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Abstract

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Keywords: Distraction, Employee commitment, Employee rights, Fear of job loss, Productivity, Shareholder wealth, Takeover speculation

JEL Classifications: D24, G00, G34, J24

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Abstract

Speculative news on corporate takeovers may hurt productivity because uncertainty and threat of job loss cause anxiety, distraction, and reduced collaboration and morale among employees and managers. Using a panel of OECD-headquartered firms, we show that firm productivity temporarily declines upon announcements of speculative takeover rumors that do not materialize. This productivity dip is more pronounced for targets and for firms in countries with weaker employee rights and less long-term orientation. Abnormal stock returns mirror these results. The evidence fosters our understanding of potential real effects of speculative financial news and the costs of takeover threats.

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1. Introduction

> *"[Some staff] check out completely, some gather around the water-cooler, some are spending all the time polishing their CVs and interviewing, and some are so stressed they just call in sick."* – The Financial Times (2019)[1]

With the rise of the internet and social media, speculative and often unfounded news about firms and other market participants have become increasingly prevalent. For example, several studies show that takeover speculation only rarely results in public bids, with 70%-90% of all takeover rumors not materializing (e.g., Ma and Zhang, 2016; Betton, Davis, and Walker, 2018; Jia et al., 2020). Consistently, Jia et al. (2020) report that 70% of takeover rumors originate from opinion pieces or speculation in the press, social media, or internet blogs. One reason for this trend is the media's need to attract readership, which creates incentives to publish sensational but potentially untrue news (Ahern and Sosyura, 2015). Another is market manipulation.[2]

Against this background, it is important to understand the role that speculative news and rumors play for firms and markets. The literature suggests that rumors manipulate stock prices (e.g., van Bommel, 2003; Schmidt, 2020) and affect mergers (e.g., Ahern and Sosyura, 2015; Alperovych et al., 2021). Yet, virtually nothing is known about the operational consequences that rumors may have for the firms involved. Our study addresses this issue, examining how firm productivity changes after rumors surface in the market for corporate control. We exploit distinct features of takeover rumors. First, many rumors are highly speculative (i.e., unrelated to firm fundamentals) and thus constitute unexpected shocks to firms. Second, although rumors rarely materialize, stock prices move upon their announcement (e.g., Ahern and Sosyura, 2015; Jia et al., 2020). This implies that the market does not ignore such rumors and that they may constitute credible threats to the involved firms, while causing no direct organizational changes.

[1] See the article "Big corporate mergers take a hidden toll on staff" in *The Financial Times* (09/16/2019), which describes how employees react to takeover speculation and pending bids.
[2] The Securities and Exchange Commission (SEC) has published several alerts warning investors about the role of social media in spreading false or misleading information. See, e.g., https://www.sec.gov/oiea/investor-alerts-bulletins/ia_rumors.html.

According to academic and anecdotal evidence, takeover rumors hurt labor productivity because they have adverse effects on employees and managers, particularly anxiety, distraction, and reduced collaboration and morale. These effects appear intuitive given the uncertainty and implicit threat of job loss and wage reductions that come with takeover rumors. In fact, labor restructuring is a key driver of M&A and the associated synergy gains (e.g., Jensen, 1988; Dessaint, Golubov, and Volpin, 2017). In this regard, Shleifer and Summers (1988) argue that takeovers are often motivated by wealth redistribution from employees to shareholders, e.g., in the form of layoffs (for empirical evidence, see, e.g., John, Knyazeva, and Knyazeva, 2015). As a result, takeover rumors can reduce employees' commitment and incentives to invest in their relationship with the firm if employees expect job loss or wage reductions. Employees may also strategically lower their productivity if they believe this may thwart the takeover. Further, takeover speculation may impede collaboration among employees if it increases expected workforce competition (Lazear, 1989).

Schweiger, Ivancevich, and Power (1987) interview employees pre and post M&A and find "significant political maneuvering initiated by acquisition rumors" (p. 128), indicating that employees react to takeover speculation. Burlew, Pedersen, and Bradley (1994) interview employees in a retail firm following the announcement of a potential sale. Their results suggest that already at the pre-acquisition stage, potential takeovers can have detrimental effects on the workforce, as this time is "most likely fraught with low employee morale, increased stress, resistance to change, higher turnover, and lower productivity" (p. 22). We thus hypothesize that takeover speculation will hurt firm productivity.

We provide empirical support for our hypothesis based on ca. 10,000 speculative takeover rumors, i.e., rumors that do not result in public bids within at least two years. Using a large panel of public firms headquartered in OECD countries, we document a statistically and economically significant decline in firm productivity after takeover rumors surface. Consistent

with none of the rumors materializing, productivity rebounds over time. We denote the resulting pattern as the *rumor-related productivity dip*.

Our main measures of firm productivity are the ratio of a firm's sales to employees as well as sales to SG&A. Yet, we also find the productivity dip using the gross profit margin and the operating ratio as alternative measures of firm productivity. Accounting for firm and quarter fixed effects, we show that firms exhibit a significant and temporary decline in productivity in the quarter during which they become involved in takeover speculation and the two succeeding quarters.[3] The productivity dip remains significant when we control for quarter*country or quarter*industry fixed effects, and when we limit the sample to North American firms.

A concern with our study is that speculative rumors may not constitute unexpected shocks to the involved firms that hurt their productivity, but rather that firms with poor past or expected productivity are more likely to become involved in takeover speculation. It is not trivial, though, to reconcile such a claim for reverse causality with our empirical strategy of examining non-materializing rumors and the resulting *temporary* decline in firm productivity. Nevertheless, we perform various tests and do not find support for this concern. First, neither do we find pre-rumor productivity trends for rumor firms, nor does firm productivity predict the occurrence of takeover rumors. The productivity dip is also robust to controls for past productivity and CEO turnover. Second, we use analyst EPS and sales estimates as a measure of market expectations of firm productivity and performance. If anything, we find that EPS and sales estimates in rumor quarters are higher (not lower) than in matched non-rumor quarters, a finding in line with the empirical literature.[4] Moreover, the productivity dip is robust to controls for analyst estimates

[3] We are unable to observe whether and when firms and other market participants learn that the takeover rumor was pure speculation (if there is any exact date at all). So we cannot test when the productivity dip should reverse. However, Figure 1 shows that the positive stock returns upon rumor announcements do not reverse fast but remain, indicating that the rumor stays in the market. Importantly, any negative effects on rumor firms' employees and ultimately productivity may linger because takeover rumors may serve as indications that the involved firms are "on the radar" of potential acquirers in the M&A market or may become active acquirers in the future.

[4] For example, Danbolt, Siganos, and Tunyi (2016) find that target firms have higher (not lower) free cash flows and are more (not less) profitable.

as well as for firms that actively seek buyers or acquisition targets. Third, we hand-collect the scoop articles for all takeover rumors involving U.S. target firms. Less than 1% of all articles mention productivity or profitability (directly or indirectly). Lastly, we neither find negative pre-rumor stock returns that may reflect poor expected productivity, nor do we find any indication for deal expectation (Betton et al., 2014) or unobserved ongoing merger negotiations (Eaton, Liu, and Officer, 2021) in the form of pre-rumor stock price run-ups. Average cumulative abnormal stock returns over the two months leading up to the announcements of takeover rumors amount to only 0.1%, in line with Betton, Davis, and Walker (2018) and Jia et al. (2020).

Another concern is that rumor firms may be inherently different from non-rumor firms. We address this concern using entropy balancing and a propensity score matching approach to match rumor firms to non-rumor firms based on lagged firm characteristics, industries, and year quarters. Alternatively, we limit our sample to rumor firms only, i.e., firms involved in at least one speculative takeover rumor over our sample period. This way, we specifically mitigate concerns that any characteristics shared exclusively among rumor firms may explain our results. In all cases, we continue to find a significant dip in firm productivity after rumors surface.

It may also be that by studying speculative takeover rumors that never materialize, we just happen to analyze cases of unobserved merger negotiations falling apart due to unexpected deteriorations in firm productivity. Although we find no stock price run-ups that may indicate merger negotiations (as per Eaton, Liu, and Officer, 2021), such negotiations might just start with the occurrence of the rumor, and a temporary shock to firm productivity might occur simultaneously. To address this concern, we use the scoop articles for the rumors involving U.S. target firms and attempt to identify where the rumors originate. We exploit rumors that are arguably exogenous in the sense that they are likely to be truly speculative and thus unlikely to reflect (or initiate) merger negotiations. We classify a rumor as "exogenous" if the scoop article explicitly states that the rumor is speculation or originates from social media or blogs or if the

rumor's source is mentioned to be anonymous. Within the sample of firms subject to these "exogenous" rumors, we again find firm productivity to decline after rumors surface.

Further, we show that the productivity dip loses economic and statistical significance for firms subject to multiple rumors. This result appears inconsistent with merger negotiations failing due to unexpected productivity shocks. Yet, it is in line with the notion that employees are concerned and distracted when they experience a takeover rumor for the first time because they can hardly assess if the rumor (and their management) is credible, while they learn about speculation and become less stressed when firms are repeatedly involved in takeover rumors.

