# Valuation Effect of Institutional Ownership: The Case of Corporate Takeovers [D]

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## ABSTRACT

We examine the relation between institutional ownership in acquiring firms and their post takeover stock performance. We find that negative long-run abnormal returns appear to decline (in economic and statistical terms) as the extent and persistence of institutional ownership increase, after accounting for the size, book-to-market and method of payment effects. Given the unusually high uncertainty surrounding takeovers, such evidence implies that the degree of short sale constraints serves as an important determinant of acquiring firms' short-run overpricing (Miller, 1977). It appears that the presence of institutions mitigates and in most cases eliminates, through effective arbitrage, any short-run overpricing that may be responsible for the long-run underperformance of acquirers, preserving in this way efficiency in the takeover markets.

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*Keywords:* Institutional Ownership; Corporate Takeovers; Mergers and Acquisitions; Short Sale Constraints; Abnormal Returns.

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We examine the relation between institutional ownership in acquiring firms and their post takeover stock performance. We find that negative long-run abnormal returns appear to decline (in economic and statistical terms) as the extent and persistence of institutional ownership increase, after accounting for the size, book-to-market and method of payment effects. Given the unusually high uncertainty surrounding takeovers, such evidence implies that the degree of short sale constraints serves as an important determinant of acquiring firms' short-run overpricing (Miller, 1977). It appears that the presence of institutions mitigates and in most cases eliminates, through effective arbitrage, any short-run overpricing that may be responsible for the long-run underperformance of acquirers, preserving in this way efficiency in the takeover markets.

## 1. Introduction

The stylised fact emerging from a large number of studies on long-run (up to five years) post takeover stock performance is a significant pattern of negative abnormal performance of acquiring firms. However, there is still much debate about the possible sources of such long-run underperformance. This paper explores the relation between institutional ownership (here-after IO) and acquiring firms' post takeover stock returns. The motivation for examining this relationship stems from the notion of overpricing as developed by Miller (1977). In a corporate takeover framework, it is expected that the extent of IO in acquirers conveys important information about the degree of their short-run overpricing, as it reflects the severity of short sale constraints for these stocks[1]. In other words, low IO levels in acquiring firms renders short-selling more difficult, thereby leading overpriced stocks to remain that way for longer than they should. Our proposition is also in the same spirit as Diether (2004), who finds that long-run post event underperformance is attributed to short-run overvaluation due to severe short constraints.

If we assume that opinion dispersion for acquiring firms is generally large given the unusually high uncertainty surrounding takeovers[2], then as implied by Miller (1977),

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[1] D'Avolio (2002) and Nagel (2004) suggest that IO is negatively related to shorting costs and Gopalan (2003) constructs a model where 'institutional holding' is a main determinant of the actual severity of short sale constraints. Given Chen, Hong, and Stein's (2001) argument that short interest may well be an insufficient and problematic proxy for short constraints, we suggest that IO could be the best possible path to capture differentials in short supply and short selling fees between stocks.

[2] Miller (1977) and Doukas, Chansog, and Pantzalis (2003) explain why wide opinion dispersion implies great uncertainty. We assume that unusually high disagreement (and thus uncertainty) about acquirers'

the severity of short sale constraints (as measured by the degree of IO) should be a deterministic factor of acquirers' short-run stock values. Along these lines, short-run overpricing and subsequent underperformance of acquiring firms should be more pronounced in segments where IO is inferior (i.e., higher level of short sale constraints) both in terms of the extent and persistence[3].

In this paper, we find both an economically and statistically significant role of IO in determining acquirers' post takeover stock returns. Specifically, we document that acquirers with low IO levels underperform those with a high degree of IO by a significantly large margin of 0.8% a month for a three-year post merger event window. Negative post takeover abnormal return significance is larger for acquirers subject to low or non-persistent IO than for their large or persistent IO counterparts. Such significant return differentials corroborate our hypotheses that IO is a major determinant of acquirers' post takeover stock performance. Further, our results are robust after accounting for a range of characteristics such as the method of payment, firm size, and book-to-market ratio.

Our study therefore contributes to the existing literature by showing that institutional ownership may help us understand one of the major puzzles in corporate finance, i.e., the long-run post takeover underperformance puzzle. Our findings implicitly suggest

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equity on the days surrounding takeovers replicates a situation where uncertainty is higher than normal for all acquirers and decays through time.

[3] 'Persistence' accounts for the effectiveness of the short sale constraint effect during the post takeover event window under examination and hence for the speed of adjustment of stock prices to equilibrium.

that institutions can enhance arbitrage through facilitating short sales and therefore preserve efficiency in the takeover markets.

The rest of the paper is organised as follows. Section 2 briefly reviews the literature of acquiring firms' post takeover stock performance and lays a theoretical ground for the role of IO in driving any patterns in stock returns. Section 3 presents our testable hypotheses. Section 4 describes the data and methodological procedures used in our empirical investigation. Section 5 presents and discusses the empirical results. Concluding remarks are provided in section 6.

