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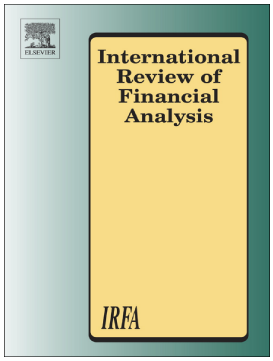

Do corporations learn from mispricing? Evidence from takeovers and corporate performance

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Do Corporations Learn from Mispricing?*

Evidence from Takeovers and Corporate Performance

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Abstract

In this article we form the simple prediction that mispricing encourages traders to collect costly information that guides managerial decisions at corporate level. Our findings support this prediction based on evidence derived from both the US market for corporate control as well as the overall variation in aggregate corporate profits. The trading activity in response to the temporary mispricing of the merging companies provides useful information that leads to the design of high-synergy deals. Such synergies are reflected in an increase in the announcement period acquirer abnormal returns and are not reversed in the long-run. At the market-wide level, our results suggest that the growth in the overall stock trading volume in response to market mispricing is associated with high future corporate profit growth. Overall, after controlling for several economic and financial conditions, the temporary mispricing in a developed and generally efficient stock market stimulates informative trading, ultimately leading to value- and performance-enhancing corporate decisions.

Keywords: Mispricing; Information; Acquisitions; Acquirer returns; Corporate profits.

JEL Classification: G14, G34.

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Abstract

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1. Introduction

By aggregating information from investors, the stock market guides corporate investment decisions (hereafter corporate decisions) via two channels. First, the reaction of equity investors to corporate announcements conveys signals to managers regarding the market's perception about the valuations of the firms they manage. Second, even in the absence of corporate announcements that primarily supply new information to investors, the trading activity of investors can still transmit new information about their estimates regarding the values of the firms. Along these lines, Roll (1988) argues that 'the financial press misses a great deal of relevant information generated privately' (p. 564). Our objective in this article is to provide a comprehensive examination of the conditions under which the second channel is likely to provide useful guidance to corporate managers in their corporate decisions. Specifically, we ask the following question: when do corporate managers extract information from the stock market in order to improve their corporate decisions?

At first glance, the inclination is to suggest that corporate managers should rely on the appraisals of the equity investors when they perceive it to be informationally efficient in order to ensure that all the costly information that they require is fully reflected in the prevailing prices. However, in their seminal article, Grossman and Stiglitz (1980) argue that there is limited incentive for market participants to acquire costly information when prices convey all the information. Specifically, Grossman and Stiglitz demonstrate that an 'equilibrium degree of disequilibrium' (p. 393) is required wherein prices reflect information only *partially*. Under this condition, one would expect that investors who allocate valuable resources to information collection are compensated for their efforts.

If the Grossman and Stiglitz (1980) conclusion holds, then firms whose shares exhibit some degree of mispricing (i.e., prices that differ from the theoretical ideal price in a perfectly integrated and efficient market) are likely to be the ones that attract the attention of investors. For example, when a company's share price exhibits a noticeable positive trend, it might become subject to increasing coverage by industry experts in order to understand whether the prevailing prices reflect growing investment opportunities, among other potential explanations. Such increased coverage by industry experts might raise the attention of the company's managers to otherwise overlooked valuable investment opportunities. More importantly, the prevailing mispricing incentivizes equity traders to invest in the acquisition of new information about the firm's growth opportunities and hence make trading decisions based on such information. While arbitrageurs do not communicate directly with the firm's managers, their trading activities offer credible signals that managers can rely upon in order to steer their corporate policies effectively. Consequently, the variation in stock prices due to the trading activity of the informed equity investors allows the firm's managers to infer valuable information that they would not otherwise possess about the growth prospects of their firm. As

a result, the integration of such information in the managerial decision-making process allows the firm's managers to be engaged in synergy-enhancing investments that can, in turn, foster corporate growth, boost profitability, and improve shareholders' wealth.

Analytically, we examine whether Grossman and Stiglitz (1980) proposition applies to the takeover market. In the US market whereby price noisiness tends to be temporary (Alvarez-Ramirez, Alvarez, Rodriguez, & Fernandez-Anaya, 2008), we expect the trading activity that emerges in response to the mispricing of the acquiring firms' shares to convey valuable information that the managers of these firms successfully incorporate in their takeover plans. This trading activity is especially relevant when equity investors realize that the company is considering a takeover, start gathering information about the potential synergies of the takeover, and subsequently make trading decisions based on such information. As the pre-acquisition mispricing of the target firm may also motivate investors to collect the rare and costly information about the target's business conditions and growth prospects, we expect the trading activity in the target's shares in response to mispricing to convey valuable information that the acquiring firms incorporate in their takeover plans. As a result, the parties involved in takeover negotiations – as they finalize their takeover plans – can extract relevant information about the prospect of their deals by monitoring the variations in their stock prices. Empirically, we predict that the trading activities in response to temporary mispricing in both the acquiring and the target firms' shares are associated with increases in acquirer announcement period abnormal returns that are not reversed in the post-announcement period.

We test this prediction using a dataset that covers 849 public-to-public domestic US mergers during the period from January 2001 to December 2014 (inclusive). The Hurst (1951) exponent level is used to quantify the firm-level degree of mispricing. This level of mispricing is defined as the absolute value of the difference between the estimated Hurst exponent and its predicted value under the random walk hypothesis based on the daily stock returns in the t-240 to t-43 days before the acquisition announcement, where t is the merger announcement day. The higher this measure, the more likely it is that the stock prices exhibit either trend-reinforcing patterns or frequent reversals relative to the random walk before the equity investors receive the early signs that the company in considering a takeover. The 43rd day cutoff is motivated by previous research, such as Schwert (1996) and Betton et al. (2014), as the day at which news about potential acquisitions start to leak to financial markets, which ultimately triggers pre-acquisition variations in the merging firms' prices.[1] Our main results suggest that the turnover in the merging firms' shares in the period following the mispricing – from the 43rd to the 10th day preceding the acquisition announcement – provides useful information for the

[1] Siganos (2013) uses the 30th day before the acquisition announcement as the starting date in measuring the target's pre-acquisition price run-up. The findings that we report in this study are not altered qualitatively or quantitatively if cutoff dates such as the 60th, 50th, 40th, and 30th day before the acquisition announcement are introduced to the analysis.

companies in finalizing their takeover plans, which in turn leads to significant increases in the acquirer abnormal returns.

We recognize that there are potentially several factors that can influence the equity investors' perception of the merger synergies. We form simple theoretical predictions in order to account for the impact of such factors in our analysis. To highlight the effect of the acquisition's payment method and the potential overvaluation of the acquiring firm (Rhodes-Kropf, Robinson, & Viswanathan, 2005; Rhodes–Kropf & Viswanathan, 2004; Shleifer & Vishny, 2003; Travlos, 1987), we control for the wealth effects arising from the use of stock financing. Moreover, it is reasonable to assume that acquiring firms (pre-)owning shares in the target firms (i.e., toehold or pre-bid ownership of target shares), and acquiring firms that operate in the same industry as their targets (i.e., focused deals), among others, hold relatively more information about the merger and are less likely to rely on the guidance offered through the stock market's trading activity. To accommodate these effects, we control for the wealth effects of toehold levels (Betton and Eckbo, 2000) as well as the industry relatedness of the merging firms (Denis, Denis, & Yost, 2002). Given that firms with large block-holders are more likely to 'listen' to the market and are more immune to agency problems (Kau, Linck, & Rubin, 2008), we also control for the percentage of acquirer shares that are closely held by a small group of investors. Overall, our conclusions remain highly consistent after controlling for these effects, the acquirer's and targets' valuation and growth prospects, in addition to the industry and time fixed effects.

A valid concern regarding the robustness of our results is that the positive effect of the share turnover on the acquirer abnormal returns in deals involving mispriced firms is itself an illustration of the acquiring and/or the target firms' mispricing. Consequently, the high acquirer (short-run) abnormal returns might be reversed in the post-announcement period. However, our results of the analysis of the acquirer long-run abnormal returns are inconsistent with this concern. In particular, the positive effect of the stock trading activity in response to pre-acquisition mispricing on the acquirer announcement period abnormal returns is not reversed in the long-run. This evidence supports the notion that the trading activity conveys useful information to the merging firms in order to realize high and persistent synergies.

