficient**	**Std error**	**Coefficient**	**Std error**
Constant	-0.0301**	(0.0081)	-0.0125*	(0.0049)	0.0130	(0.0097)
ln(SIZE) (market value)	-0.0014*	(0.0006)	-0.0016**	(0.0004)	-0.0038**	(0.0007)
AGE	0.0000	(0.0001)	0.0000	(0.0000)	0.0000	(0.0001)
AGE_PRE1964	0.0031	(0.0072)	0.0018	(0.0077)	-0.0063	(0.0118)
Q_RATIO (industry-adjusted)	-0.0014*	(0.0007)	-0.0001	(0.0006)	0.0019*	(0.0009)
SALES_GROWTH (industry-adjusted)	-0.0012	(0.0013)	-0.0003	(0.0006)	0.0009	(0.0009)
ROA (industry-adjusted)	0.0116	(0.0066)	0.0056	(0.0047)	0.0053	(0.0095)
ROA_VOLATILITY (industry-adjusted)	-0.0047	(0.0055)	0.0042	(0.0039)	0.0070	(0.0063)
LEVERAGE (industry-adjusted)	0.0005	(0.0040)	-0.0053	(0.0030)	-0.0201**	(0.0058)
LIQUIDITY (industry-adjusted)	-0.0017	(0.0051)	-0.0026	(0.0037)	-0.0084	(0.0074)
ln(DEAL_SIZE)	0.0004	(0.0006)	0.0018**	(0.0004)	0.0043**	(0.0007)
RELATIVE_SIZE	-0.0123	(0.0077)	-0.0020	(0.0032)	0.0022	(0.0073)
PRIVATE_DEAL	0.0201**	(0.0059)	0.0098**	(0.0030)	0.0119**	(0.0046)
SUBSIDIARY_DEAL	0.0216**	(0.0059)	0.0111**	(0.0029)	0.0132**	(0.0046)
DIVERSIFYING_DEAL	0.0017	(0.0012)	0.0013	(0.0009)	-0.0001	(0.0017)

Table 11 (cont.): Simultaneous-quantile regression estimates for serial acquirer cumulative abnormal returns

This table presents simultaneous-quantile regression estimates for acquirer and deal characteristics on serial acquirer cumulative abnormal returns (CARs) for the sample described in Table 1. The quartile cross-sectional linear regression estimates are presented at the level of the deal. Acquirer and deal characteristics are defined in Table A1 of the Appendix and CARs are described in Table 3. Each model also includes Industry Classification Benchmark super-sectors and acquisition announcement years. Standard errors are bootstrapped (with 2,000 replications). **, * indicate significance of coefficients at the one and five percent levels.

	CARs					
	Serial deals					
Acquirer and deal characteristics	**First quartile ((-1.468)**		**Second quartile (0.251)**		**Third quartile (2.548)**	
	Coefficient	**Std error**	**Coefficient**	**Std error**	**Coefficient**	**Std error**
XBORDER_DEAL	-0.0007	(0.0013)	0.0014	(0.0009)	0.0021	(0.0016)
CASH_DEAL	0.0021	(0.0013)	0.0001	(0.0010)	-0.0005	(0.0016)
MIXED_DEAL	0.0012	(0.0022)	-0.0008	(0.0015)	-0.0003	(0.0030)
UNSOLICITED_DEAL	-0.0278	(0.0408)	-0.0167	(0.0210)	-0.0422**	(0.0168)
RIVAL_DEAL	0.0016	(0.0185)	-0.0148*	(0.0070)	-0.0104	(0.0127)
Pseudo-R^2	0.028		0.015		0.041	
No. of obs.	2,364		2,363		2,364	