## 2. Literature Review

A large number of studies in the past two decades have examined long-run post takeover stock performance. In contrast to the central prediction of the efficient market hypothesis, a great majority of these studies has disturbingly documented significant and persistent negative abnormal returns up to five years following mergers[4]. Rational explanations attribute this phenomenon to the bad models of equilibrium used (Fama

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[4] For US empirical evidence, see for example: Asquith (1983), Malatesta (1983), Jensen and Ruback (1983), Magenheim and Mueller (1988), Agrawal, Jaffe, and Mandelker (1992), Loderer and Martin (1992), Anderson and Mandelker (1993), Loughran and Vijh (1997), Rau and Vermaelen (1998), Agrawal and Jaffe (2000), and Megginson, Morgan, and Nail (2004). For evidence from the UK, see for example: Firth (1979), Franks and Harris (1989), Limmick (1991), Kennedy and Limmick (1996), and Gregory (1997). There are, however, other studies [e.g., Bradley and Jarrell (1988), and Franks, Harris and Titman (1991)] that do not find significant underperformance in the three years following the merger.

1998). On the other hand, method of payment effects[5], slow adjustment of prices to information associated with takeovers and size/book-to-market peculiarities leading to investors extrapolating from past performance have been the most prevailing behavioral explanations. On the methodological ground, many authors argue that the observed underperformance is merely the result of a flawed test of abnormal returns generating spurious findings[6]. Accordingly, the resolution of such efficient market anomaly remains a challenge to the profession.

We contribute towards the resolution of this puzzle by examining the role of institutional ownership in determining post takeover stock performance. Since the early 1980s, institutional funds have become increasingly prominent in equity markets. Institutions in the UK for example held £2,477 billion of funds in 1999, nearly three times the 1990 total accounting for over 85% of the total funds under management. Insurance and pension schemes account for the bulk of UK institutional funds, although unit trusts and money market funds are also a growing market (IFSL 2001). Fund managers invest funds on behalf of institutions. Their primary task is to invest the flow of cash from pension contributions, insurance premiums and personal savers in portfolios of financial assets that will best meet clients' needs. In the UK, a

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[5] For evidence on such explanation see, for example, Travlos (1987), Huang and Walking (1987), Amihud, Lev, and Travlos (1990), Agrawal, Jaffe, and Mandelker (1992), Loughran and Vijh (1997), Rau and Vermaelen (1998). On the other hand, Dong, Hirshleifer, Richardson, and Hong (2003) and Mitchel and Stafford (2000) find no evidence of poor returns following acquisitions financed by equity.

[6] See, for example, Barber and Lyon (1997), Kothari and Warner (1997), Lyon, Barber, and Tsai (1999), Fama (1998), and Mitchell and Stafford (2000).

substantial proportion of institutional funds are invested in equity, some 60% in 1999 (IFSL 2001).

Given the predominance of institutions in the stock market, surprisingly the 'efficiency role' of institutional ownership has been barely examined within corporate takeovers. Nonetheless, its monitoring benefits in general have been explained and the size of institutional stakes has been linked (through the monitoring hypothesis) to managerial efficiency, the quality of corporate decision-making and consequently firm performance[7]. However, the "passive voting hypothesis" states that in general larger IO does not necessarily improve performance through more active monitoring given the prevalence of agency problems associated with institutions[8]. We therefore suggest that further examination of the 'facilitative' functions of IO is needed and hence focus on 'Miller's overpricing link' between IO and post takeover stock returns.

In this manner, it is feasible that long-run underperformance of acquiring firms can be attributed to short-run overvaluation. Miller (1977) postulates that wide opinion dispersion among investors about a stock's value leads to a steeper downward sloping demand curve and hence higher than fundamental price for this stock, especially when short sale constraints that deteriorate the creation of new supply and prevent arbitrage are imposed. Figlewski (1981) argues that negative information is not initially

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[7] For a review of the role of institutions in improving efficiency and performance through active monitoring refer to, for example, Nesbitt (1994), Smith (1996), Carleton, Nelson, and Weisbach (1998), Del Guercio and Hawkins (1999), Wahal and McConnell (2000), and Gompers and Metrick (2001).

[8] See, for example, Admati, Pleiderer, and Zechner (1994), Wahal (1996), Karpoff, Malatesta, and Walkling (1996), Duggal and Millar (1999), Faccio and Lasfer (2000), and Gillan and Starks (2001).

impounded into prices because pessimistic investors are kept out of the market due to restricted short sales, hence resulting in short run mispricing that is only corrected through time.

More recently, D'Avolio (2002), Jones and Lamont (2002) posit that short sale fees are high and hence limits to arbitrage strict when IO is low. It is therefore easier to short stocks subject to high IO and in this case only effective arbitrage is actually feasible. Chen, Hong, and Stein (2002) find that the role of breadth of ownership is important in explaining the degree of overpricing. Further, Nagel (2004) proves by using residual institutional ownership that short sale constraints help explain various cross sectional stock return anomalies. The fact that shorting acquiring firms is generally more expensive, according to Geczy, Musto, and Reed (2002), further induces the need of examining the effects of short sale constraints in a corporate takeover framework.

In such framework, uncertainty, due to the creation of a new entity (i.e., the combined firm), is relatively high and hence a takeover sample can capture what Miller refers to as a situation of high opinion dispersion. As a result, some acquirers may possibly be overpriced due to both high opinion divergence about their future growth prospects and the severe short sale constraints they are subject to. After the completion of a takeover, uncertainty continuously diminishes as some first results for acquirers become public. Consequently, long-run post takeover underperformance should be more pronounced for acquirers subject to severe short sale constraints relative to others that may be easier to short. This effect should be more apparent the stricter the short

sale constraints and the longer they are present, as proxied for by the extent and the persistence of IO in acquirers respectively.