Previous research also stresses the role of the stock market's informativeness in affecting the variation of corporate investments (Chen, Goldstein, & Jiang, 2007), the efficiency of such investments (Durnev, Morck, & Yeung, 2004), and the prediction of corporate earnings (Durnev, Morck, Yeung, & Zarowin, 2003). These studies employ either the Roll (1986) price non-synchronicity measure[2] (Durnev et al., 2003) or the probability of informed trading (Chen et al.,

[2] This measure is estimated as the portion of the variation in a company's stock returns that is not explained by the market and industry-related factors.

2007; Durnev et al., 2004) to represent the degree of market informativeness. Durnev et al. (2004) also relate their use of price informativeness measures to the Grossman and Stiglitz (1980) argument that a lower cost of private information acquisition leads to a higher intensity of informed trading. Nevertheless, our analysis differs from these studies in the key aspect of highlighting another dimension of Grossman and Stiglitz. While recognizing the role of information acquisition cost as a key determinant of the amount of information incorporated into stock prices, the main counterintuitive result of Grossman and Stiglitz is that some degree of inefficient pricing is needed for the stock market to attract traders that invest in acquiring relevant information. It is with this key result in mind that we present the degree of firm-specific mispricing as a main incentive for relevant information collection. Subsequently, we use the share turnover in response to this mispricing as a measure of informed trading.

Extant studies also find that the merging firms' managers extract information from the stock market's reaction to merger announcements in order to determine whether the merger should be consummated (Luo, 2005; Kau et al., 2008). This result is noticeable when the companies have less information than the market (small and high technology firms), and when the cancellation of the merger is legally and logistically feasible (Luo, 2005). Moreover, the decision to withdraw a deal in response to a negative market reaction is also dependent on whether the firms have large block-holders and their CEOs have high pay-performance sensitivities (Kau et al., 2008). Our analysis complements these findings in two key ways. First, our results suggest that the acquiring firms extract useful information as a result of the stock market's variation in finalizing their takeovers before the official deal announcement. Second, while previous research documents an increase in options trading before acquisition announcements and treats such an increase as an indicator of informed trading in the options market (Jayaraman, Frye, & Sabhenval, 2001; Siougle, Spyrou, & Tsekrekos, 2011), our results put further emphasis on the role of the stock market as a source of pre-acquisition informed trading.

We recognize that M&A announcements are not the only venues to study the informative role of the stock market in navigating corporate decisions. As a result, we further examine whether the findings documented at firm-specific level hold in an aggregate time series analysis of overall corporate profit growth. As suggested in the Morck et al. (1990) active informant hypothesis, the variation in stock returns can convey useful information about the state of the overall economy. When the economy can be in one of multiple equilibria, the stock market can aggregate the beliefs of investors to determine which one of many potential equilibria is the most likely. Morck et al. (1990) find limited support to this hypothesis. However, if the Grossman and Stiglitz (1980) reasoning holds at the market-wide level, then an increase in the stock trading activity in response to temporary market-wide mispricing will be associated with

the collection of relevant information that can be partly reflected in the stock prices. As the corporate managers adjust their investment plans accordingly, this trading activity must be associated with a future increase in corporate profit growth.

Our results from the Threshold Vector Autoregressive (TVAR) models support this prediction. In particular we find that an increase in the overall stock market trading activity in response to temporary mispricing – which we measure as the absolute deviation of the quarterly level of market-wide Hurst (1951) exponent from its predicted value under the random walk hypothesis – is associated with future increases in the growth in corporate profits. Put simply, both the firm-specific and aggregate-level evidence reported in this article emphasize the role of the stock market activity as an active informant (Chen et al., 2007; Durnev et al., 2004, 2003) rather than a simple sideshow (Morck et al., 1990).

While our results are exclusively related to the US market, further analysis is required to determine whether similar evidence persist in other markets with different institutional frameworks. Possibly, mispricing leads to informed trading decisions only in liquid markets with relatively transparent institutional frameworks and binding legal arrangements. On the contrary, in markets with low liquidity, limited transparency and weak legal frameworks, the stock market mispricing might not be limited to temporary episodes during which investors try to collect new information. Alternatively, instead of being temporary, mispricing might be an illustration of more fundamental problems related to the functioning of the stock market and the difficulties of incorporating information in the prevailing prices.

The rest of this paper is organised as follows: Section 2 provides a brief review of the literature on corporate learning from stock prices; Section 3 presents the M&A dataset used in the analysis and discusses the main sample statistics; Section 4 describes the estimation of the degree of firm-specific pre-acquisition mispricing; Section 5 discusses the empirical results of the takeover-related analysis; Section 6 shows the time series analysis of the overall stock market mispricing's impact on overall corporate profits growth, and Section 7 concludes.

2. Corporate Learning from Stock Prices

The seminal work by Hayek (1945) highlights the informative role of prices in guiding the decisions of production and resource allocation. In Hayek's terminology, market prices solve the dispersed knowledge problem by aggregating information from many dissimilar traders to guide decision makers in their resource allocation. While Hayek's analysis was originally applied to the goods and services markets, it can be extended to financial markets whereby stock prices offer useful guidance for corporate managers in making investment decisions (Dow, Goldstein, & Guembel, 2016). Along these lines, Subrahmanyam and Titman (1999) stress the role of serendipity: when investors dedicate substantial efforts to collect information, their

increased level of attention allows them, even by chance, to come across (often unexpected) valuable information. As a result, a large body of literature has been focused on quantifying the extent to which prevailing prices reflect informed trading (Collin-Dufresne & Fos, 2015; Jiang & Zhu, 2017; Yan & Zhang, 2014).

Corporate managers can elicit such information by observing the variations in the stock prices of the firms they manage. Such information is therefore a valuable resource for the managers in steering their investment strategies. Morck et al. (1990) develop what they refer to as the 'active informant hypothesis' whereby stock market developments convey useful information to corporate managers and consequently predict future variations in corporate investments. While Morck et al. (1990) find limited support to this hypothesis in their time series analysis, later work using quantifiable measures of price informativeness has shown that corporate managers tend to learn from the variations in stock prices about their firm's fundamentals and integrate such information in their investment decisions. Chen et al. (2007), for instance, show that the rise in the magnitude of informed trading in a company's stock increases the sensitivity of the company's investments to stock market developments.

In the field of M&A, there is strong evidence from the options market that the rumors of takeover announcements tend to be preceded by significant increases in the magnitude of informed trading (Jayaraman et al., 2001). In turn, Kau et al. (2008) show that the managers of the acquiring firms are inclined to listen to the market and consequently respond to negative reaction to their takeover announcement by cancelling their deal. Furthermore, Betton et al. (2014) test a model whereby the pre-acquisition target price run-up conveys information to the merging firms about the synergies of the acquisition.

While these studies emphasize the role of stock market in guiding investment decisions, more attention is required on the incentives of market participants (i.e., equity traders) to collect the costly information that is much-needed by corporate managers who aim to adjust their investment strategies. The seminal contribution of the Grossman and Stiglitz (1980) emphasizes the role of price noisiness in incentivizing traders to collect such information. In the Grossman and Stiglitz model, security prices accomplish their role in revealing information but with some noisiness or even some delays, in order to ensure that the traders investing in the acquisition of costly information are ultimately rewarded for their efforts.

Our empirical analysis highlights the role of mispricing in incentivizing the informed trading that allows corporate managers to develop value- and profit-enhancing decisions. Our main empirical prediction is that the stock market trading activity is more likely to carry costly and relevant information when such activity emerges in response to mispricing. At the firm-specific level, we expect the share turnover that emerges in response to mispricing in both the acquiring and the target firms in M&As to lead to high-synergy deals that are also associated

with sustained acquirer abnormal returns. At the market-wide level, the main empirical prediction in our time series analysis is that the trading activity that emerges in response to temporary mispricing in the stock market is a significant predictor of increases in corporate profit growth.

3. Data and Sample Statistics

Our sample includes all US domestic public-to-public M&As collected from the Securities Data Corporation (SDC) M&As Database, which meet the following criteria: the bid is announced between January 1, 2001 and December 31, 2014 (inclusive); the deal is completed and has a disclosed deal value of at least $1 million; the acquirer controls 100% of the target shares at the deal's completion date; the deal payment is settled in either cash or stock; the deals announced by the same bidder within five trading days of each other are excluded; the acquiring and the target firms' stock prices, market values, and market-to-book value ratios are available from Datastream.