We also provide additional cross-sectional evidence supporting the notion that takeover speculation hurts firm productivity because it has adverse effects on labor. In particular, we document that the rumor-related dip in firm productivity is more pronounced in instances in which employees will have to fear job loss and other wealth redistributions favoring shareholders more. First, while we find productivity to decline for both rumored acquirers and targets, the results are more prevalent for targets, consistent with layoffs being more likely for those firms. This result is in line with Shleifer and Summers (1988) who argue that takeovers provide the incoming management with a special opportunity to infringe on (implicit) long-term contracts between the target's employees and its incumbent managers. Following the same logic, we also find productivity to decline less for firms located in countries with more long-term orientation (as per Hofstede, 2001), where managers arguably are less likely to violate long-term contracts. Further, in line with the evidence in Dessaint, Golubov, and Volpin (2017), we find a less pronounced productivity dip for firms in countries with stronger employee rights (i.e., employment protection and collective bargaining).[5]

[5] The cross-sectional patterns we document suggest that rumors ultimately hurt firm productivity because fear of job loss, renegotiations, and uncertainty have adverse effects on labor. However, this labor channel necessitates that employees and managers really pay attention to takeover speculation. We provide evidence that supports this notion. Specifically, using the SEC's EDGAR server logs data, we show that clicks and downloads of the filings of rumor firms via IP addresses belonging to the rumor firms increase significantly after rumors surface.

Finally, we determine abnormal stock returns around announcements of speculative takeover rumors to provide some indication of potential wealth implications for shareholders. Consistent with the literature and with the notion that speculative rumors constitute credible takeover threats, we find a significantly positive stock price reaction to rumor announcements. Importantly, stock returns over the subsequent quarters tend to mirror our results on productivity declines. We find significantly negative stock returns over the three to four quarters after the rumor announcement (with the difference from the third to the fourth quarter being marginal). The negative returns outweigh the positive announcement effect of the rumor, being about twice as large in absolute terms. Hence, the market does not only reverse the initial stock price increase, but indicates significantly negative shareholder wealth implications. The buy-and-hold return from 2 to 180 days after a rumor averages -4.7%. To support this prima facie evidence that declines in productivity may translate into negative returns for shareholders, we also show that firm profitability declines after speculative takeover rumors surface.[6]

This study contributes to the literature on the economic consequences of rumors and speculative news. Extant work suggests that rumors can affect stock prices (e.g., van Bommel, 2003; Schmidt, 2020; Jia et al., 2020) and influence takeovers of public and private firms (Ahern and Sosyura, 2015; Alperovych et al., 2021). However, while there is significant evidence on the real effects of financial markets (Bond, Edmans, and Goldstein, 2012), virtually nothing is known about whether rumors, particularly highly speculative ones that are common in financial markets, bring about potential operational consequences for the firms involved. We use speculative rumors of takeovers, i.e., disruptive events that directly affect firms' human

[6] Additionally, we find that long-term stock returns are significantly lower for rumored takeover targets and for firms in countries with less long-term orientation and weaker employment protection, which we find to exhibit stronger productivity declines. However, despite the cross-sectional variation in stock returns mirroring the cross-sectional variation in our panel results, we cannot completely rule out that the negative stock price reaction simply reflects the market's updated probability that a takeover will less likely occur in the future. Nevertheless, these results should inform firms, investors, and regulators.

capital, to provide primary evidence of such operational consequences, mainly firm productivity.[7]

Our study also contributes to a limited literature on the dark side of the threat of takeovers. An active market for corporate control is generally regarded as a value-creating governance mechanism because the threat of a takeover disciplines directors and managers (e.g., Manne, 1965; Jensen, 1988; Lel and Miller, 2015). However, some studies question the generality of such findings, arguing that firms subject to a takeover threat also incur costs, such as managerial short-termism, reduced innovation, and impaired customer relations (e.g., Stein, 1988; Fulghieri and Sevilir, 2011; Atanassov, 2013; Cen, Dasgupta, and Sen, 2016). In contrast to our paper, these studies do not examine direct operational consequences, such as firm productivity, and they consider different effects on firms' employees and managers imposed by the takeover threat. Furthermore, our study provides new insights on how the costs of the takeover threat can depend on the setting in which firms operate, particularly with respect to employee rights and long-termism. In this regard, we also extend a recently emerging literature on the intersection of human capital and takeovers (see, e.g., Dey and White, 2021; Lee, Mauer, and Xu, 2018).

The results of our study have practical implications regarding the debate on reforms of takeover regulation that reduce the time over which companies can be involved in so-called "virtual bids" (that often follow or coincide with takeover speculation). The 2011 takeover reform in the U.K. is an example of such a regulation. Even though we do not claim to conduct a comprehensive analysis of the costs and benefits of anti-takeover regulation, we cautiously conclude that limiting the time companies can be "in play" in takeover speculation may, on average, benefit the involved firms and shareholders.

[7] While we study takeover rumors because we attempt to understand the tangible effects of speculation, firm productivity might also decline upon official takeover announcements. Yet, we note that the results may be weaker because official takeover announcements entail less uncertainty.

2. Hypothesis Development and Empirical Predictions

The main hypothesis of this paper builds on the notion that speculative news, although they are unverified and possibly spread by rumormongers, have real operational consequences because they affect an organization's human capital. Specifically, we argue that speculative takeover rumors may affect the productivity of labor and ultimately firm productivity.

According to both anecdotal and interview-based academic evidence, takeover rumors hurt firm productivity because they have adverse effects on the employees and managers of the firms involved. The effects include anxiety and stress, distraction, as well as reduced employee morale and commitment. Schweiger, Ivancevich, and Power (1987) conduct interviews with employees pre and post M&A and find "significant political maneuvering initiated by acquisition rumors" (p. 128). This result implies that frictions are already caused by rumors, i.e., before it becomes known whether a takeover will actually go through. Consistently, Cartwright and Cooper (1993) show that it is mostly the expectation of change and fear of future survival, rather than the change itself, that causes merger-related anxiety and stress. Regarding the costs and frictions imposed by takeover rumors, Ivancevich, Schweiger, and Power (1987) present a diagnostic framework for human resource implications of M&As and conclude that there are "obvious losses in terms of tardiness, absenteeism, turnover, output, and destructive behavior" (p. 23). Burlew, Pedersen, and Bradley (1994) interview employees in a retail firm following the announcement of a potential sale. Their main results imply that already at the pre-acquisition stage, potential takeovers can have a detrimental effect on the workforce, as this time is "most likely fraught with low employee morale, increased stress, resistance to change, higher turnover, and lower productivity" (p. 22).

Psychology suggests that adverse effects of takeover rumors, such as anxiety and stress, stem from the increased level of uncertainty, particularly with regard to organizational change and job loss, that rumors bring about (e.g., Marks and Mirvis, 1985; Rentsch and Schneider, 1991). Fear of job loss is warranted given that labor restructuring is the key driver of M&A and

the associated synergy gains (Jensen, 1988; Li, 2013; Dessaint, Golubov, and Volpin, 2017).[8] Using Swedish employer-employee data, Bach et al. (2021) show that the incidence of mental health issues, including anxiety and depression, and the likelihood of outpatient care and hospitalizations increase significantly after takeovers. This finding applies to employees in both target and acquiring firms. In this regard, the health and psychology literature has long acknowledged that anxiety and stress are strongly and negatively related to productivity (e.g., Murphy, Duxbury, and Higgins, 2006; Wolever et al., 2012). Consistently, Roskies and Louis-Guerin (1990), who study managers of Canadian companies, find that job insecurity is associated with decreased work behavior and attitude. Firm productivity may also be lower due to absenteeism and, in particular, paid sick days, which are common in most countries and several US states.

Economic theories also build on the threat of layoffs and related means of redistributing wealth from employees to shareholders (e.g., wage reductions) that come with takeovers. Shleifer and Summers (1988) argue that takeovers, particularly hostile ones, are often motivated by ex-post wealth redistribution from employees to shareholders (for empirical evidence, see, Becker, 1995; John, Knyazeva, and Knyazeva, 2015; Tian and Wang, 2021). Specifically, they argue that a takeover provides the incoming management with a special opportunity to infringe on implicit long-term contracts between the employees of the target and its incumbent management, often in the form of layoffs. The same mechanism should apply to acquiring firms and their employees, even if only to a lesser extent. Hence, if employees and managers expect to lose their jobs or face adverse renegotiations should rumors materialize, takeover rumors can lower their commitment and incentives to invest in the relationship with the firm (Williamson,

[8] Anecdotal evidence also suggests that such fears negatively affect employees and lower firm productivity before mergers are completed. Reporting on the merger between Dow Chemical and DuPont in an article titled "Dow and DuPont Strive to Find the Right Chemistry – Planned merger hinges on keeping about 100,000 employees calm and focused", the *Wall Street Journal* states: "Senior leaders [...] are coping with upended career prospects and attempting to keep their staff focused amid the merger of two companies with a combined value of $103 billion" and fear that the "merger process trigger[s] a "chain reaction of anxiety" among staff" (WSJ, January 13, 2016).

1979). Less commitment and incentives to invest in the firm, in turn, can lower labor – and ultimately firm – productivity. Lower productivity may stem, for example, from employees or managers reducing their (unobservable) effort or just spending their time applying to other firms. However, they may also lower their productivity for strategic reasons, in an attempt to thwart a potential takeover.

Moreover, takeover speculation may hurt firm productivity due to reduced employee collaboration. In particular, employees' incentives to collaborate or help their colleagues can be lower because of (perceived) increases in competition among employees (e.g., Lazear, 1989) that typically result from any two companies' plans to merge. Given that collaboration and teamwork foster productivity (e.g., Hamilton, Nickerson, and Owan, 2003) and can create possible gains from complementarities in production among workers or knowledge transfer (Lazear, 1998), reduced collaboration may hurt firm productivity.[9]

Overall, based on the above evidence and theories, we hypothesize that, on average, takeover speculation will have a negative effect on firm productivity. More specifically, our design, i.e., the use of speculative rumors that do not result in public bids, allows for a testable empirical prediction. Given that firms and their employees will realize over time that the takeover rumor was purely speculative (and that serious takeover bids do not follow), we expect the aforementioned adverse effects of takeover speculation to vanish over time. Still, however, we note that low productivity may linger if takeover rumors serve as indicators that the rumored firms are "on the radar" of potential acquirers in the M&A market or are likely to become active acquirers in the near future. Overall, we hypothesize that firm productivity declines after speculative takeover rumors and later rebounds, resulting in a temporary dip in firm productivity.