Finally, we note that although both divergence of opinion and short sale constraints, in Miller's setting, are determinants of the degree of overpricing, we would argue that when examining unusually uncertain events such as corporate takeovers, opinion dispersion may actually be less significant given the level of short sale constraints that eventually oil the wheels of overpricing. This argument is partly supported by Boehme, Danielsen, and Sorescu (2002b) who suggest premiums or discounts depend on the presence of short sale constraints. Furthermore, Gopalan (2003) derives a model in which short constraints bind with opinion dispersion among other factors, hence suggesting that the two notions are usually correlated and that the most short constrained stocks should be expected to be subject to high opinion dispersion. We argue that the unusually high investor disagreement about the future growth prospects of acquiring firms at the days surrounding takeover events is an unambiguous fact, and this alone could help us generate a reliable test of Miller's joint hypothesis of short-run overpricing by using only the short sale constraint proxy (i.e., the IO).

## 3. Hypotheses

Based on the discussion above we develop the following testable hypotheses.

*Hypothesis 1*

The extent of institutional ownership determines acquirers' long run post takeover stock returns since it reflects the level of short sale constraints that in a situation of high uncertainty explains the degree of short-run overpricing.

*Hypothesis 2*

The persistence of institutional ownership also determines acquirers' long run post takeover stock returns as it reflects the time horizon within which short sales may be effectively practiced.

This latter hypothesis accounts for the persistence of the short sale constraint during the three-year post takeover event window under examination and hence for the speed of adjustment of stock prices to equilibrium. If IO in some acquirers lasts for the entire examination period then arbitrage may be expected to be more effective for these stocks.

According to the above, we examine the valuation effects of IO on corporate takeovers by studying a UK sample of acquiring firms' three-year post takeover stock returns. For each event year (in the 1993-1998 period) we sum up all (above 3%[9]) holdings by institutions in each acquiring firm to obtain the overall amount of IO. Acquirers located in the High-IO sample are those that have one or more institutions each owning at least 3% stake at the takeover year t. On the other hand Low-IO acquirers are either not held at all or are subject to less than 3% holding by any institution. Furthermore, acquirers in the Excessive-IO group are subject to High-IO of more than 10%[10] while the ones in the Moderate-IO group of less than 10% at the event year t. Finally, acquirers in the Persistent-IO portfolio are subject to at least three-year (post event)

[9] The Companies Act (1985) (sections 198 and 199) requires that if a holding reaches or exceeds 3% of the company's market value it must be declared. We posit that any holding of 3% or above is sufficiently large.

[10] 10% is the median IO value for all acquirers in the High-IO sample.

High IO while the ones in the Non-Persistent-IO group are subject to at most two-year High IO.

In particular we investigate: (i) Whether acquirers subject to High-IO (at the event year t) outperform ones with Low-IO, and (ii) whether acquirers subject to Excessive-IO and/or Persistent-IO outperform their peers that are subject to Moderate-IO and/or Non-Persistent-IO respectively.

## 4. Data and Methodology

Annual IO data[11] are collected from a unique database of UK institutional holdings from 1993 to 2001, provided by Hemscott Plc (a London Stock Exchange listed data company). Studying three-year post-event stock performance requires that we collect event data up to 1998. We thus examine a sample of UK successful public takeovers (i.e., public target and acquirer) with deal value above one million dollars from 1993 to 1998[12]. We identify all UK public acquirers excluding financial and utility firms and

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[11] Hemscott's IO current percentage ownership is reported either due to transactions or due to year ends for each firm. We calculate the average annual ownership by each firm in each acquirer but we ensure ownership data are reported before the takeover effective dates in order to realistically reflect short constraints around the takeover. This was achieved by allowing some takeover observations with effective dates near the start of year to match with IO data in the mid or end of the previous year. Consequently, when referring to IO at the event year, in some cases this may have been shaped by IO at the previous year.

[12] We follow Fuller, Netter, and Stegemoller (2002), Moeller, Schlingemann, and Stulz (2004a,b), and Moeller and Schlingemann (2005) employ a one million dollar cut-off to avoid results being driven by very small deals.

other related information from the Securities Data Corporation (SDC). Acquirers'

monthly stock prices, size (market value), and book-to-market ratios are obtained from

Thomson Financial Datastream. Following Lyon, Barber, and Tsai (1999), firms with a

negative equity book value, although relatively rare, are excluded from the analysis.

164 UK acquiring firms are finally selected from the intersection of the above three

databases; a rather small sample but still sufficient if we consider that the examination

period is only six years (1993-1998) as the UK IO data (from Hemscott) are not

available prior to 1993.

Table I reports the sample statistics. It is evident that in each year the number of

acquirers is similar and averages to 27 with 33 being the highest in 1995 and 22 the

lowest in 1996. It is hence unlikely that our results are subject to more weight being

given to specific trends in takeovers occurring at any peculiar year. The fact that there

exist significant firm size differentials between the mean and median in each year

reflects that some very large firms have been involved in takeovers during our sample

period. Finally, the mode of payment data shows that stock financing is the least

common payment method in our sample.

Institutional holding statistics per year for the period under examination (1993-1998)

along with the allocation of the 164 acquirers in sub-samples formed on the basis of IO

are reported in Table II. We observe that takeover activity in the Low-IO sample varies

each year and is concentrated mainly in the first two years (1993 and 1994). On the

other hand, takeover activity in the High-IO sample is mainly concentrated in the last

two years (1997 and 1998).