The restriction that both the acquiring and the target firms are listed in a stock exchange is introduced to ensure that the degrees of mispricing of both firms are measurable. The restriction that the acquirer is ultimately controlling 100% of the target at the deal's completion date is introduced to ensure that the acquirers in the sample have the same objective of full target ownership. Furthermore, we limit the sample to full cash and full stock financed deals in order to explicitly distinguish between these groups in our multivariate analysis. The analysis is limited to domestic US deals to guarantee that the degrees of mispricing are estimated for acquirers and targets that operate within the same institutional framework. This follows the emphasis by Morck et al. (2001) on the role of institutional frameworks and property rights as key determinants of the difference in the degree of informed trading across countries. Consequently, focusing on domestic deals ensures that the analysis does not conflate firm-level informed trading with the differences in institutional arrangements between the acquirer's and the target's nations.

Table 1 presents the annual breakdown of the sample in terms of payment method, acquirer and target industry relatedness and target industrial sector. In particular, Panel A records the annual distribution of our sampled deals in which: (a) the merger is financed with either cash or stocks as the payment method, and (b) the acquisition is either an industry-focused deal whereby the acquirer and the target share the same two-digit SIC code, or industry diversifying whereby the acquirer and the target have different two-digit SIC codes. The Table highlights that the overall M&A activity exhibited its peak in the year 2001 and started declining thereafter. The Table also documents that the majority of deals in the sample are cash financed (57.83%) and industry focused ones (65.14%). At the target industrial sector level, the majority

of deals in our sample appear in the High Technology and Financials sector, with respective percentages of 28.39% and 25.44%. In turn, the minority of deals in our sample are in the retail, real estate and media sectors.

(Insert Table 1 about here)

Table 2 presents the descriptive statistics of the firm- and deal-specific variables that we use in our analysis. CAR_ACQ is the acquirer's Cumulative Abnormal Returns. As in Barbopoulos and Sudarsanam (2012) and Fuller et al. (2002), this measure is estimated as the sum of the daily differences between the acquirer's returns and the returns of an overall market index (NYSE firms) over the 5-day window (*t*-2, *t*+2) around the M&A announcement, *t*. Brown and Warner (1980) show that the use of a market-adjusted model in estimating the abnormal returns in an event study is robust, as the adjustment for the firm's systematic risk does not improve the precision of the short-term abnormal returns. The mean level 0.17% is in line with previous research suggesting that, on average, M&As do not yield additional wealth to the acquiring firm (see Alexandridis et al. (2010)). Nevertheless, the high standard deviation of CAR, its maximum (86.69%), and minimum (-33.66%) values suggest a substantial variation in the M&A wealth effects among the acquirers.

(Insert Table 2 about here)

Moreover, we follow Officer (2003) by dividing the deal value by the target's market value of equity 43 days before the announcement, subtracting 1, and multiplying the result by 100. As the case of CAR, the premium also exhibits substantial variation with values that range from -98% for targets that are close to bankruptcy to a maximum of 653%.[3]

DEV_ACQ and DEV_TARG refer to the degrees of the acquirer's and the target's pre-acquisition mispricing, respectively, from the *t*-243 to the *t*-43 day preceding the acquisition announcement, *t*. These variables are described in more detail in Section 3. DEV_MKT refers to the market-level degree of mispricing and is discussed in more detail in Section 5. ACQUIRER_TRADING and TARGET_TRADING are the variables representing the level of acquirer and target share turnover, respectively, from the *t*-43 to the *t*-10 day preceding the acquisition announcement, *t*. As proposed by Gervais et al. (2001), the trading activity is a proxy for the level of investor attention. In the context of our analysis, the increase in this trading activity in response to mispricing should reflect the growing role of investors who accumulate costly information that guides the merging firms' synergy-generating strategies. The turnover rate is estimated as the average daily ratio of traded shares volume relative to listed shares over the corresponding period. The (*t*-43, *t*-10) window is chosen to represent the period following the pre-acquisition mispricing and preceding the acquisition announcement, when investors are

[3] Officer (2003) excludes deals with premium levels higher than 200% or lower than 0%. The results reported in this article hold if the same approach is followed.

likely to dedicate substantial attention to the merging firms' stocks and collect relevant information about the prospect of the acquisition. In this article we argue that the trading activity conveys valuable information that contributes in the design of high-synergy deals by the merging firms' managers who are carefully observing the stock market developments. Table 2 also covers a rich set of factors that we employ as control variables in our analysis such as the acquirer and the target market values and the market-to-book value ratios, 43 days before the acquisition's announcement day.

Moreover, we include the percentages of target shares owned by the acquiring firm before the bid announcement as well as the acquirer shares that are closely held by a limited group of family members or institutional shareholders. While Datastream reports the percentage of target shares that are closely held, the inclusion of such a variable in our analysis substantially reduced our sampled deals. For the same reason, we only include the acquirer Debt-to-Assets ratio 43 days before the deal. Appendix 1 provides a detailed description of the source of each variable, the acronym of each variable, as well as construction of each variable.

4. Measuring Firm-Specific Mispricing

The rich array of studies evaluating long-range dependence can be divided into two distinct branches. The first branch is primarily focused on determining the degree of long-range dependence using a quantifiable measure (Cajueiro & Tabak, 2004; Peters, 1994; Saffi & Sigurdsson, 2011; Sensoy & Tabak, 2015). The second branch is mainly concerned with developing statistics to test the hypothesis of long-range dependence (see Lo (1991) for instance). The latter approach represents an interesting research area that depends on the statistical assumptions adopted in developing and applying the various long-range dependence tests. However, given that the analysis in this article is assembled around the evaluation of the variations in the degrees of dependence in stock returns rather than testing propositions related to the significance of such dependence, the first approach is adopted.

The exponent developed by Hurst (1951) is used to quantify the diffusion of information into prices. The value of the Hurst exponent determines whether a series: (a) follows a random walk when $H=0.5$, (b) exhibits a trend reinforcing pattern when $H>0.5$, or (c) displays frequent reversals when $H<0.5$. Following Peters's (1994) introduction of the Fractal Market Hypothesis whereby stock returns are hypothesized to exhibit long-range dependence, this measure has been used in previous research to study the dynamic behavior of aggregate stock indices (see Alvarez-Ramirez et al. (2008), Sensoy and Tabak (2015), Cajueiro and Tabak (2004) and Serletis and Rosenberg (2007)).

Compared to alternative measures of mispricing such as the autocorrelation in stock returns and the explanatory power of lagged market returns (Saffi & Sigurdsson, 2011), the

Hurst exponent has the advantage of providing inferences about the distribution of returns in addition to highlighting their degree of autocorrelations. As explained in detail by Fama (1963), the Hurst exponent is the inverse of the characteristic exponent α of the characteristic function for Mandelbrot's stable paretian distributions. H=0.5 indicates the presence of a normal distribution (α =2), the only paretian stable distribution with a finite variance. When $\alpha = \frac{1}{H}$ is in the interval 0 < α < 2, the family of paretian distributions has no finite variance and the extreme tails of distributions are higher than those of the normal distribution. The most important consequence is that the variance exists (i.e., is finite) only in the extreme case where α = 2. The mean, however, exists as long as α > 1. Moreover, by quantifying the extent of information diffusion into prices, rather than the magnitude of overvaluation or undervaluation, the Hurst exponent –as a measure of mispricing– is less restrictive compared to alternative measures such as Rhodes-Kropf et al. (2005) which are based on the theoretical decomposition of the company's market-to-book ratio.