[9] In general, increased competition may also have a positive effect on employees' effort and productivity. However, if employees expect biased tournaments they may exert less effort (see, e.g., Prendergast, 1999). Mergers likely constitute biased tournaments in the sense that the acquiring firm's employees and managers tend to have a higher (lower) chance of being promoted (fired). Accordingly, the management literature has long documented the tendency of acquired managers to leave the firm (see, e.g., Hambrick and Cannella, 1993).

The evidence and theories outlined in this section also allow us to derive an empirically testable prediction regarding the cross-section of rumor firms. Ceteris paribus, we expect that the rumor-related dip in firm productivity be more pronounced in instances in which employees have to fear job loss, wage reductions, and other wealth transfers more. Due to the asymmetry in the balance of power between acquirer and target employees, and hence higher fear of job loss, we expect the productivity dip to be more pronounced for target firms. This expectation is consistent with Shleifer and Summers (1988), according to which incoming management teams are particularly likely to violate implicit long-term contracts with target firms' employees. Following this logic, we also expect a less pronounced productivity dip when managers are more likely to value long-term contracts. Finally, we expect a less pronounced productivity dip in instances in which employees have stronger rights and are better organized, which can help preempt severe post-takeover reorganizations and reduce the fear of job loss and other wealth redistributions.

3. Data, Methodology, and Summary Statistics

3.1 Data

We obtain data on 33,095 financial market-related rumors over the period 1997-2018 from Bureau van Dijk's Zephyr database. Zephyr also provides information on the rumor date, which equals the date on which a potential transaction is mentioned in the media, in a press release or elsewhere for the first time. We exclude all rumors that are not related to M&As, such as rumors referring to IPOs, joint ventures, and share buybacks.

Importantly, Zephyr defines rumors as unconfirmed reports. The unconfirmed reports relate to both takeover rumors that are purely speculative and those that materialize later on. We are interested in the real effects of the former and hence focus on speculative takeover rumors that do not materialize. Specifically, none of the rumors in our sample result in a public bid within at least two years of the rumor announcement (as per the SDC database).

We only consider speculative rumors in which either the acquiring or target firm is headquartered in one of the 36 OECD countries. Further, we exclude rumors relating to M&As with a potential transaction value of less than USD 1 million. The described procedure results in 21,917 rumors that relate to mergers and acquisitions as well as institutional and management buy-outs. We exclude 175 duplicate entries. To match rumors with other relevant data, we rely on ISINs (International Securities Identification Numbers) as firm identifiers, as provided by Zephyr. After excluding all observations with missing ISINs, we end up with 14,115 speculative takeover rumors, predominantly from the 2000s and 2010s.

We match these rumors to the Compustat Global and Compustat North America databases to create a panel at the firm-quarter level that contains accounting and other firm data (such as industry classifications) as well as information on whether and when a firm was subject to a takeover rumor.[10] The panel includes all firms headquartered in one of the 36 OECD countries and spans the fiscal years 1994-2018. We require additional sample years to be able to estimate reliable within estimators and to compare firms pre and post rumor (for the rumors that occurred early in the sample period). This procedure yields an initial sample of 1,884,116 firm-quarter observations, including 10,294 firm-quarters (for 6,035 distinct firms) during which speculative takeover rumors were announced.[11] Because some data in Compustat Global is missing for a significant number of firm-quarters, the number of observations in our regression analyses is considerably lower and hinges on the dependent variables we use.

For robustness tests, we additionally obtain data on I/B/E/S analyst estimates for firms' EPS and sales. We merge I/B/E/S estimates with our firm panel using CUSIPs and SEDOLs (for Compustat Global) in conjunction with the quarters to which the respective estimates refer.

[10] To match M&A rumors from Zephyr based on ISINs, we transform CUSIPs from the Compustat North America database to ISINs using Refinitiv Eikon. For the years 1997 and 1998, for which Zephyr contains only few rumors, we do not find any positive ISIN matches with the Compustat databases.

[11] Thereof, 511 observations refer to acquirers or targets that have been rumored as such more than once in the same quarter. For robustness purposes, we exclude observations referring to such multiple acquirers or targets and find that they do not drive our results.

We also obtain data on firms announcing to seek buyers or seek target firms or assets to acquire for the years 2000 and later from the Capital IQ database. We merge this data with our panel using combinations of ISINs and the years in which such announcements occurred.

We complement the international firm panel described above with country-level data on employee rights, which we obtain from the OECD database (https://data.oecd.org/). This data includes the Employment Protection Legislation (EPL) index and the collective bargaining coverage, which are available until the years 2018 and 2017, respectively. The EPL index quantifies the procedures and costs related to individual and collective dismissals. Collective bargaining coverage is the ratio of the number of employees covered by the collective agreement and the overall number of wage earners and salaried employees per country. Data on collective bargaining is not available for some country-years, so we replace missing values by the values of the preceding years. We also use data on the level of long-term orientation that prevails in a country, which is provided by Geert Hofstede (https://geerthofstede.com). We merge the above data to our firm panel based on information about firm headquarter countries.

Finally, to provide evidence that employees actually pay attention to rumors, we use the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) server logs data, which captures all clicks or downloads of a public firm's SEC filings (see, e.g., Drake et al., 2020; Drake, Roulstone, and Thornock, 2016). This data allows us to test whether a firm subject to a takeover rumor receives more attention from its employees as approximated by the firm's filings clicked or downloaded from the firm's own IP addresses. We clean the data by removing all clicks and downloads by bots.

3.2 Methodology

In our main analyses, we estimate specifications of the regression model shown in equation (1) to analyze – at the firm-quarter level – how firm productivity changes when firms become involved in speculative takeover rumors:

$$Productivity_{it} = \beta_1 * Rumor_i * Post_{it} + \sum_k \beta_k * Control_{it} + Firm\ FE + Quarter\ FE \quad (1)$$

The placeholder *Productivity* stands for two main measures of firm productivity, which we use as dependent variables, namely *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. For robustness purposes, we also use *Gross Profit Margin* and *Operating Ratio* as alternative measures of firm productivity. We define *Gross Profit Margin* as the difference between sales and costs of goods sold divided by sales, which rules out that our results might just reflect declines in (target) firms' sales. *Operating Ratio* is defined as the sum of operating expenses and costs of goods sold divided by sales. The indicator variable *Rumor* equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter *t* in which firm *i* becomes involved in a speculative takeover rumor as well as for the two subsequent quarters, and zero otherwise. *Control* is a vector of control variables at the firm-quarter level. The variables are *Capex to Total Assets*,[12] *Cash to Total Assets*, *Debt to Total Assets*, and *Firm Size* (which is the natural logarithm of total assets). We convert accounting data denoted in local currency to USD using Compustat currency files and winsorize all continuous variables at the 1st and 99th percentiles. All regressions also include firm and quarter fixed effects to account for unobserved variables, which are either constant over time or constant across firms. Importantly, the inclusion of firm and quarter fixed effects rules out that industry-specific factors or time trends in our measures of firm productivity explain our results. We cluster standard errors at the firm level to allow for serial correlation in firm productivity resulting from unobservable firm characteristics.

For robustness purposes, we re-estimate equation (1) including two additional control variables, i.e., *Analyst EPS Estimate (I/B/E/S)* and *Seeking M&A*. The former equals the (three-month) average value of monthly I/B/E/S mean analyst estimates for firms' earnings per share

[12] Since Compustat provides capital expenditure data on year-to-date level, we transform this data to quarterly level by subtracting the value of the previous quarter from the values of the second, third, and fourth quarters, respectively. We replace missing values for capital expenditures with zero values and include an indicator variable in our regressions that accounts for this replacement.

(EPS). As I/B/E/S estimates are not available for many international firms, we replace missing estimates with zero values and include an indicator variable in our regressions that accounts for this replacement. Alternatively, we use analyst sales estimates and proceed accordingly. The indicator variable *Seeking M&A* equals one if a takeover rumor occurred in the same year in which a firm announces that it seeks a buyer or a target firm (or assets) to acquire.

In cross-sectional analyses, we interact *Rumor*Post* with additional variables at the country level. The variable *EPL* is the OECD's EPL index, which is the measure of employee protection used in Dessaint, Golubov, and Volpin (2017). Larger index values correspond to greater employment protection. *Collective Bargaining* measures the percentage of employees per country and year with the right to bargain. *Long-Term Orientation* is the LTO index provided by Geert Hofstede, which measures the extent to which a country's culture is long-term oriented (Hofstede, 2001). The index does not change over time. Higher index values correspond to more long-term orientation.

To examine whether employees pay attention to rumors, we re-estimate equation (1) substituting the productivity measures on the left-hand side of the equation by the natural logarithm of all quarterly clicks and downloads of all of a firm's filings on EDGAR (plus 1) that originate from the firm's IP range.

3.3 Summary statistics

Table 1 presents the summary statistics for our sample and variables described before. Panel A provides an overview of the distribution of speculative takeover rumors across countries for acquirers and targets. Overall, 4,024 acquirers and 6,270 targets are involved in rumors. Thirty percent of these rumors refer to North American companies and another 22% to companies from the other Anglo-Saxon OECD countries, i.e., Australia, Ireland, New Zealand, and the U.K. The considerable share of Anglo-Saxon countries reflects their more developed markets for corporate control. As to the other rumors in the sample, companies from the five largest

economies in Continental Europe, i.e., Germany, France, Italy, Spain, and the Netherlands, as well as from Scandinavia account for another quarter of all M&A rumors. The remaining rumors mainly involve firms from Japan, Korea, Poland, Portugal, and Switzerland.