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Such pattern reflects a significant increase in institutional funds invested in UK acquirers during the last decade. The observation that in 1999, UK institutions held £2,477 billion of assets, nearly three times the 1990 total (IFSL 2001), confirms this pattern and suggests that our sample is also representative of the general institutional investment activity throughout the UK. In addition, it also reflects the necessity to study thoroughly the role of institutions in corporate takeovers in the last decade where IO is more intense than prior to the 1990s. Table II also reveals that the number of acquirers with Persistent and Excessive IO have both been increasing through time. The gradual increase of IO in UK acquirers during our sample period is represented diagrammatically in Figure I.

The entire sample is initially split into the High-IO and Low-IO subsamples to examine the overall role of IO in determining acquiring firms' post takeover stock returns. The High-IO sample is subdivided in two different ways in order to capture the effects of both extent and persistence of IO on acquirers' stock returns. We then calculate long-run post takeover abnormal returns for each of the sub-samples identified.

We use the calendar time portfolio regression (CTPR) to mitigate the problem of cross-sectional dependence in stock returns. In each calendar month, a portfolio is formed by including all acquirers that have completed a takeover in the past 36 months[13]. We rebalance our portfolios each month to include acquirers that have just

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[13] The motivation to use 36 months holding period sources from the need to capture the slow adjustment of prices to equilibrium and is advocated by the use of persistence of IO as a proxy for this adjustment.

completed an event and to disregard the ones that have just fulfilled 36 months in the calendar approach. We use both equal- and value-weighted approaches to calculate the calendar portfolios' stock returns. We then estimate the Fama and French three-factor model by using the UK three-factor following Dimson, Nagel, and Quigley (2001)[14]. We note that the intercept (alpha) in this regression is the mean monthly abnormal return for each portfolio over the estimation period. For robustness we also estimate the CAPM intercepts that are however not reported in our empirical discussion for brevity. We note though that when focusing on CAPM alphas the results more strongly support our hypotheses.

The above procedure is repeated for all our samples. To an extent, any statistically and economically important differentials in abnormal returns between the paired-samples will be driven by the differentials in IO. We use zero-investment portfolios to assess return differentials between paired samples to ensure that the actual observed differentials are not products of the uneven calendar months between these samples. Finally, in order to establish that method of payment, size, and/or book-to-market characteristics are not the sources of such return differentials we also conduct a robustness check by investigating such sample firms' features at the end of section 5.

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[14] Dimson, Nagel, and Quigley (2001) use different breakpoints to those of Fama and French (1993) to construct size and book-to-market portfolios in order to account for UK size and book-to-market peculiarities.

## 5. Empirical Results

In table III we report estimates of monthly average abnormal returns (i.e., the intercept alpha) for the calendar time portfolios formed on the basis of IO in acquiring firms using the Fama-French 3-factor model. For the full sample, we find a negative (-1%) and highly significant (t-stat: -4.58) alpha when equal-weighted portfolio returns are used. For the value-weighted calendar portfolio the negative abnormal return declines (-0.57%) but is still statistically significant (t-stat: -5.16). This finding is consistent with previous studies that have documented significant negative post takeover abnormal returns.

As defined earlier, the entire sample is divided into High-IO and Low-IO subsamples. For the Low-IO sample, negative abnormal returns are economically and statistically significant for both equal (-1.71% significant at the 1% level) and value weighted (-0.62% significant at the 1% level) calendar portfolios. The large equally weighted negative abnormal return reflects to a great extent that size plays a significant role in addition to IO in determining the amount of shortable shares or shorting costs and thus stock performance. This is consistent with previous findings on the relation between size, IO, and equity returns such as Hong and Stein (2001), Nagel (2004), Boehme et al (2002a) and Reed (2002). Overall, acquirers in the Low-IO sample underperform the benchmark in the long run regardless of the weighting scheme. Note that alphas in this case imply a -62% three-year abnormal return under equal weighting and -22% under value weighting that are substantially more negative than in any other sub-samples subsequently examined.

For acquirers in the High-IO sample the picture is clearly different. Abnormal returns remain negative but their economical significance is weaker relative to the Low-IO sample for both equal- and value-weighted calendar portfolio returns. On an equal-weighted basis alpha (-0.86%) is 50% smaller than that in the Low-IO sample and statistically significant (t-stat: -4.78) while on a value-weighted basis alpha (-0.51%) declines considerably but is still statistically significant (t-stat: -4.70). Overall, even though inferences from equal-weighted returns may be considered as more reliable in a small sample, still the High-IO sample significantly outperforms the Low-IO one by a statistically and economically important margin regardless of the weighting scheme applied. Note that the High-Low IO (i.e., high minus low) monthly percentage differential from a zero-investment portfolio (Table IV) is a statistically significant 0.8% when equally weighted (0.22% when value weighted). This to a great extent demonstrates the importance of institutional ownership in eliminating short-run overpricing.

The High-IO sample is divided into two: Moderate-IO (acquirers with 3-10% IO) and Excessive-IO (acquirers with more than 10% IO). Table III presents the results for these two subsamples. Under both equal- and value-weighting schemes, the Excessive-IO sample's alphas are statistically insignificant -0.58% (t-stat: -1.34) and –0.28% (t-stat: -1.64) respectively. On the other hand, alphas for the Moderate-IO sample are statistically significant under both weighting schemes (0.89% with t-stat -4.26 when equal weighting and 0.51% with t stat -4.43 when value weighting). The equal-weighted monthly return differential (Table IV) of Excessive-Moderate IO (i.e., excessive minus moderate) is 0.27% (0.18% when value weighting) and even though

statistically insignificant, is still sufficient in order to eliminate overpricing for the excessive IO sample (Table III). Such results further strengthen our argument regarding the significant role of IO in corporate takeovers, which predicts that not only large but also excessive ownership (at the event year) contributes in more effectively eliminating short-run overpricing through facilitating short sales.