In estimating the Hurst exponent, Mandelbrot (1973) emphasizes the superiority of the R/S analysis to alternative techniques in detecting long-run dependence. To introduce this analysis, we follow the same notations adopted by Weron (2002). First, for the window covering the t-240 to t-43 days period before the M&A announcement, the series of each company's stock returns over the risk-free rate of length L is divided into d subseries of length n. For each subseries, $m = 1, \dots, d$, the mean E_m and the standard deviation S_m are estimated. Second, these returns are normalized by subtracting the sample mean $X_{i,m} = E_{i,m} - E_m$ for each subsample $i = 1, \dots\dots, n$ to create the cumulative series $Y_{i,m} = \sum_{j=1}^{i} X_{j,m}$. Third, the range $R_m = max\{Y_{1,m}, \dots\dots, Y_{n,m}\} - min\{Y_{1,m}, \dots\dots, Y_{n,m}\}$ is calculated and scaled by dividing it by S_m. The rescaled range of all subseries of length n is:

$$(R/S\,)_n = \frac{1}{d}\sum_{m=1}^{d} R_m/S_m \tag{1}$$

which asymptotically follows the power law:

$$(R/S\,)_n \sim cn^H \tag{2}$$

By artificially increasing n, H can be estimated by Ordinary Least Square (OLS) using the following regression:

$$\log (R/S)_n = \log c + H \log n \tag{3}$$

However, following the observation that the estimated level of the Hurst exponent H deviates significantly from 0.5 in small samples, Anis and Lloyd (1976) provide expected values of the R/S analysis under the null hypothesis of random walks.[4]

[4] This equation was initially provided by Anis and Lloyd (1976) and was then modified by Peters (1994). More specifically, the term $\left(\frac{n-0.5}{n}\right)$ was added by Peters to provide further improvement of the R/S analysis's performance in small samples.

$$E(R/S)_n = \frac{n-0.5}{n}\frac{\Gamma\left(\frac{n-0.5}{2}\right)}{\sqrt{n}\Gamma(\frac{n}{2})}\sum_{i=1}^{n-1}\sqrt{\frac{n-i}{i}} \quad (4)$$

Γ is the Euler gamma function. For the 197 (t-240, t-43) day window of each acquirer and target, the expected H level is estimated by introducing the expected value from Equation (4) in the regression Equation (3). The resulting expected value is 0.557. Hence, the variables DEV_ACQ and DEV_TARG in Table 2 refer to the absolute value of the difference between the estimated Hurst exponent value and 0.557796 for the acquirer and the target, respectively.

The descriptive statistics for each of the variables are reported in Table 2. The Table shows that the estimated mispricing measures – DEV_ACQ and DEV_TARG – take values ranging from 0 whereby the stock is efficiently priced, to 0.55 at which the Hurst exponent fully deviates from the predicted value under efficient pricing. Such dispersion in the estimated degree of mispricing, while suggesting various degrees of firm-specific pricing, can also be influenced by the noisiness in our estimation. Such noisiness might be due to the choice of the estimation window or the presence of outliers. To minimize these effects in our results, we employ the dummy variables MISPRICED_ACQ and MISPRICES_TARG which are assigned the value of 1 if variables DEV_ACQ and DEV_TARG take values that exceed their median levels, and 0 otherwise.

Table 3 provides a comparison between the mean values of the empirical variables among acquirers (targets) that experienced pre-acquisition mispricing and acquirers (targets) that did not experience such mispricing. With respect to the wealth effect of takeovers on the acquirer's shareholders, the univariate evidence reported in Table 3 suggests that acquirers shareholders receive 1% higher CAR in deals including pre-acquisition mispriced acquirers (targets) compared to deals in which the acquirers (targets) did not experience a period of mispricing.

(Insert Table 3 about here)

Note that the means of most of the covariates do not differ between the deals in which the acquirer (target) experiences pre-acquisition mispricing and the deals in which the acquirer (target) does not experience such a pre-bid mispricing. This suggests that, at least at the univariate level, the degree of pre-acquisition mispricing and consequently informed trading is not particularly dependent on specific firm characteristics.

5. Firm-Level Results and Discussion

The informed trading in response to the mispricing of a company's shares allows the managers and the potential acquiring firms to extract valuable information that will be useful in steering their subsequent investment decisions. If this empirical prediction holds, we should then expect that the turnover in the shares of the acquirers and targets whose securities displayed a high degree of pre-acquisition mispricing to predict high acquirer announcement period abnormal

returns. A potential concern regarding these predictions is that the high abnormal returns, if present, might reflect an inaccurate assessment of the deal's wealth effects due to the merging firms' pre-acquisition mispricing. As a result, this section also analyses the post-announcement buy-and-hold abnormal returns to determine whether the announcement period abnormal returns are reversed in the post-announcement period.

5.1. Announcement Period Returns

Table 4 presents the multivariate regression analysis of the determinants of acquirer announcement period 5-day CAR. The estimated models have the following specification:

$$\begin{aligned} CAR\_ACQ_i = {} & \alpha + \beta_1 ACQUIRER\_TRADING_i + \beta_2 TARGET\_TRADING_i \\ & + \beta_3 ACQUIRER\_TRADING_i \times MISPRICED\_ACQ_i \\ & + \beta_4 TARGET\_TRADING_i \times MISPRICED\_TARG_i + \sum_{j=5}^{k} \beta_j X_{ij} + \varepsilon_i \end{aligned} \quad (5)$$

where Model (1) does not include year and industry fixed-effects while Model (2) includes them.[5] $\sum_{j=5}^{k} \beta_j X_{ij}$ presents the effects of the control variables and ε_i is an error term with an expected value of 0. β_1 and β_2 represent the effect of the pre-acquisition trading activity in response to low mispricing for the acquirer and the target, respectively. $\beta_1 + \beta_3$ represent the average effect of the trading activity in the acquiring firm's shares on the announcement period acquirer abnormal returns in response to high pre-acquisition mispricing. $\beta_2 + \beta_4$ represent this effect based on the trading in the target's securities. If our main empirical predictions hold, β_3 and β_4 should have significant positive effects on the acquirer CAR. This finding would support the notion that the trading activity in response to high pre-acquisition mispricing transfers a more informative aspect than the trading activity that emerges when the level of mispricing is relatively low.

(Insert Table 4 about here)

Table 4 presents the two models following the specification (5). Interestingly, the wealth effects of both the acquirer's and the target's pre-acquisition activity are statistically significant only when this activity is preceded by high degrees of mispricing. In Model (1), the coefficients associated with ACQUIRER_TRADING and TARGET_TRADING (-0.46 and -042 respectively) are statistically insignificant. However, the coefficients associated with ACQUIRER_TRADING × MISPRICED_ACQ and TARGET_TRADING × MISPRICED_TARG (1.01 and 1.18) are positive, larger in magnitude, and statistically significant at the 5% level. However, when year and industry fixed-effects are added in Model (2), the level of the statistical significance of these coefficients is reduced. Nevertheless, both these effects remain significant at the 10%

[5] The levels of pre-acquisition turnover for both the acquiring and the target firms do not differ between high and low levels of mispricing. Nevertheless, our main prediction is not that trading activity that arises in response to mispricing is necessarily high but rather that such activity carries relevant information that guides the merging firms' takeover plans.

significance level. This results supports the application of the Grossman and Stiglitz (1980) analysis in the takeover market by suggesting that the pre-acquisition trading activity, in both the acquirer's and the target's shares, presents a significant predictor of acquirer abnormal retruns when this activity follows a period of temporary mispricing.

As discussed in Section 1 (Introduction Section), we control for the effect of various firm- and deal-related factors that influence the deal's synergies and also the market's perception of such synergies. To highlight the wealth effects of stock financing on acquirer abnormal returns (Shleifer and Vishny, 2003; Rhodes–Kropf and Viswanathan, 2004; Rhodes–Kropf et al., 2005), a dummy variable assigned the value of 1 if the deal is stock financed (STOCK) is added to our analysis, among the other factors that we control for. To emphasize the effect of the acquiring firm's familiarity with the target firms' business environment, we employ two proxies: (a) we control for the effect of toeholds (TOEHOLD_ACQ) and (b) we control for the effect of cross-industry acquisitions (DVRD). Moreover, our analysis accounts for the percentage of acquirer shares that are closely held by large blocks of shareholders that are likely to 'listen' to the market and are immune to agency problems (Kau et al., 2008). In addition, we control for the effect of the premium offered to the target firm to control for the possibility that the market might treat the payment of high premia as a sign of overpayment or high synergies in the deal (Antoniou, Arbour, & Zhao, 2008).