Summary statistics for the outcome and control variables we use in this study are shown in Panel B and Panel C of Table 1. Panel B presents the statistics for takeover rumor firms (for which the variable *Rumor* equals one), while Panel C presents the statistics for firms not involved in any rumors. The number of observations varies across variables due to data availability. Rumor firms are larger in terms of market capitalization (3,975mn vs. 757mn) and with respect to other size measures, i.e., the number of employees, sales, and total assets. Their ratio of capital expenditures to total assets is slightly higher (0.0121 vs. 0.0118), they hold less cash (16% vs. 18% of total assets), and they use less debt (61% vs. 66% of total assets). Rumor firms also show higher levels of firm productivity (for all productivity measures) than firms not subject to rumors. All aforementioned differences are statistically significant.

4. Speculative Takeover Rumors as Unexpected Events

A concern regarding empirical tests of our main hypothesis is that speculative takeover rumors may not constitute unexpected events. Specifically, realized or expected low firm productivity may cause speculative rumors if it triggers the need for acquisitions or causes targets to become susceptible to predatory deals. As a result, such rumors would not serve as unexpected shocks to employees' threat of job loss, wage reductions, etc. Furthermore, results might reflect reverse causality if lower *temporary* firm productivity or expectations of *temporary* reductions in productivity cause takeover speculation (not vice versa). This concern however is difficult to reconcile with the reality of the M&A market where firms – if acquired for performance or predatory reasons – typically have problems that are not just temporary. Still, before turning to the core of our analysis, we first analyze whether speculative takeover rumors are systematically related to pre-rumor (expected) productivity or abnormal pre-rumor stock returns.

First, we analyze firms' stock returns in the weeks leading up to the announcement of speculative rumors.[13] Betton et al. (2014) document rational deal expectation in the form of significant stock price run-ups weeks before M&A transaction announcements. Figure 1 shows cumulative average abnormal returns (CAAR) for 9,379 rumors. As can be seen from the figure, there is no significant stock price run-up or negative stock return prior to rumor announcements, which would be indicative of deal/rumor expectation. In fact, Panel B of Table 8 shows that CAAR in the 40 trading days prior to the rumor announcement is indistinguishable from zero. This evidence provides an indication that market participants do not systematically anticipate speculative takeover rumors and that those events are unexpected. The absence of abnormal pre-rumor stock returns is also inconsistent with the notion that unobserved merger negotiations precede the rumor announcements in our sample. In this regard, Eaton, Liu, and Officer (2021) show that M&As, on average, are privately initiated 112 trading days before they are publicly announced and that stock price run-ups, on average, start 105 trading days prior to deal announcement.

In a next step, we consider the determinants of takeover speculation. A concern with our study is that poor productivity may trigger the need for acquisitions (for acquirers) or that targets become susceptible to predatory deals. We address the concern that pre-rumor productivity or expectations of productivity (or profitability) may predict the occurrence of rumors in two ways. First, we conduct regressions of the variable *Rumor*Post Q0* on our productivity measures – each included in a separate regression – along with firm controls as well as firm and quarter fixed effects. *Rumor*Post Q0* is an indicator variable that equals one for rumor firms in the quarter during which the speculative takeover rumor surfaces. The productivity measures and firm controls enter the regressions with one lag. The results, which we present in Panel A of

[13] We conduct an even study for 9,379 speculative rumor announcements using the FTSE World index as the market portfolio and an estimation window for the market model that ranges from -241 to -41 days. We describe the event study methodology and setting in detail in Section 6.

Table 2, suggest that prior firm productivity does not predict takeover rumors for all four measures of firm productivity. However, a firm's leverage and size predict rumors. The positive coefficient on $Firm\ Size_{t-1}$ supports the notion that speculative rumors are more likely for better-known firms to which the media pay more attention. Consistently, Ahern and Sosyura (2015) find that media articles about large, recognizable firms are less accurate than articles concerning less newsworthy firms. In addition, the low R-squared of 0.2% implies that our regression models explain only little variation in rumor occurrence, supporting the idea that speculative rumors tend to be unexpected events.

In addition to the above test, we hand-collect the scoop articles for all speculative rumors concerning U.S. target companies in our sample in the Lexis/Nexis database and complement the search with Google searches. We also cross-check the relevant observations with the merger rumors data published on Kenneth Ahern's website (Ahern and Sosyura, 2015). We read the scoop articles and further news for all 923 events. News sources mention target (bidder) productivity and/or profitability (directly or indirectly) as a motivation for the speculated transaction in only 0.7% (0.2%) of all cases. This evidence further suggests that (expectations of) low productivity or profitability do not systematically trigger takeover speculation.

Finally, we study financial analysts, who play a significant role in forming expectations of market participants. We compare analysts' average I/B/E/S estimates of sales and earnings per share (EPS) for the quarter following the rumor quarter to the estimates for non-rumor quarters. If speculative takeover rumors reflect or are caused by lower expected productivity or profitability, we should find such evidence in analyst estimates. Panel B of Table 2 shows differences in means and medians of analyst estimates of sales and EPS for rumor and propensity-score matched non-rumor quarters. Propensity scores are obtained from a Probit regression of the dependent variable *Rumor* on firm control variables lagged by one quarter, two-digit SIC industry fixed effects, and quarter fixed effects. We use the propensity scores from the Probit regression to perform a matching based on the nearest neighbor. If anything,

the results show higher levels of sales and EPS in quarters in which takeover speculation surfaces. In untabulated tests, we find similar results if we do not match rumor and non-rumor quarters or use several nearest neighbors. Hence, if anything, rumor firms tend to be more, not less, successful. These findings are in line with empirical papers on takeover target prediction modelling building on the seminal study by Palepu (1986). For example, Danbolt, Siganos, and Tunyi (2016) document that target firms have higher (not lower) free cash flows and are more (not less) profitable.

In all, the event study results as well as the analyses of rumor determinants, scoop articles, and analyst estimates together provide strong evidence that speculative takeover rumors are unexpected events that are not driven by prior or expected low firm productivity.

5. Takeover Speculation and Firm Productivity

On average, we expect speculative takeover rumors to negatively affect firm productivity. Further, this effect should only be temporary because we study speculative rumors that do not materialize. Figure 2 provides a descriptive indication of how firm productivity changes around the occurrence of speculative rumors. Specifically, the figure shows changes in the residuals of our productivity measures *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)* as well as *Gross profit margin*, and *Operating ratio* in event time. To compute the time-varying residuals, we estimate the regression model in equation (1) omitting our variable of interest, *Rumor*Post*. We calculate the average residuals for pre- and post-rumor quarters for all rumor firms. Changes in residual productivity equal the absolute values of the changes in average residual productivity from one period to the next. Pre-rumor periods include the quarters t-6 to t-4 and t-3 to t-1. The rumor period spans the quarters t0, t+1 and t+2, consistent with the definition of *Rumor*Post*. The post-rumor periods include the quarters t+3 to t+5 and t+6 to t+11. We use a longer second post-rumor period to provide evidence on how firm productivity develops after a rumor.

Figure 2 reveals a consistent picture, indicative of a dip in firm productivity associated with temporary takeover speculation. In fact, all productivity measures decline from the pre-rumor period to the rumor period (i.e., quarters t0 to t+2) and recover thereafter. This preliminary evidence of temporary declines in firm productivity supports our expectation.

5.1 Baseline regressions results

To test whether and how firm productivity changes after speculative takeover rumors surface, we estimate our baseline regression model as outlined in equation (1). Table 3 shows regression results for our main productivity measures, *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*, based on the OECD firm-quarter panel described above. Our main variable of interest is *Rumor*Post*. Given the hypothesis derived in Section 2, we expect a negative coefficient on this variable indicating a temporary decline in firm productivity after takeover speculation starts. The coefficient estimates in Panel A of Table 3 are in line with the descriptive results in Figure 2 and support our empirical predictions. Columns (1) and (2) show the results for the dependent variable *ln(Sales to Employees$_{t-1}$)*, while columns (3) and (4) show the results for the dependent variable *ln(Sales to SG&A)*. In columns (2) and (4), we show results from regressions including all control variables (as described in Section 3.2), whereas the regressions shown in columns (1) and (3) omit the control variables for capital expenditures, cash, and debt because they might be directly affected by merger rumors and hence capture part of the effect we attempt to measure. For both productivity measures, the coefficient on *Rumor*Post* is negative and statistically significant (at least at the 5% level), indicating a temporary decline in firm productivity. The coefficients also show an economically meaningful magnitude across firms. On average, rumors are associated with a 1.5 and 2.0 percent decline in sales to employees and sales to SG&A, respectively.[14]

[14] For example, in Section 5.2, we separately examine firms subject to one vs. multiple speculative takeover rumors and estimate the effect on sales to employees to be 2.8 percent (instead of 1.5 percent). Also, testing for cross-

To mitigate concerns of simultaneity bias beyond the tests discussed in Section 4, we re-estimate the regressions in Panel A using a lead-lag structure, considering only the two quarters after the takeover rumor quarter (Q0). Panel B of Table 3 shows the results. We denote the variable of interest *Rumor*Post w/o Q0*. The coefficients on this variable is negative and statistically significant in both columns, supporting the existence of the rumor productivity dip.

For robustness purposes, we re-estimate the regressions in Panel A of Table 3 using our alternative firm productivity measures *Operating Ratio and Gross Profit Margin*. Appendix A shows the results. The coefficients on both variables are statistically significant and have the expected sign (i.e., positive for *Operating Ratio and* negative for *Gross Profit Margin*). Again, the results are economically meaningful. For example, the variable *Operating Ratio* increases by 5.6 percent relative to the sample mean for rumor firms. Furthermore, Appendix B shows that the results for all four productivity measures remain qualitatively unchanged when we include quarter*industry or quarter*country fixed effects to account for industry-time or country-time specific differences that may explain both firm productivity and the occurrence of takeover speculation.