We finally split the High-IO sample into two other subsamples in order to examine the significance of the persistence or duration of IO (i.e., the time-window during which short sales are likely to be constrained) and further enrich our evidence. Table III reports the results for both the Non-Persistent and the Persistent-IO samples. Clearly, negative abnormal returns decline in economic and statistical terms when moving from the former sample to the latter for equally weighted alphas. In this case alphas are respectively –0.87% (t-stat: -3.96) and –0.62% (t-stat: -1.45) for the two subsamples, which indicates that persistently held acquirers, on average, outperform the non-persistently held ones. When value-weighted returns are considered, negative average abnormal return is higher for the Persistent-IO sample (-0.45% with t-stat –2.21) rather than for the Non-Persistent one (-0.38% with t-stat -5.85). We note that there exists only one large firm in the Persistent-IO portfolio (Table V). It is therefore possible that placing more weight to firms that are in reality small (in our entire sample) has generated this result. To an extent value-weighting here reflects a peculiarity and we can only draw fruitful conclusions by referring to the equal-weighted result. Hence we find that Non-Persistently held acquirers underperform persistently held ones. This suggests that constantly high post event institutional ownership results in persistently

less constrained short sales that effectively eliminate any short-run overpricing of acquirers surrounding the takeover event.

Table IV reports actual percentage differentials in alphas as well as abnormal returns of zero-investment portfolios of each paired subsample. The latter alphas are obtained by regressing mean calendar portfolio return differentials on the Fama-French three factors. Our results demonstrate that investors experience less loss when investing in acquirers subject to High rather than Low IO. In addition, investing in acquirers subject to Excessive rather than simply High IO, results in even less loss. The 0.25% equal-weighted differential in alphas (0.26% for the zero-investment portfolio) between persistent and non-persistent IO acquirers confirms our prediction expressed in the second hypothesis. The 0.73% Excesive–Low IO and the 1% Persistent–Low IO (both statistically significant at the 1% level) equal-weighted zero investment portfolio alphas demonstrate that both the extent and the persistence of IO can play a vital role in eliminating overpricing.

Nonetheless, such statistical and/or economic differentials in alphas could possibly be driven by the majority of acquirers in some subsamples being tiled towards some specific firm characteristics (for instance method of payment, size, and book-to-market ratio) identified as performance determinants by previous studies. We must therefore address the concern that the abnormal return differentials obtained may perhaps be generated by such distinctive characteristics.

Table V can help resolve to an extent such concerns. It shows that cash, averaging to 50% across all samples, is generally the prevailing method of payment in our sample. The largest differential between cash and stock payments of 38% (51% for cash and 13% for stock payments) is evident for the Low-IO sample even though post takeover stock underperformance is more pronounced in this particular sample. In general, stock payments that average to just 26% among all samples, is unlikely to be the reason for the economically and/or statistically significant abnormal return differentials detected.

Furthermore, small/large and value/glamour acquirers in the entire sample are in some cases not evenly spread among the subsamples. The positive High-Low IO abnormal return differential is large although small firms are mainly concentrated in the High-IO sample rather than the Low IO one[15]. In this respect, we note that there only exists one acquirer in the largest size quartile of the Persistent-IO sample and this still leads to a better performance (in economic and statistical terms) even the sample dominated by small acquirers. This result thus indicates that IO is relevant in addition to size when addressing misvaluation issues. In the rest of the cases small/large and value/glamour firms are to an extent equally split into the quartiles suggesting that our results are free of any potential bias involving such characteristics.

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[15] Since small acquiring firms in general underperform large ones in our sample then we should expect larger negative abnormal returns with higher concentration of small acquirers (i.e., for the High-IO group).

**6. Conclusion**

Our research indicates that the level of short sale constraints (as proxied for by institutional ownership) plays a major role in determining post takeover stock price performance. Overall, the Low-IO, Moderate-IO and Non-Persistent-IO acquirer portfolios underperform their High-IO, Excessive-IO and Persistent-IO peers in the long run. The return differentials between the paired portfolios show that institutional ownership, both in terms of extent and persistence, plays a pivotal role in explaining the ferocity of negative post takeover abnormal returns. Our findings therefore suggest that the widely documented underperformance puzzle could largely be attributed to acquirers exhibiting low and/or non-persistent institutional investment rather than to size, book-to-market, and method of payment peculiarities.

Our evidence reveals that monthly average abnormal returns decay in statistical and/or economic terms as the extent and persistence of institutional ownership increases, which thus suggests that IO is indeed a key factor in explaining the degree of acquirers' overpricing. This result is consistent with the continuously growing literature postulating that short sale constraints can induce short-run overpricing and hence lead to long-run negative abnormal returns as efficiency takes its course. The presence of institutions is therefore vital in ensuring the efficiency of the takeover markets since IO significantly deteriorates short-run overpricing and thus eliminates the chances for post takeover return reversals. The latter statement is consistent with Nagel (2004), who finds that short sale constraints drive most common cross sectional anomalies documented in the literature. Accordingly, we hope our study forms the basis for more extensive future examinations on the valuation implications of

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institutional ownership as related to corporate takeovers or other event studies and on the general role of institutions in preserving efficiency in financial markets through facilitating shorting opportunities.