We also control for the effects of firm-specific factors that potentially affect the equity investors' ability to accurately assess the effects of the announced takeovers on acquirer value. Both the acquiring and the target firms' sizes are controlled for following the observation by Roll (1981) that investors face substantial difficulties in assessing the riskiness of small companies. Noteworthy, the smaller stocks are difficult to undertake arbitrage with because of the high fixed trading costs. Moreover, we control for the wealth effects of the merging firms' market-to-book value ratio following Lakonishok et al's (1994) findings related to the equity investors' overvaluation of growth companies, undervaluation of value companies, and the temporary difficulties in immediately arbitraging away such misvaluations. An alternative reason for including the market-to-book value ratio in our analysis relates to the possibility that its decline is likely to be associated with financial distress, which makes companies more difficult to value, as well as the correction of their mispricing highly costly (Chelley-Steeley, Lambertides, & Savva, 2017). In addition to being proxies for valuation difficulties, the merging firms' sizes and market-to-book value ratios can also proxy for the potential synergies to be realized from the deal. Lastly, we control for the level of pre-acquisition riskiness for both the acquiring and the target companies by introducing the standard deviation of their abnormal returns to the analysis. While we do not explicitly interpret the effects of these variables, it is

important to note that our findings remain both economically and statistically significant after controlling for these effects.

5.2. Post-announcement Abnormal Returns

To examine whether the increases in the acquirer announcement period CAR in response to mispricing are reversed in the post-announcement period, we examine in a multivariate framework the variation in the acquirer post-announcement buy-and-hold abnormal returns (BHARs). The acquirer holding period abnormal returns, which are the differences between the cumulative returns of investment in the acquirer shares and those in the market index, are computed for the holding periods of 12 and 36 months from the end of the deal's announcement month. The BHARs are analyzed in a multivariate framework within the following equation:

$$\begin{aligned} BHAR(x)_i = {} & \alpha + \beta_1 ACQUIRER\_TRADING_i + \beta_2 TARGET\_TRADING_i \\ & + \beta_3 ACQUIRER\_TRADING_i \times MISPRICED\_ACQ_i \\ & + \beta_4 TARGET\_TRADING_i \times MISPRICED\_TARG_i + \sum_{j=5}^{k} \beta_j X_{ij} + \varepsilon_i \end{aligned} \tag{6}$$

which has the same specification as Equation (5) with the dependent variable being $BHAR(x)_i$, which is the acquirer *i*'s BHARs for the x-months period following the the end of the deal's announcement month. If the positive announcement period abnormal returns driven by trading activity in response to mispricing are themselves an illustration of such mispricing, then β_3 and β_4 should be negative and significant to highlight a reversal in the announcement period wealth effects. In both Models (1) and (2), with and without year and industry fixed-effects respectively, none of the coefficients associated with ACQUIRER_TRADING, TARGET_TRADING, ACQUIRER_TRADING × MISPRICED_ACQ and TARGET_TRADING × MISPRICED_TARG are statistically significant. Hence, the initial wealth effects of share turnover in response to mispricing effects are not reversed in the long-run. Such results support the proposition that the share turnover in response to acquirer and target mispricing provides information to the merging firms to earn persistent synergies to their takeovers.

(Insert Table 5 about here)

6. Time Series Analysis

6.1. Time variation in the market Hurst exponent

One of the main tasks in this article is to investigate whether the firm-level analysis that has been executed in the preceding sections also applies to the aggregate relationship between the degree of market mispricing and the growth rates in corporate profits. Within the context of the Grossman and Stiglitz (1980) conclusion, temporary market-wide mispricing can incentivize the

equity investors to collect valuable information about the overall macroeconomic environment. Such information can help corporations adjust their investment plans in a way that will ultimately foster corporate growth, boost profitability, and improve shareholders' wealth. We expect, ceteris paribus, the growth in stock market trading activity that follows the increases in market-wide mispricing to be associated with future increases in corporate profits growth.

Accordingly, in order to analyze the impact of the variation of market-wide mispricing, we measure the quarterly degree of market efficiency as the Hurst exponent of the daily excess returns of the 63 trading days covered in each quarter from 1970 through 2014. The levels of excess returns are for the value-weighted portfolio of all CRSP firms incorporated in the US and listed on the NYSE, AMEX, or NASDAQ. These excess returns are retrieved from Professor Kenneth French's website. As in Alvarez-Ramirez et al. (2008), our estimations highlight erratic dynamics of persistent and anti-persistent behavior in the stock market. Figure 1 depicts the time-varying quarterly levels of the estimated Hurst exponent measures for the US stock market from the first quarter of 1970 until the fourth quarter of 2014. As argued by Alvarez-Ramirez et al. (2008), the long-term trend of the US stock market's Hurst exponent is negative, suggesting an inclination towards more efficient behavior. The authors attribute this increase in market efficiency to the free-floating currency arrangements, the free capital flows and the increasing participatory aspects of financial markets following the end of the Bretton Woods system. Moreover, the periods of market turbulence – such as the 1987 and 2007 crashes – are characterized by Hurst exponent levels below 0.5. Such levels reflect the frequent reversals in stock returns and the increasing volatility levels that tend to emerge during these periods of market instability.

(Insert Figure 1 about here)

6.2. TVAR model

The Threshold Vector Autoregression (TVAR) models (Galvao, 2003; Tong, 1983; Tsay, 1998) present a flexible channel for testing our empirical predictions at the market-wide level. TVARs are piecewise linear models where the values of a pre-chosen threshold variable determine various autoregressive regimes. This family of models is able to capture various non-linear relations, multiple equilibria, and also asymmetric reactions from the endogenous variables. Moreover, the coefficients within each regime can be recovered with computational ease via simple sum of least squares minimization. In applying these models, the empiricist does not have to determine a priori threshold levels. Instead, a grid search is applied to determine the threshold levels that minimize the sum of squared residuals while estimating the OLS coefficients. This method is known as Conditional Least Squares (CLS). We estimate the following two-regime TVAR model:

$$y_t = \begin{cases} \alpha_1 + A_1(L)y_t + \varepsilon_{1t} & if\ DEV\_MKT_{t-3} \leq \gamma \\ \alpha_2 + A_2(L)y_t + \varepsilon_{2t} & if\ DEV\_MKT_{t-3} > \gamma \end{cases} \quad (7)$$

In this model, DEV_MKT is the pre-determined threshold variable and γ is the estimated threshold value. This measure is used to determine the market-wide mispricing and consists of absolute value of the difference between the estimated Hurst exponent and its predicted value of 0.51 under the null hypothesis of random walk.

y_t is the 4 × 1 column vector that includes DEV_MKT, the growth in corporate profits (PROFIT_GROWTH), the stock market's excess returns (EXCESS_RETURNS), and the quarterly growth rate in the S&P 500's volume of traded shares (VOLUME_GROWTH). α_i, $i = 1,2$, are 4 × 1 column vectors of constants. The matrices $A_i(L) = A_{i1}L + A_{i2}L^2 + A_{i3}L^3$ are estimated with L being the lag operator. The lag order is set at 3 according to the Akaike Information Criterion (AIC). The error term ε_t is the normally distributed error term with an expected value of 0.[6] Table 6 reports the equations that explain the variation in the stock market trading activity and corporate profits growth in the estimated TVAR model. The estimated threshold value of market-wide mispricing (0.058) separates the overall model into two sub-models. The first sub-model covers 74% of the observations while the remaining 26% are covered in the second sub-model. As predicted, the growth in the traded volume of the S&P 500 shares predicts future growth in corporate profits only in the regime that emerges in response to high market mispricing (DEV_MKT>0.058). In particular, the two-quarter lag of S&P 500 trading volume growth (VOLUME_GROWTH(-2)) in this regime has a positive and significant effect on the growth in corporate profits. One can interpret this finding as evidence that an increased trading stock market activity in response to market-wide mispricing proves critical information to corporations seeking to steer their investment strategies to realize higher profits. Interestingly, in the low market mispricing regime (DEV_MKT≤0.058), the growth in the traded volume of the S&P 500 does not predict future variations in corporate profits.

(Insert Table 6 about here)

Overall, the findings presented above support the 'active informant hypothesis' postulated by Morck et al. (1990) whereby the variation in stock returns conveys useful information about the overall state of the economy and consequently guides corporate investment decisions. Nevertheless, the distinguishing aspect of these findings is their emphasis on the role of inefficient pricing as a key incentive for relevant information collection. More specifically, the conclusion of the time series results is in line with the results of the firm-level analysis suggesting that the periods of temporary mispricing offer companies with a valuable

[6] In untabulated results, the null hypothesis of unit root is rejected for the empirical variables in the estimations based on the Augmented Dickey Fuller test.

opportunity to extract performance-improving information that boosts profitability and shareholder wealth.