Pre-rumor trends in firm productivity may interfere with our identification strategy. To assess pre-rumor trends, we define two indicator variables, *Pre Q1* and *Pre Q2,* for each of the two quarters prior to the quarter in which the speculative takeover rumor surfaces and interact them with the *Rumor* indicator. We re-estimate the regressions shown in equation (1), additionally including the variables *Rumor*Pre Q2* and *Rumor*Pre Q1*. To better understand how firm productivity changes during the rumor period (i.e., quarters t0 to t+2), we also replace the variable *Rumor*Post* with an indicator variable for each post-rumor quarter, i.e., *Rumor*Post Q0*, *Rumor*Post Q1*, and *Rumor*Post Q2*. Panel C of Table 3 displays the results of these model specifications. We find no indication of pre-rumor trends. The coefficients on

sectional variation in Section 5.3, we find considerably larger economic effects in instances in which employees have to fear job loss and other wealth redistributions more.

*Rumor*Pre Q2* and *Rumor*Pre Q1* are statistically indistinguishable from zero, implying similar trends in pre-rumor productivity for rumor and non-rumor firms. Furthermore, the coefficients on the three rumor period indicators, i.e., $Rumor_i$**Post Q0*, $Rumor_i$**Post Q1*, and $Rumor_i$**Post Q2*, show that firm productivity declines during the rumor-quarter and/or the following two quarters.

As mentioned before, a potential concern is that rumors might be spread in expectation of temporary productivity declines or related M&A activity. To further address this concern, we use data on I/B/E/S analyst EPS estimates as well as data for firms announcing to seek buyers, target firms, or assets as part of their business strategy. The variables *Analyst EPS Estimate (I/B/E/S)* and *Seeking M&A*, which we additionally include in our baseline regression model, capture a potential reverse causality going from business development or strategy to M&A rumors.[15] Panel D of Table 3 shows the regression results. While firms expected to be on an upward earnings trajectory (as indicated by EPS estimates) show higher productivity, our main variable of interest, *Rumor*Post*, still shows a statistically and economically significant coefficient for both $ln(Sales\ to\ Employees_{t-1})$ and *ln(Sales to SG&A)*. Firms that have announced to engage in asset sales or acquisitions (i.e., *Seeking M&A*) do not seem to be systematically related to higher or lower productivity. We conclude that speculative takeover rumors caused by market expectations of positive and negative business development or by firms guiding markets towards M&A expectations are unlikely to explain our results.

5.2 Robustness

This section provides various empirical tests to further address endogeneity concerns (beyond our efforts described in Section 4) and establish the robustness of our results. One concern is that firms involved in speculative takeover rumors may be inherently different from non-rumor

[15] As indicated above, we use analyst sales estimates as an alternative to earnings estimates in untabulated regressions yielding qualitatively similar results. These results available from the authors upon request.

firms, and that our control variables and firm fixed effects may not fully capture these differences. We address this concern in several ways.

First, we employ a propensity score matching (PSM) (Rosenbaum and Rubin, 1983) approach to match rumor firms to a more comparable control group. To this end, we obtain propensity scores from Probit regressions of the dependent variable *Rumor*Post* on lagged firm characteristics (i.e., those used as control variables in our baseline regressions), two-digit SIC industry fixed effects, and quarter fixed effects. We use the propensity scores to perform a nearest neighbor matching based on the closest propensity score. To maintain statistical independence of our tests, we implement a nearest neighbor matching without replacement. We then use the resulting PSM-matched sample to re-estimate our baseline regressions shown in Panel A of Table 3. We present the results in Panel A of Table 4. For both productivity measures, the coefficient on *Rumor*Post* is negative and statistically significant at the 5% level or better. The coefficient estimates are slightly larger in terms of economic magnitude. Appendix C presents evidence for covariate balance resulting from our PSM approach. The PSM matching approach corroborates our baseline regression results and supports the existence of a rumor-related dip in firm productivity. The same is true when we use an entropy-balanced sample (Hainmueller, 2012), where balancing is done on the mean and variance of firm characteristics as well as industries and year quarters, as shown in Panel B of Table 4.

Second, as an alternative to the PSM-matched and entropy-balanced samples, we exploit the staggered occurrence of speculative rumors across firms and quarters and re-estimate our baseline regressions including only firms that were subject to at least one takeover rumor over the sample period (i.e., the variable *Rumor* equals 1). In this case, the group of rumor firms serves as the counterfactual and any characteristics shared exclusively by this group of firms are unlikely to explain our results. Panel C of Table 4 shows the results for this subsample. The coefficient on the variable of interest, *Post*, is negative and statistically significant (at least at

the 5% level) for both productivity measures. This evidence further supports the conclusion from Table 3 that firm productivity declines after speculative takeover rumors surface.

Another concern is that by studying speculative takeover rumors that never materialize, we may analyze cases of unobserved merger negotiations falling apart because of temporary deteriorations in firm productivity that materialize unexpectedly (beyond analysts' estimates). Although we find no significant abnormal stock returns prior to rumor announcements that may indicate merger negotiations (as per Eaton, Liu, and Officer, 2021), such negotiations might happen to just start with the occurrence of the rumor, and a temporary shock to firm productivity might simultaneously occur. This concern is difficult to address. Nevertheless, we make use of the scoop articles for the speculative takeover rumors involving potential U.S. target firms (described in Section 4) and attempt to identify the ultimate source of the rumors. The idea is to exploit rumors that are arguably exogenous in the sense that they are likely to be truly speculative and thus unlikely to reflect or initiate merger negotiations. Obtaining this information is challenging and, despite our best efforts, we are not able to classify all rumors as "exogenous" or not. Yet, for a limited sample of the rumors we can obtain information about the rumor's origin. We classify a rumor as "exogenous" if the scoop article states that the rumor is speculation or if the rumor originates from social media or blogs or if the source of the rumor is mentioned to be anonymous. We are aware that there is no perfect classification ensuring that the rumor does neither reflect nor initiate merger negotiations, but at least our approach should reduce endogeneity concerns. We re-estimate the (within-treatment group) regressions shown in Panel C of Table 4 with the restricted sample of "exogenous" rumors. The results are shown in Panel D of Table 4. The coefficient on *Post*, our variable of interest, is negative and statistically significant (at the 5% level or better) for both productivity measures. Hence, even

with the restricted sample of rumors that are arguably unlikely to reflect or initiate merger negotiations, we again find evidence of a rumor-related dip in firm productivity.[16]

Table 5 presents evidence from another test that addresses the concern that we may just happen to analyze cases of unobserved merger negotiations falling apart because of unexpected temporary productivity shocks. The logic of the test is simple: if the rumors we analyze indeed systematically fall apart due to productivity shocks, the coefficient on *Rumor*Post* should be significantly negative for both firms subject to one rumor and firms subject to multiple rumors. However, if the rumor-related productivity dip results from distraction, fear of job loss, and uncertainty of employees, the coefficient on *Rumor*Post* may lose (economic and statistical) significance for firms repeatedly involved in speculative rumors because employees will get used to this form of stress and/or learn that the rumors may likely just be pure speculation (or believe management when it says so). For firms involved in multiple rumors, which account for 59% of the rumor firms, we find the coefficient on *Rumor*Post* to be insignificant in column (3) and to be marginally significant in column (4) of Table 5. In contrast, for firms subject to only one rumor, the coefficient on *Rumor*Post* is significant at the 5% level for both productivity measures and has a greater magnitude than in our baseline regressions in Table 3 (e.g., 2.8% instead of 1.5% decline in sales to employees). This evidence appears inconsistent with the idea that the rumors we analyze constitute potential mergers that fall apart during the negotiations process because of productivity shocks.

We perform additional robustness tests. First, because North American firms constitute 30% of our rumor observations, we test whether our results are upheld if we limit the sample to these firms only. The focus on North American firms does not only reduce unobserved heterogeneity, but it also allows us to control for additional firm characteristics (with poor

[16] In untabulated regressions, we again focus on rumors involving U.S. targets and exclude all rumors for which the scoop articles mention negative productivity, profitability, or stock performance as well as negative financials or distress. Again, the variable *Post* is negative and statistically significant (at least at the 5% level) for both productivity measures.

coverage in Compustat Global) that may drive both takeover rumors and firm productivity, namely firm age (i.e., the firm's life cycle) and R&D expenses (capturing "growth targets"). The results, which we present in Appendix D, indicate that the takeover rumor productivity dip prevails among North American firms and that it is robust to additional firm-level controls. Second, we address the concern that we might just happen to pick up the (annual) pattern of a dip in firm performance around CEO turnover, as documented in Murphy and Zimmermann (1993) and others, if turnover increases a firm's likelihood of being involved in takeover speculation. We use CEO turnover data provided by Brochet et al. (2021), i.e., sudden CEO deaths as well as just all changes in a firm's CEO position. Our results, which we do not tabulate for brevity, remain qualitatively unchanged when we exclude all M&A rumors coinciding with CEO turnovers. Importantly, only one sudden CEO death, which arguably is the most disruptive form of CEO turnover, occurs during a month when a rumor is announced. Lastly, we re-estimate our baseline model for each productivity measure using a dynamic estimation approach by including the lag (either one quarter or four quarters) of the respective productivity measure as a control variable. The results (not tabulated for brevity) remain qualitatively unchanged.

In sum, all of the above tests confirm our baseline result of a temporary decline in firm productivity after takeover rumors surface. Nonetheless, as a caveat, we note that what causes the rumors to occur is not perfectly observable and hence a potential source of endogeneity. In the following, we further alleviate endogeneity concerns by studying the cross-sectional variation of the productivity dip, testing whether it is more or less pronounced in instances in which theory would predict it is.