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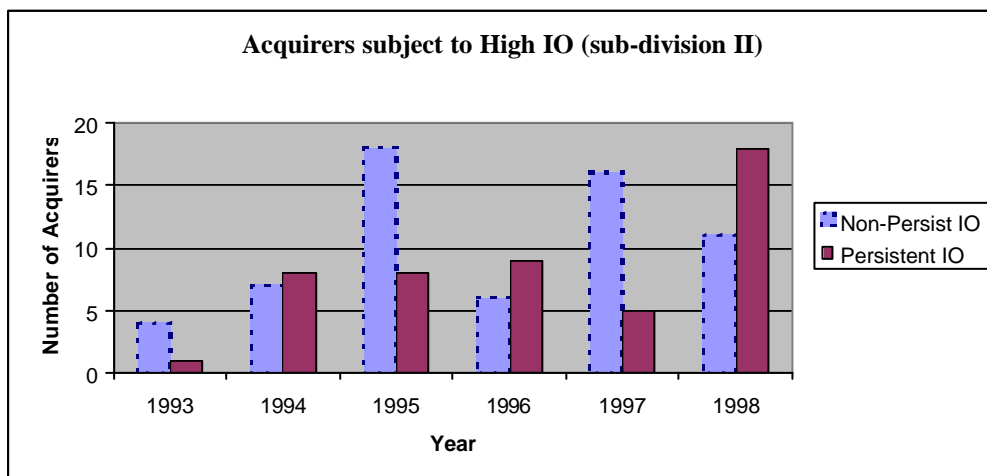
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**Figure I: Institutional Ownership in UK Acquiring Firms (1993-1998)**

**High IO Vs Low IO Acquirers**

*Number of Acquirers* vs *Year*

Legend: IO <3%, IO >3%

**Acquirers subject to High IO (sub-division I)**

*Number of Acquirers* vs *Year*

Legend: Moderate IO, Excessive IO

**Acquirers subject to High IO (sub-division II)**

*Number of Acquirers* vs *Year*

Legend: Non-Persist IO, Persistent IO
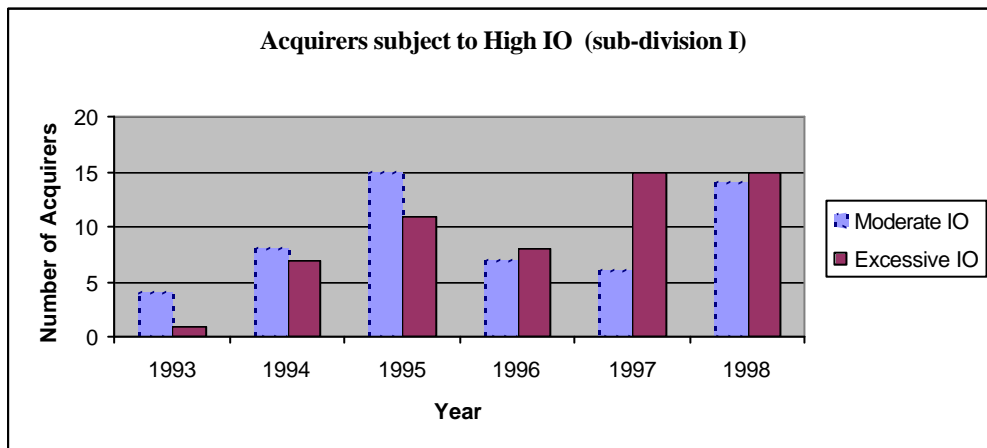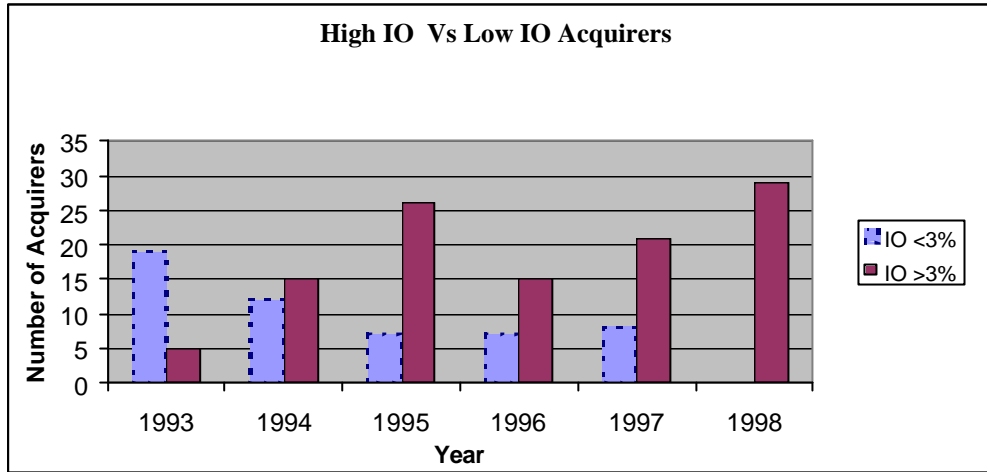
**Table I. Summary Statistics for Acquiring Firms: Size, Book to Market Ratio, and Method of Payment.**