These results should be interpreted within the context of the generally efficient and liquid US stock market in which mispricing patterns tend to be temporary. More specifically, mispricing patterns in less developed markets might reflect fundamental problems related to the lack of liquidity and the weak legal framework that limit investor participation. Consequently, further empirical investigation is required to determine whether our findings hold in non-US contexts, especially in less developed markets.

6.3. Testing Non-linearity

In order for the choice of TVAR models rather than linear models to be appropriate, the tested threshold effects should be statistically significant overall. The multivariate extension of the linearity test advanced by Hansen (1999) and Lo and Zivot (2001) is used to assess the level of this significance. This test computes Likelihood Ratio (LR) test based on the covariance matrix attached to each model. The LR statistic can be presented as follows:

$$LR_{01} = T\left(\ln\left(det\hat{\Sigma}_0\right) - \ln\left(det\hat{\Sigma}_1\right)\right) \quad (6)$$

In Equation (6), $\hat{\Sigma}_0$ is the estimated covariance matrix of the model under the null hypothesis of no threshold effect; $\hat{\Sigma}_1$ is the estimated covariance matrix under the alternative of a two-regime model; and T is the number of observations in the series. The bootstrap distribution of this statistic is based on (a) resampling the residuals from the model under the null hypothesis, and (b) estimating the threshold parameter and computing the test. Results are obtained by using the middle 70% of the sorted observations based on Hansen's (1996) recommendation that the optimal trimming level is 15%. When this test is applied to the TVAR model in Table 6, the resulting p-value is 0.001. This significant threshold effect further validates the use of the TVAR model in the time series analysis in Section 6.2.

7. Conclusion

This article traces the implications of investors' efforts to collect rare and costly information, especially in response to periods of inefficient pricing, on acquirer abnormal returns. In the main analysis, we predict that the increase in mispricing should motivate investors to collect costly information that also guides corporate managers in making value- and performance-enhancing corporate decisions.

By using the deviation of the Hurst exponent from its predicted value under the random walk hypothesis as a proxy for both the firm-level and the market-wide degree of mispricing, the findings offer strong support to our predictions. We find that the trading activity in the shares of the acquiring and the target firms – especially when such shares have been subject to

temporary mispricing – presents a significant predictor of increases acquirer announcement period abnormal returns. Such abnormal returns are not reversed in the post-announcement period. This result is robust to the inclusion in our estimations of various controls reflecting deal- and firm-related characteristics. In turn, at the market-wide level, the increase in the overall degree of mispricing is associated with future increases in corporate profits growth, after controlling for the effects of the prevailing financial conditions.

Overall, our results emphasize the role of the stock market's informativeness in influencing corporate investment decisions and performance, especially when some degree of mispricing motivates equity investors to collect rare and costly firm-specific information that guides corporate decisions. Nevertheless, we are still cautious in generalizing our findings into non-US contexts due to the requirement of controlling for various factors such as the degree of stock market development and the institutional arrangements that govern the market. The investigation of these effects in a cross-country analysis presents a fruitful area for future research.

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Appendix 1: Variable definitions

Variable (Acronym)	Description	Source
Acquirer's CAR (CAR_ACQ)	The acquirer's 5-day (-2, 2) announcement period cumulative abnormal returns. The abnormal return in each day is the difference between the firm's returns and the value-weighted returns of NYSE firms.	Datastream
Acquirer's Closely Held Shares (CLOSELYHELD_ACQ)	The percentage of the target's shares that are closely held by a small group of investors.	Datastream
Acquirer's Debt-to-Assets (DEBT_ACQ)	The acquirer's ratio of Debt to Assets 43 days prior to the bid announcement.	SDC
Acquirer's Market Value (MV_ACQ)	The acquirer's market value of equity 43 days prior to bid announcement, in millions of dollars.	Datastream
Acquirer's Market-to-Book Value (MTBV_ACQ)	The market value of the acquirer 43 days before the acquisition, divided by its book value of equity from the most recent accounting statement prior to the bid announcement.	Datastream
Acquirer's Market-to-Book Value (MTBV_TARG)	The market value of the target 43 days before the acquisition, divided by its book value of equity from the most recent accounting statement prior to the bid announcement.	Datastream
Acquirer's Mispricing (DEV_ACQ)	The absolute value of the difference between the estimated Hurst exponent of the acquirer's daily returns and this exponent's predicted value (0.557796) under the random walk hypothesis. The daily returns used to estimate the Hurst exponent cover the 240 to 43 days that precede the bid announcement.	Datastream + Authors' Estimations
Acquirer's Pre-Acquisition Standard Deviation (SD_ACQ)	The standard deviation of the acquirer's daily abnormal returns for the 240 to 43 days that precede the bid announcement.	SDC
Acquirer's Toehold (TOEHOLD_ACQ)	The portion of the target's shares that are held by the acquirer before the deal's announcement.	SDC
Buy-and-hold abnormal returns of the acquiring firm for x years following the acquisition (BHAR(x))	The acquirer's buy-and-hold abnormal returns for the period of x months following the acquisition.	Datastream
Cash Financed Transactions (CASH)	Dummy=1 if the consideration is 100% financed with cash and 0 otherwise.	SDC
Diversifying Deals (DVRD)	Dummy=1 if the acquirer and the target have different two-digit SIC codes, and 0 otherwise (FCSD).	SDC
GDP Growth (GDP_GROWTH)	The quarterly (annualized) growth rate of real gross domestic product.	The US Bureau of Economic Analysis
Growth in the Stock Market's Trading Volume (VOLUME_GROWTH)	The quarterly growth rate in the total number of traded shares of the companies listed in the S&P 500.	Datasream
Market's Mispricing (DEV_MKT)	The absolute value of the difference between the estimated Hurst exponent of the stock market's daily excess returns and this exponent's predicted value under the random walk hypothesis in each quarter. The daily returns used to estimate the Hurst exponent cover the 63 trading days in each quarter.	Datastream + Authors' Estimations
Mispriced Acquirer (MISPRICED_ACQ)	Dummy=1 if DEV_ACQ exceeds its median level of 0.12, and 0 otherwise.	Datastream + Authors' Estimations
Mispriced Target	Dummy=1 if DEV_TARG exceeds its median level of 0.12, and 0	Datastream +

(MISPRICED_TARG)	otherwise.	Authors' Estimations
Premium Paid in the Deal PREMIUM (%)	The deal's value divided by the target firm's market value 43 days before the acquisition, minus 1. The resulting measure is multiplied by 100.	SDC + Datastream
Profits Growth (PROF_GROWTH)	The seasonally adjusted quarterly (annualized) growth rate of corporate profits level after tax.	The US Bureau of Economic Analysis
Stock Financed Acquisitions (STOCK)	Dummy=1 when the consideration is 100% financed with stocks and 0 otherwise.	SDC
Target's Market Value (MV_TARG)	Target's market value of equity 43 days prior to bid announcement, in millions of dollars.	Datastream

Continued

Target's Mispricing (DEV_TARG)	The absolute value of the difference between the estimated Hurst exponent of the target's daily returns and this exponent's predicted value (0.557796) under the random walk hypothesis. The daily returns used to estimate the Hurst exponent cover the 240 to 43 days that precede the bid announcement.	Datastream + Authors' Estimations
Target's Pre-Acquisition Standard Deviation (SD_TARG)	The standard deviation of the target's daily returns for the 240 to 43 days that precede the bid announcement	SDC
The Acquirer's pre-acquisition trading (ACQUIRER_TRADING)	The average daily ratio of the acquirer's traded shares to listed ones for the period ranging from 43 to 10 days before the acquisition announcement.	Datastream
The Acquirer's pre-acquisition trading (TARGET_TRADING)	The average daily ratio of the target's traded shares to listed shares for the period ranging from 43 to 10 days before the acquisition announcement.	Datastream
The Stock Market's Excess Returns (EXCESS_RETURNS)	The difference between the quarterly level of market returns and the risk free rate of interest.	Professor Kenneth French's website