5.3 Cross-sectional variation in the rumor-related productivity dip

Having established our baseline results, we exploit cross-sectional variation in our data at the firm and country level to identify channels through which the rumor-related dip in productivity may be either mitigated or amplified. Examining potential channels serves as a test for the

underlying mechanisms and theories that can explain why firm productivity declines after takeover speculation surfaces. Given the hypotheses in Section 2, we expect productivity to decline more (less) in instances in which employees have to fear job loss and other wealth redistributions (less). Specifically, the productivity dip should be driven by and be more pronounced for target firms as well as for firms located in countries with weaker employee rights and less long-term orientation.

Before turning to our cross-sectional tests, we first attempt to provide evidence indicating that a firm's employees indeed pay attention to takeover speculation. A significant stock market reaction to speculative rumors does not necessarily imply that employees take such rumors serious, even though takeovers generally constitute disruptive events to the involved parties. We examine whether employees pay attention to takeover speculation by studying their clicks and downloads of their firms' SEC filings using the EDGAR sever logs data. More specifically, we use the variable *Ln(1 + Downloads of focal rumor firm filings from EDGAR by focal rumor firm IP addresses)*, which is the natural logarithm of 1 plus the quarterly number of filings by the focal rumor firm that were clicked or downloaded from the EDGAR server by IP addresses that belong to the focal rumor firm. We regress this measure of employee attention on our variable of interest, *Rumor*Post*, along with the same controls and fixed effects as shown in equation (1). We present the results in Table 6. The coefficient on *Rumor*Post* is statistically significant at the 1% level in both columns, with column (2) showing the results with additional controls for firm age and R&D expenses. We find that the EDGAR-based employee attention increases by at least 5 percent after speculative takeover rumors surface. While being far away from a perfect test of employee attention, this approach tends to run against us finding any significant results because many employees will arguably use other sources to obtain information about their firm (such as the local press or colleagues). Nevertheless, the results provide an indication that employees indeed pay attention to takeover speculation.

We now turn to our cross-sectional tests. In a first step, we investigate the effect of rumors for target and acquirer firms separately. We replace *Rumor*Post* by the two variables *Rumor*Post*Target* and *Rumor*Post*Acquirer*, which equal one, respectively, for targets and acquirers in the rumor quarter and the following two quarters, and zero otherwise. Table 7, Panel A, reports the results for the amended regression model. While we find productivity to decline for both types of firms, target firms drive the productivity decline. In particular, we find a significantly negative regression coefficient on *Rumor*Post*Target* for both productivity measures, $ln(Sales\ to\ Employees_{t-1})$ and *ln(Sales to SG&A)*, while the coefficient on *Rumor*Post*Acquirer* is only statistically significant when used to explain *ln(Sales to SG&A)*. For $ln(Sales\ to\ Employees_{t-1})$, the estimated magnitude of the variable *Rumor*Post* for target firms is also considerably greater (i.e., a decline in productivity of about 2.8 percent) than the average decline of about 1.5 percent found in our baseline regressions in Table 3. The results generally support our expectation. As suggested by the literature outlined in Section 2, especially Shleifer and Summers (1988), employees of target firms tend to be more heavily affected by takeovers. Hence, the threat of job loss and wage reductions that accompanies the takeover speculation is stronger for target employees. Nonetheless, our evidence also indicates that expectations of merger related stress affect employees in acquiring firms, in line with findings by Bach et al. (2021).

To analyze the effects of employee rights in the cross-section of firms, we use OECD data on collective bargaining and employment protection at the country level. To examine the time-varying EPL index (variable EPL_{ct}), which quantifies the cost and procedures related to individual and collective dismissals, we estimate the following regression model:

$$Productivity_{it} = \beta_1 * Rumor_i * Post_{it} * EPL_{ct} + \beta_2 * Rumor_i * Post_{it} + \beta_3 * Rumor_i * EPL_{ct} + \beta_4 * Post_{it} * EPL_{ct} + \beta_5 * EPL_{ct} + \sum_k \beta_k * Control_{it} + Firm\ FE + Quarter\ FE \quad (2)$$

We estimate a model similar to equation (2) to examine the role of collective bargaining, which we capture by the variable *Collective Bargaining*$_{ct}$, which is defined as the percentage of employees covered by collective bargaining agreements per country and year. Our main coefficient of interest is β_1 for the interaction term *Rumor*$_i$**Post*$_{it}$**EPL*$_{ct}$ or, alternatively, for the interaction term *Rumor*$_i$**Post*$_{it}$**Collective Bargaining*$_{ct}$. We expect β_1 to be positive and thus to have the opposite sign as the coefficient β_2 for *Rumor*$_i$**Post*$_t$, indicating that the decline in productivity associated with speculative rumors is weaker for firms in countries with stronger employee rights. Panel B of Table 7 shows the results of this analysis. Columns (1) and (2) show the results for the dependent variable *ln(Sales to Employees*$_{t-1}$*)*, and columns (3) and (4) show the results for the dependent variable *ln(Sales to SG&A)*. For brevity, we do not tabulate all interaction terms. The coefficient of interest (β_1) on *Rumor*$_i$**Post*$_{it}$**EPL*$_{ct}$ or, alternatively, *Rumor*$_i$**Post*$_{it}$**Collective Bargaining*$_{ct}$ is positive in all four columns, and statistically so in columns (1) and (2). Hence, the productivity dip, at least in terms of sales to employees, is indeed amplified (muted) in countries with low (high) levels of employee rights. This result provides some support for our hypothesis that takeover speculation is accompanied by fear of job loss and uncertainty that have detrimental effects on employees, which in turn affects firm productivity. Yet, the results are only partly significant.[17]

Finally, we look at cultural differences across countries as another way to exploit variation in the expected effects of speculative takeover rumors. Based on the index provided by Geert Hofstede, we replace the employee protection and bargaining measures in the aforementioned

[17] As a related robustness test, we exploit differences in potential M&A synergies across industries to test whether firm productivity declines less severely when employees have to fear job loss etc. less. We use the indicator variable *Low Synergy Industry*, which equals one for two-digit SIC industries for which the average values of SG&A to total assets or COGS to total assets or both are below (or equal to) the respective sample medians, and zero otherwise. The rationale is that firms in low synergy industries have less room for generating synergies by cutting labor costs and other related expenses. We estimate a regression model similar to equation (2) and include the indicator *Low Synergy Industry*$_i$. We are particularly interested in the coefficient on the interaction term *Rumor*$_i$**Post*$_{it}$**Low Synergy Industry*$_i$, which we expect to have a positive sign indicating that the productivity dip is weaker for firms from industries with less room for synergies. The results, which we provide upon request, are consistent with our expectation.

models by the variable *Long-Term Orientation*$_c$, which captures the extent to which a country's culture and its norms are long-term oriented. We expect managers in countries where long-term orientation is the norm to be less likely to violate implicit long-term contracts (in the spirit of Shleifer and Summers, 1988) to make short-term profits, which should lower employees' fear of job loss and wage reductions. Therefore, we expect the coefficient on the interaction term *Rumor*$_i$***Post*$_{it}$***Long-Term Orientation*$_c$ to be positive, indicating that the rumor-related dip in productivity is weaker for firms in countries with a more long-term oriented culture. Panel C of Table 7 shows the respective results, which are in line with our expectations. The coefficient on the above interaction term is significantly positive for both productivity measures.

Overall, we provide evidence that employees pay attention to takeover speculation as well as for meaningful cross-sectional variation in the rumor-related productivity dip. The latter suggests that the decline in firm productivity relates to employees' fear of job loss etc.

6. Stock Returns around Takeover Speculation

The evidence presented so far suggests that the productivity decline associated with speculative takeover rumors is economically meaningful and only completely reverses months after the rumor first surfaced. In this section, we conduct an event study analysis to assess the potential implications of takeover speculation for shareholder wealth, particularly in the long run. While we caution against over-interpreting the results, given that (long-term) stock returns incorporate any price-relevant information, we consider the analysis of stock returns around speculative takeover rumors to be informative for firms, investors, and regulators.

We obtain total return data for rumor firms from the Refinitiv Datastream database. The data is available for 9,379 distinct events (i.e., speculative takeover rumor announcements). We use the FTSE World index as the market portfolio for which the daily total return data is available from 1994 onwards. We use this data to calculate buy-and-hold abnormal returns (BHAR). We calculate the daily BHAR for each firm as the difference between the realized and

the expected buy-and-hold return, where the latter equals the contemporaneous total return of the FTSE World index. For robustness, we also calculate cumulative average abnormal returns (CAAR) using the standard market model approach and find qualitatively similar results. To measure short-term and long-term stock returns around speculative takeover rumors, we calculate the BHAR and CAAR for the event day (t=0) as well as for longer event windows, which each start on the second trading day after the rumor announcement (t=2) and end on days 180 and 240 after the rumor. We winsorize BHAR and CAAR at the 1st and 99th percentiles. Table 8 presents the results.

In line with the literature (e.g., Pound and Zeckhauser, 1990; Ahern and Sosyura, 2015) we find positive average abnormal stock returns of 2.27% upon rumor announcements (i.e., on event day t=0), as shown in Panel A of Table 8. The positive stock market reaction indicates that speculative rumors, on average, appear credible to investors, even though they do not materialize ex post. This finding implies that speculative rumors are likely to constitute takeover threats that firms and their employees will seriously care about. Furthermore, the stock market reaction one day before and after the rumor announcement is much lower (with a BHAR of about 0.3% each), which supports the accuracy of the rumor dates we use.