The full sample consists of 164 UK public domestic mergers with a deal value of one million dollars or more. Size is the market value of equity at the even month reported in million pounds. B/M is the book to market equity at the even month. There are three methods of payment: pure cash, pure stock, and mixed. The mixed payment subset consists of all mergers where the payment method is neither pure cash nor pure stock. The following table reports number of acquirers, mean and median size and book-to-market ratios, and the proportion of deals under the different methods of payment per calendar year.

| Years | Acquirers | Size (£m) | | B/M | | Method of Payment | | |
|---|---|---|---|---|---|---|---|---|
| | | Mean | Median | Mean | Median | Cash (%) | Stock (%) | Mixed (%) |
| **1993** | 24 | 2126 | 423 | 0.44 | 0.32 | 37.5 | 12.5 | 50 |
| **1994** | 27 | 2647 | 471 | 0.33 | 0.30 | 37 | 14.8 | 48.2 |
| **1995** | 33 | 2472 | 237 | 0.42 | 0.42 | 30 | 6.6 | 63.4 |
| **1996** | 22 | 4276 | 491 | 0.29 | 0.19 | 45.5 | 22.7 | 22.8 |
| **1997** | 29 | 1082 | 256 | 0.43 | 0.39 | 31 | 27.6 | 41.4 |
| **1998** | 29 | 688 | 103 | 0.72 | 0.71 | 44.8 | 17.2 | 48 |
| **All** | **164** | **2131** | **318** | **0.44** | **0.34** | **37.8** | **19.7** | **43.3** |

**Table II. Institutional Ownership Statistics and Allocation of Acquirers in Sub-samples**

The table presents total and year-by-year acquirers' allocation (for the full sample of 164 acquirers) in each of the six sub-samples identified. The full sample is divided into institutional ownership sub-samples in three different ways. Firstly, the entire sample is split into the Low IO (i.e., IO<3% at year t, the merger completion year) and High IO (i.e., IO>3% at year t) sub-samples. Secondly, the High IO is divided into two different sub-samples, one with acquirers subject to institutional holding of 3-10% (i.e., the Moderate IO) at year t and one with acquirers subject to institutional holding greater than 10% at year t (i.e., the Excessive IO). Finally, the same High IO sample is divided into two alternative sub-samples. One with acquirers subject to institutional holding of >3% for a period of at most 2 years after the event year (i.e., the Non-Persistent IO), and one with acquirers subject to institutional holding of >3% for at least 3 years after the event (i.e., the Persistent IO).

| Year | Acquirers | Low IO <3% at year t | High IO >3% at year t | Moderate IO 3-10% at year t | Excessive IO >10% at year t | Non-Persistent IO >3% at year(s) t, (t+1, t+2) | Persistent IO >3% at years t, t+1, t+2, t+3 |
|------|-----------|----------------------|-----------------------|------------------------------|------------------------------|--------------------------------------------------|----------------------------------------------|
| **1993** | 24 | 19 | 5 | 4 | 1 | 4 | 1 |
| **1994** | 27 | 12 | 15 | 8 | 7 | 7 | 8 |
| **1995** | 33 | 7 | 26 | 15 | 11 | 18 | 8 |
| **1996** | 22 | 7 | 15 | 7 | 8 | 6 | 9 |
| **1997** | 29 | 8 | 21 | 6 | 15 | 16 | 5 |
| **1998** | 29 | 0 | 29 | 14 | 15 | 11 | 18 |
| **Overall** | **164** | **53** | **111** | **54** | **57** | **62** | **49** |

**Table III. Calendar Time Portfolio Monthly Average Returns in Excess of the CAPM and Fama and French 3-Factor Model**

The table presents OLS estimates of monthly abnormal returns (alphas) to takeover samples for i) all 164 acquirers in the full sample; ii) the Low IO (i.e., <3% institutional holding at year t, the merger completion year); iii) the High IO (i.e., >3% institutional holding at year t; iv) the Moderate IO (i.e., 3-10% holding at year t); v) the Excessive IO (i.e., > 10% holding at year t); v) the Non-Persistent IO (i.e., >3% holding for at most 2 years and vii) the Persistent IO (i.e., >3% holding for at least 3 years). Calendar-time portfolio regressions were performed for each of the seven samples formed on the basis of percentage IO. Acquirers enter the portfolio on the effective month of the takeover and remain for 36 months. Calendar portfolios are rebalanced each month to include firms that have just completed a takeover and to disregard the ones that have just fulfilled 36 months. The monthly abnormal returns are intercepts ap in the CAPM model and the Fama and French three-factor model, respectively: $R_{pt} - R_{ft} = a_p + b_p(R_{mt} - R_{ft}) + e_{pt}$ and $R_{pt} - R_{ft} = a_p + b_p(R_{mt} - R_{ft}) + s_p SMB_t + h_p HML_t + e_{pt}$

Where $R_{pt}$ is the calendar time portfolio return, $R_{ft}$ is the return on a one-month T-bill during month t, SMB is the difference in returns of value weighted portfolios of small firms and big firms during month t, HML is the return differential of value weighted portfolios of high and low book-to-market ratio firms in month t, $\beta_p$, $s_p$ and $h_p$ are regression parameters specific to the portfolio and $e_{pt}$ is the error term. Heteroscedasticity and autocorrelation adjusted t-statistics are reported in brackets below each estimate. N is the number of acquirers in each sample and Cal. Months is the number of calendar months for each calendar portfolio regression.