Table 1: Annual distribution of our sampled deals

	Panel A					Panel B											
YEAR	ALL	CASH	STOCK	FCSD	DVRD	IND	HCR	CST	MAT	MED	RTL	CPS	HT	EPW	TLC	FIN	RST
2001	124	47	77	85	39	6	11	4	2	3	1	7	39	4	5	41	1
2002	67	35	32	41	26	2	10	1	3	4	3	4	19	2	3	16	0
2003	72	34	38	49	23	1	7	1	0	1	1	7	18	3	4	26	3
2004	79	41	38	51	28	3	14	3	2	1	2	7	22	4	2	18	1
2005	68	40	28	38	30	5	11	2	2	2	1	3	22	1	3	14	2
2006	73	53	20	41	32	2	8	3	2	3	1	2	24	5	2	18	3
2007	68	53	15	39	29	4	12	1	3	5	2	4	19	0	4	13	1
2008	38	28	10	25	13	2	7	0	0	0	2	0	16	2	1	8	0
2009	38	17	21	25	13	1	5	3	1	0	0	2	13	5	2	5	1
2010	57	45	12	39	18	5	9	1	1	0	0	2	25	2	2	10	0
2011	38	23	15	29	9	3	6	0	5	0	0	0	3	4	3	10	4
2012	36	23	13	23	13	2	3	1	0	0	1	3	8	2	3	13	0
2013	45	27	18	36	9	2	6	2	0	1	2	3	7	4	1	15	2
2014	46	25	21	32	14	1	8	3	3	3	1	3	6	4	3	9	2
N	849	491	358	553	296	39	117	25	24	23	17	47	241	42	38	216	20
%	100.00	57.83	42.17	65.14	34.86	4.59	13.78	2.94	2.83	2.71	2.00	5.54	28.39	4.95	4.48	25.44	2.36

Note: Panel A represents the annual distribution of public-to-public M&A bids announced by US acquirers between January 1st, 2001 and December 31st, 2014. The distribution of the sample is presented according to the total number of transactions (ALL), method of payment (Cash or Stock), and whether the acquisition is industry-focused (FCSD) or diversifying. Panel B represents the yearly distribution of the M&A bids with respect to the target's sector. The sectors, as reported by SDC, are: Industrials (IND), Healthcare (HCR), Consumer Staples (CST), Materials (MAT), Media and Entertainment (MED), Retail (RTL), Consumer Products (CPS), High-Technology (HT), Energy and Power (EPW), Telecommunications (TLC), Financials (FIN) and Real Estate (RST).

Table 2: Summary statistics

Variable	Mean	Median	Max	Min	SD
CAR_ACQ (%)	-0.17	-0.16	86.69	-33.66	9.06
PREMIUM (%)	53.42	41.89	653.71	-98.16	65.49
DEV_ACQ	0.14	0.12	0.55	0.00	0.11
DEV_TARG	0.15	0.12	0.55	0.00	0.11
MV_TARG (m$)	837	166	53535	1.19	3076
MV_ACQ (m$)	19702	2579	525775	3.69	44881
MTBV_ACQ	3.29	1.83	231.55	0.09	9.44
MTBV_TARG	2.71	1.96	26.94	0.03	2.60
TOEHOLD_ACQ (%)	2.92	0.00	95.32	0.00	12.92
CLOSELYHELD_ACQ (%)	12.88	6.78	93.96	0.01	15.91
SD_TARG (%)	3.63	3.00	22.01	0.00	2.42
SD_ACQ (%)	2.60	2.00	23.47	0.64	01.88
DEBT_ACQ (%)	20.35	18.60	78.80	0.00	16.05
ACQUIRER_TRADING (%)	0.92	0.57	14.74	0.00	1.27
TARGET_TRADING (%)	0.70	0.38	8.39	0.01	0.93

Note: This table represents descriptive statistics for the continuous covariates in the sample. For each empirical variable, the mean, median, maximum, minimum and standard deviation values are reported. Please refer to Appendix 1 for an accurate description of the variables.

Table 3: Univariate analysis

Variable	(1) Mean in deals in which the acquirer had pre-bid mispricing	(2) Mean in deals in which the acquirer did not have pre-bid mispricing	(1) - (2)	(3) Mean in deals in which the target had pre-bid mispricing	(4) Mean in deals in which the target did not have pre-bid mispricing	(3) –(4)
CAR_ACQ (%)	0.38	-0.71	1.08*	0.58	-0.89	1.44**
PREMIUM (%)	55.68	51.22	4.46	55.82	51.04	4.78
MV_TARG (m$)	788.11	885.72	-97.61	821.86	853.04	-31.19
MV_ACQ (m$)	19497.24	19902.55	-405.31	19036.34	20369.32	-1332.98
MTBV_ACQ	3.11	3.48	-0.37	3.64	2.94	0.70
MTBV_TARG	2.66	2.76	-0.10	2.65	2.77	-0.12
TOEHOLD_ACQ (%)	0.06	0.06	0.00	0.07	0.06	0.01
CLOSELYHELD_ACQ (%)	0.28	0.33	-0.05*	0.32	0.29	0.02
SD_TARG (%)	3.60	3.67	-0.08	3.53	3.73	-0.20
SD_ACQ (%)	2.61	2.60	-0.02	2.52	2.69	-0.2
DEBT_ACQ (%)	20.88	19.84	1.04	20.28	20.43	-0.15
ACQUIRER_TRADING (%)	0.95	0.89	0.06	0.93	0.92	0.01
TARGET_TRADING (%)	0.76	0.72	-0.04	0.69	0.72	-0.03

Note: This table reports the mean value of each empirical variable employed in the analysis of the group of deals in which the acquirers (targets) experienced periods of pre-bid mispricing and the group of deals in which the acquirers (targets) did not experience such mispricing. We also report the difference between each variable's mean in the deals in which the acquirer (target) experienced pre-bid mispricing and the mean in deals in which the acquirer (target) did not experience pre-bid mispricing. The significance of the *t*-test with the null hypothesis that this difference is equal to 0 is also reported. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively.

Table 4: Acquirer announcement period CAR

Dependent Variable	CAR_ACQ	CAR_ACQ
Explanatory Variable\Model (.)	(1)	(2)
Intercept	3.362	1.3617
	(2.159)	(2.765)
ACQUIRER_TRADING	-0.441	-0.388
	(0.447)	(0.487)
TARGET_TRADING	-0.444	-0.508
	(0.488)	(0.480)
ACQUIRER_TRADING x MISPRICED_ACQ	1.006**	0.898*
	(0.455)	(0.475)
TARGET_TRADING x MISPRICED_TARG	1.199**	1.074*
	(0.613)	(0.622)
DEV_ACQ	-0.041	0.552
	(2.927)	(2.927)
DEV_TARG	3.369	3.734
	(2.764)	(2.723)
STOCK	-2.768***	-3.027***
	(0.658)	(0.273)
DVRD	-0.138	-0.022
	(0.634)	(0.626)
ln(MV_TARG)	-0.540**	-0.585**
	(0.254)	(0.268)
ln(MV_ACQ)	-0.007	0.073
	(0.224)	(0.224)
MTBV_ACQ	0.001	0.003
	(0.022)	(0.023)
MTBV_TARG	-0.197	-0.137
	(0.184)	(0.192)
TOEHOLD_ACQ	-0.323	-0.802
	(1.519)	(1.462)
CLOSELYHELD_ACQ	0.017	0.021
	(0.025)	(0.026)
SD_TARG	-0.343*	-0.295
	(0.198)	(0.230)
SD_ACQ	0.605	0.757
	(0.404)	(0.467)
DEBT_ACQ	0.039**	0.037
	(0.019)	(0.022)
PREMIUM	-0.015**	-0.016**
	(0.007)	(0.006)
Year and Industry Effects	NO	YES
N	849	849
Adjusted R-Squared	0.04	0.06

Note: This table reports the results of the cross-sectional analysis explaining the 5-day announcement period acquirer Cumulative Abnormal Returns (CAR_ACQ) in the takeover deals covered in the sample. The standard errors reported in parentheses are corrected for heteroskedasticity using the White (1980) heteroskedasticity consistent standard errors. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively. Please refer to Appendix 1 for an accurate description of the variables.