Consistent with Figure 1, we find no indication for deal anticipation in the form of pre-rumor stock price run-ups or negative returns. Average BHAR (Panel A) and CAAR (Panel B) over the two months leading up to the rumor announcement amount to only 0.5% and 0.1%, respectively. This result is consistent with the evidence in Betton, Davis, and Walker (2018) and again supports the notion that speculative takeover rumors are unexpected events, unlikely to reflect ongoing negotiations.

Turning to long-term post-rumor BHAR, stock returns turn negative over the four quarters after rumor announcements, with the difference from the third to the fourth quarter being only marginal. Specifically, as the probability of a public takeover bid announcement and/or other information that solidifies the rumor fade over time, short-term market reactions to the rumor

dissipate and the average BHAR over the next 180 trading days (i.e., the treatment period in our panel regressions) is -4.7%. The negative returns outweigh the positive announcement effect of the rumor, being about twice as large in absolute values. Thus, the market does not just reverse the stock price increase in reaction to speculative takeover rumors (which, over time, become less likely to materialize), but indicates significant shareholder wealth destruction. Panel C of Table 8 shows that the decline in stock returns occurs for both rumored targets and rumored acquirers, and that it is stronger for rumored targets, for which we also document a more pronounced productivity dip.[18]

While it is impossible to unambiguously relate long-term stock returns to specific events, the productivity dip we document coincides with significantly negative stock returns. Hence, the above results provide prima facie evidence suggesting that the decline in firm productivity may translate into wealth losses for the shareholders of takeover rumor firms. As a more direct test of this potential performance effect, we additionally examine how firm profitability changes when takeover speculation surfaces. We re-estimate the regression model in equation (1) substituting productivity measures on the left-hand side of the equation for profitability measures, namely the pre-tax profit margin and pre-tax ROA. Appendix E shows the results. The coefficient on the variable *Rumor*Post* is negative and statistically significant (at the 5% level or better), indicating that the reduced productivity we find for takeover rumor firms also translates into significantly lower profitability.

The event study results are consistent with the productivity dip we document. However, as a caveat, we note that we cannot completely rule out that the overall negative stock price

[18] Untabulated analyses of the cross-sectional differences in observed BHAR show that the differences are consistent with and mirror our cross-sectional regression results for the rumor-related productivity dip. In line with our predictions for the cross-sectional variation in the productivity dip, we expect the negative shareholder wealth effects to be muted if there is less fear of job loss and wage reduction associated with takeovers. The event study results support our predictions. BHAR are significantly less negative for firms located in countries with higher levels of employment protection and long-term orientation. However, we do not discuss these results in detail because of the difficulties in interpreting long-term stock returns.

reaction we find simply reflects the market's updated probability that a takeover bid will less likely occur in the future.

7. Conclusion

Although speculative journalism has been on the rise for years and speculative news are prevalent in financial markets, relatively little is known about their real implications for the firms involved. This study uses a large sample of speculative takeover rumors to provide evidence that firm productivity temporarily declines after rumors that do not materialize surface. The productivity dip is found to be stronger for target firms as well as for firms located in countries with lower levels of employee rights and less long-term orientation. Stock returns mirror these results. The evidence is consistent with theory and anecdotal evidence indicating that takeover speculation causes distraction, reduced employee morale and collaboration, and stress. Nevertheless, and despite our numerous efforts to rule out alternative explanations, we caution against over-interpreting our results because part of the M&A rumor process remains unobservable.

This study provides a first step towards a better understanding of the real effects of speculative news and rumors. In this sense, our paper contributes to the debate on the regulation of speculation in the market for corporate control, such as the 2011 UK anti-takeover reform. The results imply that limiting the time over which firms can be "in play" in takeover rumors may benefit rumor firms and potentially their employees and shareholders. Furthermore, we provide new insights on the potential costs of the takeover threat. In particular, our evidence on the mitigating role of employee rights and a society's long-term orientation for the dip in firm productivity point to the important role that laws and cultural norms as well as human capital may play in the market for corporate control.

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FIGURES

Figure 1: No abnormal returns prior to announcements of speculative takeover rumors

This figure shows event study results for 9,340 speculative takeover rumors. Cumulative average abnormal returns are reported for day t-40 to day t+15, which are defined relative to the rumor announcement date t0. Daily abnormal returns for each firm are calculated as the difference between the realized and the expected total return. Expected returns are calculated using the market model with an estimation window from -220 to -41 trading days and the FTSE World index. Takeover rumor data is from the Zephyr database. Total return data is from the Refinitiv Datastream database.

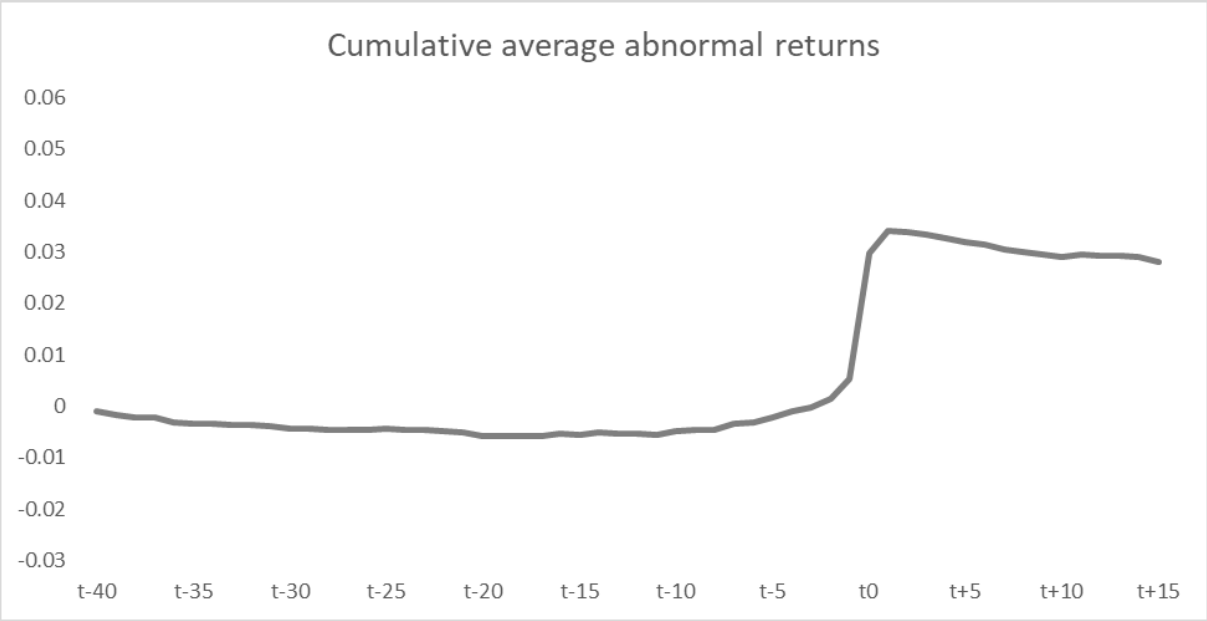
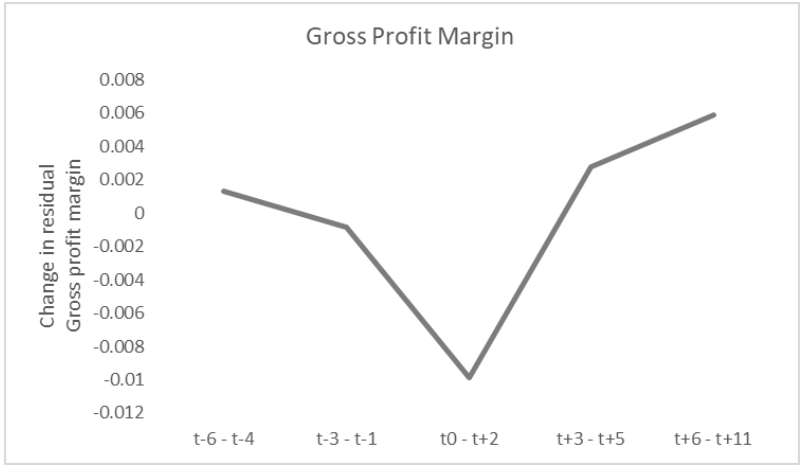
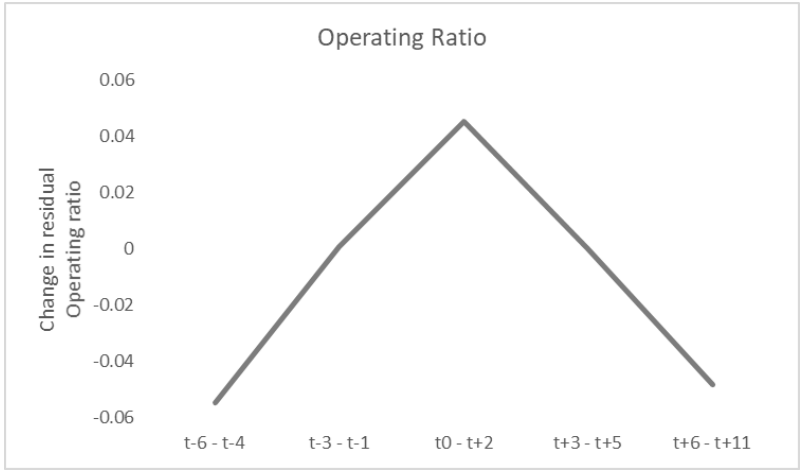


Figure 2: Changes in residual firm productivity around announcements of speculative takeover rumors (rumor firms only)

This figure shows changes in the residuals of firm productivity measures, i.e., *ln(Sales to Employees$_{t-1}$)*, *ln(Sales to SG&A)*, *Gross profit margin*, and *Operating ratio*, around speculative takeover rumors. We compute time-varying residuals from regressions similar to those shown in Table 3, Panel A, where we omit the variable *M&A rumor*Post*. We calculate the average residuals for pre- and post-rumor quarters for all firms involved in speculative takeover rumors. Changes in residual productivity equal the absolute values of changes of average residual productivity from one period to the next, with pre-rumor periods including the quarters t-6 to t-4 and t-3 to t-1 before the rumor quarter t0. The rumor period spans the quarter t0 (during which the rumor is announced) and the quarters t+1 and t+2. The post-rumor periods include the quarters t+3 to t+5 and t+6 to t+11.