| Intercept | | All | Low | High | Moderate | Excessive | Non Persistent | Persistent |
|---|---|---|---|---|---|---|---|---|
| **CAPM a** | EW | -0.62 | -1.53 | -0.51 | -0.61 | -0.27 | -0.45 | -0.41 |
| | | [-1.78][c] | [-3.05][a] | [-1.49] | [-1.93][c] | [0.50] | [-1.14] | [-0.82] |
| | VW | -0.55 | -0.60 | -0.48 | -0.47 | -0.23 | -0.33 | -0.44 |
| | | [-5.59][a] | [-5.16][a] | [-4.22][a] | [-3.89][a] | [-1.42] | [-4.01][a] | [-2.08][b] |
| **FF a** | EW | -1.02 | -1.71 | -0.86 | -0.89 | -0.58 | -0.87 | -0.62 |
| | | [-4.58][a] | [3.73][a] | [-4.78][a] | [-4.26][a] | [-1.34] | [-3.96][a] | [-1.45] |
| | VW | -0.57 | -0.62 | -0.51 | -0.51 | -0.28 | -0.39 | -0.45 |
| | | [-5.16][a] | [-5.03][a] | [-4.70][a] | -4.43 | [-1.64] | [-5.80][a] | [-2.20][b] |
| **N** | | 164 | 53 | 111 | 54 | 57 | 62 | 49 |
| **Cal. Months** | | 105 | 94 | 105 | 105 | 98 | 103 | 100 |

*a,b,c  indicate significance at the 1,5 ,10 percent level for two-tailed t-test.*

**Table IV. Zero-Investment Portfolio and Economic Differentials between Calendar Time Portfolio Monthly Average Returns in Excess of the Fama and French 3-Factor Model**

The table presents zero-investment portfolio and economic percentage differentials between OLS estimates of monthly abnormal returns (alphas) to takeover samples involving: i) the Low IO (i.e., <3% institutional holding at year t, the merger completion year); ii) the High IO (i.e., >3% institutional holding at year t; iii) the Moderate IO (i.e., 3-10% holding at year t; iv) the Excessive IO (i.e., >10% holding at year t); v) the Non-Persistent IO (i.e., >3% holding for at most 2 years and vi) the Persistent IO (i.e., >3% holding for at least 3 years). Hedge portfolios' (the zero-investment portfolio, ZIP) mean calendar time portfolio return differentials are regressed on the FF 3-Factor model. The regression procedure is identical to that described in table III. Economic Differentials are the differences between the actual alphas obtained in table III. Both, economic differentials between actual alphas and hedge portfolios' alphas are formed on both equal- and value-weighted basis. Heteroscedasticity and autocorrelation adjusted t-statistics in brackets under zero-investment portfolios' estimates are obtained from a one-tail t-test.

| | | High - Low | Excessive - Moderate | Persistent - Non Persistent | Excessive - Low | Persistent - Low |
|------|-----------------------|-------------|----------------------|------------------------------|-------------------|-------------------|
| EW | FF a ZIP | 0.8 [2.01][b] | 0.27 [0.55] | 0.26 [0.51] | 0.73 [1.51][c] | 1.00 [2.02][b] |
| | FF actual differential | 0.85 | 0.31 | 0.25 | 1.13 | 1.09 |
| VW | FF a ZIP | 0.22 [1.65][c] | 0.18 [1.00] | 0.01 [0.10] | 0.36 [1.78][b] | 0.34 [1.70][b] |
| | FF actual differential | 0.11 | 0.23 | -0.07 | 0.34 | 0.17 |

*a,b,c indicate significance at the 1,5 ,10 percent level for one-tail t-test.*

## Table V. Distinctive Firm Characteristics of all Samples

The table reports detailed allocation of acquirers on the basis of method of payment, size, and book-to-market ratio for all seven samples considered in the previous analysis. Method of payment data availability is reported along with the number of acquirers in each sample. There are three methods of payment: pure cash, pure stock, and mixed. The mixed payment subset includes all mergers where the method of payment is neither pure cash nor pure stock. The proportion of acquirers under different methods of payment for each sample is reported below. Number of acquirers in each sample ranked according to i) size and ii) book-to-market ratio quartiles of the full sample are also reported below.

| Firm Characteristics | All | Low IO | High IO | Moderate IO | Excessive IO | Non-Persistent IO | Persistent IO |
|---|---|---|---|---|---|---|---|
| **Number of Acquirers** | 164 | 53 | 111 | 54 | 57 | 62 | 49 |
| **Method of Payment Data Available** | 129 | 39 | 89 | 43 | 46 | 47 | 42 |
| **Cash Payment** | 48% | 50% | 48% | 56% | 43% | 53% | 41% |
| **Stock Payment** | 24% | 13% | 28% | 25% | 33% | 26% | 33% |
| **Mixed Payment** | 28% | 37% | 24% | 19% | 24% | 21% | 26% |
| | | | | | | | |
| **Small Firms** | 41 | 16 | 25 | 17 | 8 | 13 | 12 |
| **2** | 41 | 3 | 38 | 14 | 24 | 13 | 25 |
| **3** | 41 | 11 | 30 | 10 | 20 | 19 | 11 |
| **Big Firms** | 41 | 23 | 18 | 13 | 5 | 17 | 1 |
| | | | | | | | |
| **High B/M Firms** | 41 | 11 | 30 | 14 | 16 | 14 | 16 |
| **2** | 41 | 9 | 32 | 14 | 18 | 21 | 11 |
| **3** | 41 | 15 | 26 | 16 | 10 | 13 | 13 |
| **Low B/M Firms** | 41 | 18 | 23 | 10 | 13 | 14 | 9 |