Table 5: The acquirer long-term BHARs

Dependent Variable	BHAR (12)	BHAR (36)
Explanatory Variable\Model (.)	(1)	(2)
Intercept	6.657	-5.065
	(11.547)	(10.601)
ACQUIRER_TRADING	-1.033	-0.768
	(1.816)	(1.817)
TARGET_TRADING	2.706	2.576
	(2.175)	(2.180)
ACQUIRER_TRADING x MISPRICED_ACQ	-0.297	-0.653
	(2.036)	(2.038)
TARGET_TRADING x MISPRICED_TARG	2.584	2.498
	(2.591)	(2.595)
DEV_ACQ	-17.683	-16.656
	(13.998)	(13.962)
DEV_TARG	-8.791	-7.359
	(13.817)	(13.840)
STOCK	-3.028	-2.527
	(3.344)	(3.329)
DVRD	-0.213	-0.193
	(2.926)	(2.931)
ln(MV_TARG)	-0.710	-1.118
	(1.262)	(1.257)
ln(MV_ACQ)	0.708	1.219
	(0.986)	(0.970)
MTBV_ACQ	-0.150	-0.142
	(0.142)	(0.142)
MTBV_TARG	-0.671	-0.731
	(0.568)	(0.569)
TOEHOLD_ACQ	8.181	9.229*
	(5.732)	(5.737)
CLOSELYHELD_ACQ	-0.044	-0.019
	(0.092)	(0.091)
SD_TARG	-0.319	-0.052
	(0.872)	(0.870)
SD_ACQ	1.127	1.927*
	(1.780)	(1.143)
DEBT_ACQ	-0.032	-0.025
	(0.097)	(0.097)
PREMIUM	-0.021	-0.020
	(0.022)	(0.022)
Year and Industry Effects	YES	YES
N	848	757
Adjusted R-Squared	0.04	0.03

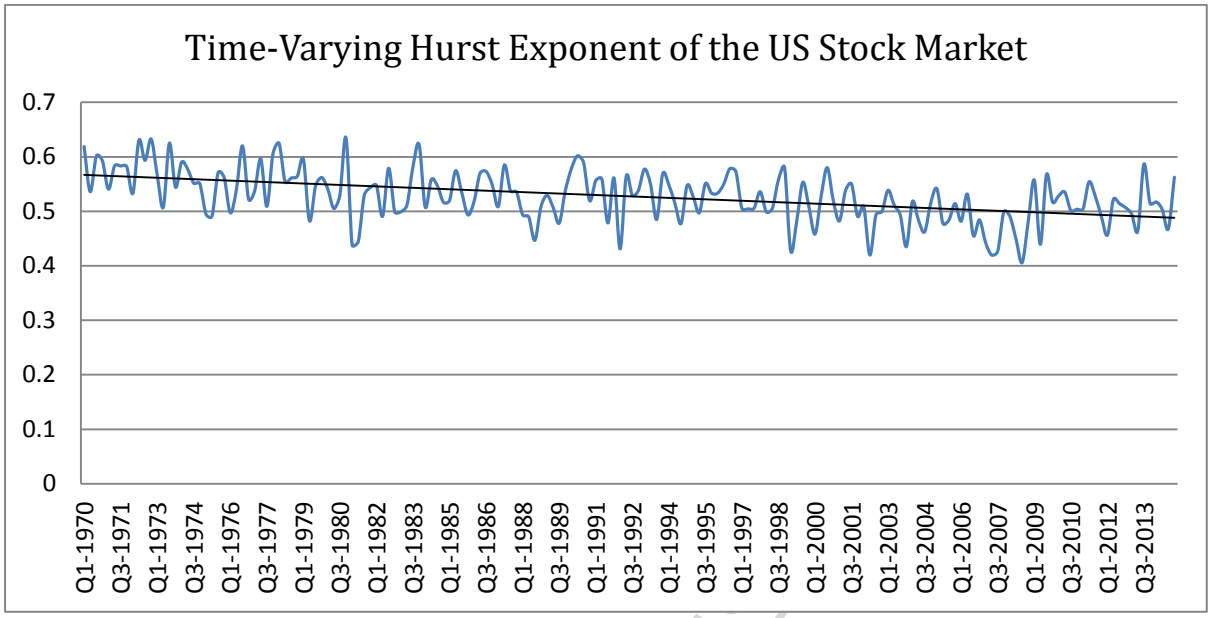
Note: This table reports the results of the cross-sectional analysis explaining the buy-and-hold acquirer returns in the takeover deals covered in the sample. The standard errors reported in parentheses are corrected for heteroskedasticity using the White (1980) heteroskedasticity consistent standard errors. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively. Please refer to Appendix 1 for an accurate description of the variables.

Table 6: TVAR model of the effects of market mispricing

	DEV_MKT (-3) ≤ 0.04 (61.9%)		DEV_MKT (-3) > 0.04 (38.1%)	
Dependent Variable	VOLUME_GROWTH	PROFIT_GROWTH	VOLUME_GROWTH	PROFIT_GROWTH
Explanatory Variable\Model (.)	(1)	(2)	(4)	(5)
Intercept	-2.754	0.488	22.657***	-4.261
	(3.349)	(2.043)	(6.147)	(3.750)
VOLUME_GROWTH (-1)	-0.165	-0.118*	-0.437***	0.116
	(0.107)	(0.065)	(0.124)	(0.076)
VOLUME_GROWTH (-2)	-0.288***	0.012	-0.471***	0.176**
	(0.098)	(0.060)	(0.112)	(0.068)
VOLUME_GROWTH (-3)	-0.031	-0.144**	-0.171	0.080
	(0.093)	(0.057)	(0.127)	(0.078)
DEV_MKT(-1)	141.456***	-28.784	-42.038	39.876
	(42.276)	(25.794)	(52.356)	(31.944)
DEV_MKT(-2)	63.599	39.782	3.173	31.563
	(45.601)	(27.822)	(47.718)	(29.114)
DEV_MKT(-3)	41.066	58.339	-148.779*	49.836
	(107.531)	(65.608)	(82.314)	(50.222)
PROFIT_GROWTH(-1)	-0.074	0.290**	-0.379**	-0.386***
	(0.232)	(0.141)	(0.168)	(0.103)
PROFIT_GROWTH(-2)	0.079	0.079	-0.526**	-0.339**
	(0.098)	(0.098)	(0.254)	(0.155)
PROFIT_GROWTH (-3)	-0.006	-0.006	-0.468**	0.293**
	(0.104)	(0.104)	(0.213)	(0.130)
EXCESS_RETURNS(-1)	0.201	0.155	0.245	-0.060
	(0.148)	(0.091).	(0.171)	(0.104)
EXCESS_RETURNS(-2)	-0.290**	0.049	-0.330	0.137
	(0.144)	(0.088)	(0.186).	(0.114)
EXCESS_RETURNS(-3)	0.021	0.037	-0.105	0.042
	(0.130)	(0.079)	(0.219)	(0.133)

Note: This table reports four equations of the TVAR model that links corporate profits growth (PROFIT_GROWTH), the degree of market mispricing (DEV_MKT) and the stock market's excess returns (EXCESS_RETURNS). The threshold variable is DEV_MKT with a one-quarter lag. The equations reported explain the variation in market mispricing (DEV_MKT) and corporate profits growth (PROFIT_GROWTH). The standard errors reported in parentheses are corrected for heteroskedasticity using the White (1980) heteroskedasticity consistent standard errors. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively. Please refer to Appendix 1 for an accurate description of the variables.

Figure 1: The time-varying dynamics of the US stock market's quarterly Hurst exponent



Note: This figure visualizes the time variation of the quarterly Hurst exponent levels estimated for the US stock market from the first quarter of 1970 until the fourth quarter of 2014. The Hurst exponents are estimated using equation (3) for the 63 trading days for each quarter. This figure also depicts a best-fit line highlighting the negative trend in the quarterly Hurst exponent levels in the post-Bretton Woods period.

Highlights

- Temporary mispricing incentivizes the collection of relevant information
- Acquisitions by mispriced acquirers generate high acquirer shareholder returns
- Acquisitions of mispriced targets generate high acquirer shareholder returns
- Market-wide mispricing is associated with future increases in profit growth
- These results hold after controlling for various economic/financial factors