TABLES

Table 1: Summary statistics

Panel A: Distribution of speculative takeover rumors

OECD countries	Number of rumors	Rumors related to targets	Rumors related to acquirers
Australia	915	508	407
Austria	107	65	42
Belgium	93	58	35
Canada	654	380	274
Chile	55	37	18
Czech Republic	25	18	7
Denmark	77	53	24
Estonia	5	4	1
Finland	87	53	34
France	502	262	240
Germany	598	408	190
Greece	59	36	23
Hungary	29	16	13
Iceland	7	3	4
Ireland	65	36	29
Israel	257	149	108
Italy	483	313	170
Japan	310	144	166
Latvia	10	9	1
Lithuania	20	18	2
Luxembourg	35	17	18
Mexico	55	28	27
Netherlands	165	111	54
New Zealand	63	45	18
Norway	135	98	37
Poland	448	213	235
Portugal	100	79	21
Republic of Korea	297	177	120
Slovakia	4	2	2
Slovenia	36	28	8
Spain	414	263	151
Sweden	200	139	61
Switzerland	231	112	119
Turkey	80	57	23
United Kingdom	1,209	790	419
United States of America	2,464	1,541	923
Total	**10,294**	**6,270**	**4,024**

This table reports the geographical distribution of speculative takeover rumors (with at least USD 1 mil. deal value) from the Zephyr database which are related to listed acquirers and targets matched with the Compustat universe. Targets and acquirers included in the sample are headquartered in one of the thirty-six OECD countries.

Panel B: Summary statistics for rumor firms

	N	Mean	P25	P50	P75	SD
Raw Variables						
$Employees_{t-1}$	233,006	13.2760	0.3260	2.2000	11.2000	25.7030
Market Value	277,633	3,975.4988	66.2400	465.1100	2,864.2500	8,412.6293
Sales	265,166	778.8094	12.7850	98.5425	576.6060	1,632.9174
Total Assets	320,485	7,508.6384	87.3632	610.9385	3,931.4714	18,729.9784
Control Variables						
Capex to Total Assets	320,356	0.0121	0.0000	0.0049	0.0144	0.0209
Cash to Total Assets	317,367	0.1623	0.0310	0.0841	0.2025	0.2028
Debt to Total Assets	320,186	0.6079	0.3575	0.5557	0.7358	0.6474
Firm Size (ln(Total Assets))	320,356	6.3088	4.4727	6.4169	8.2775	2.7572
Outcome Variables						
Gross Profit Margin	245,901	0.0512	0.1965	0.3598	0.5606	2.5455
ln(Sales to $Employees_{t-1}$)	185,021	11.2068	10.5955	11.1642	11.7938	1.0941
ln(Sales to SG&A)	209,967	1.4993	0.9071	1.4935	2.1954	1.2161
Operating Ratio	253,524	2.0913	0.7712	0.8872	0.9717	7.8651
Sales to Total Assets	255,004	0.2236	0.0811	0.1793	0.3042	0.2008

This table reports the descriptive statistics for rumor firms, i.e., firms with at least one speculative takeover rumor (either as acquirer or target) in the Zephyr database. The firm characteristics are from the Compustat Global and Compustat North America databases and are stated in USD millions. The number of employees is stated in thousands. The market value in USD millions is from the Refinitiv Datastream database. All variables are obtained on a quarterly basis with except of the number of employees, which is available on an annual basis only and is lagged by one fiscal year. All variables are winsorized at the 1st and 99th percentiles. *Gross Profit Margin* is defined as the difference between sales and costs of goods sold divided by sales. *Operating Ratio* is defined as the sum of operating expenses and costs of goods sold divided by sales.

Panel C: Summary statistics for firms not involved in takeover speculation

	N	Mean	P25	P50	P75	SD
Raw Variables						
$Employees_{t-1}$	877,712	3.2473	0.0830	0.4230	1.9830	9.9979
Market Value	985,201	757.2088	17.9900	78.7600	361.2900	2,806.6189
Sales	1,070,935	177.8063	1.9578	14.5850	82.0734	635.2061
Total Assets	1,318,451	1,829.0252	20.1430	117.6813	605.3280	8,144.3176
Control Variables						
Capex to Total Assets	1,315,573	0.0118	0.0000	0.0031	0.0131	0.0224
Cash to Total Assets	1,300,355	0.1839	0.0260	0.0853	0.2442	0.2330
Debt to Total Assets	1,313,804	0.6598	0.2769	0.5204	0.7545	0.9599
Firm Size (ln(Total Assets))	1,315,573	4.6889	3.0166	4.7747	6.4097	2.5598
Outcome Variables						
Gross Profit Margin	962,516	-0.1457	0.1792	0.3478	0.5585	3.1474
ln(Sales to $Employees_{t-1}$)	649,787	10.9165	10.3462	10.9077	11.5152	1.1512
ln(Sales to SG&A)	801,434	1.2329	0.7202	1.3229	1.9715	1.2874
Operating Ratio	987,846	2.7499	0.7833	0.9105	1.0415	9.5555
Sales to Total Assets	1,014,918	0.2198	0.0385	0.1665	0.3174	0.2258

This table reports the descriptive statistics for firms without a speculative takeover rumor in the Zephyr database. The firm characteristics are from the Compustat Global and Compustat North America databases and are stated in USD millions. The number of employees is stated in thousands. The market value in USD millions is from the Refinitiv Datastream database. All variables are obtained on a quarterly basis with except of the number of employees, which is available on an annual basis only and is lagged by one fiscal year. All variables are winsorized at the 1st and 99th percentiles. *Gross Profit Margin* is defined as the difference between sales and costs of goods sold divided by sales. *Operating Ratio* is defined as the sum of operating expenses and costs of goods sold divided by sales. *Differences between firms involved and those not involved in speculative takeover rumors are statistically significant.*

Table 2: Predicting speculative takeover rumors

Panel A: Speculative takeover rumors and pre-rumor firm characteristics

	Rumor * Post Q0			
	(1)	(2)	(3)	(4)
ln(Sales to Employees$_{t-1}$)$_{t-1}$	**-0.0003**			
	(-1.623)			
ln(Sales to SG&A)$_{t-1}$		**-0.0001**		
		(-0.793)		
Operating Ratio$_{t-1}$			**0.0000**	
			(1.027)	
Gross Profit Margin$_{t-1}$				**-0.0000**
				(-1.257)
Capex to Total Assets$_{t-1}$	-0.0067	-0.0066	-0.0052	-0.0056
	(-1.182)	(-1.406)	(-1.227)	(-1.276)
Cash to Total Assets$_{t-1}$	-0.0015*	-0.0004	-0.0004	-0.0006
	(-1.718)	(-0.539)	(-0.589)	(-0.951)
Debt to Total Assets$_{t-1}$	0.0004**	0.0006***	0.0004***	0.0005***
	(2.500)	(3.676)	(3.444)	(3.917)
Firm Size$_{t-1}$	0.0018***	0.0018***	0.0017***	0.0017***
	(7.797)	(9.208)	(10.736)	(10.560)
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	796,751	936,333	1,144,090	1,115,680
R-squared	0.002	0.002	0.002	0.002

Panel A reports regression results on the relation between a firm's involvement in a speculative takeover rumor and preceding firm productivity. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post Q0* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor. Firm productivity measures and control variables are lagged by one quarter. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)*, *ln(Sales to SG&A)*, *Operating Ratio, and Gross Profit Margin*. All variables are winsorized at the 1st and 99th percentiles. Accounting data is from the Compustat Global and Compustat North America databases. M&A rumor data is from the Zephyr database. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel B: Analyst sales and EPS estimates for treated and PSM-matched untreated observations

	Takeover rumor quarter			Matched quarters			Differences	
	N	*Mean*	*Median*	*N*	*Mean*	*Median*	*Mean*	*Median*
Analyst Sales Estimate (I/B/E/S)	3,536	6.2957	6.5916	3,536	6.1267	6.3773	0.1690***	0.2143***
Analyst EPS Estimate (I/B/E/S)	3,461	0.5017	0.3040	3,461	0.4711	0.3267	0.0306**	-0.0227

Panel B reports summary statistics as well as difference-in-means and Wilcoxon median tests for sales and EPS estimates referring to the takeover rumor quarter and other fiscal quarters of a propensity score matched sample. The number of speculative takeover rumors is significantly smaller than in the baseline regressions in Panel A because analyst estimates are not available for many international firms. Propensity scores are obtained from a Probit regression of the dependent variable *Rumor* on firm control variables lagged by one quarter, (two-digit SIC) industry fixed effects, and quarter fixed effects. We use the propensity scores from the Probit regression to perform a nearest neighbor matching without replacement. *Analyst Sales Estimate (I/B/E/S)* is the natural logarithm of the average value of monthly I/B/E/S estimates on *Sales* for the next quarter. *Analyst EPS Estimate (I/B/E/S)* is the average value of monthly I/B/E/S estimates on *EPS* for the next quarter. All variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Table 3: Takeover speculation and firm productivity

Panel A: Baseline estimation results

	ln(Sales to Employees$_{t-1}$)		ln(Sales to SG&A)	
	(1)	(2)	(3)	(4)
Rumor * Post	**-0.0154****	**-0.0152****	**-0.0197*****	**-0.0204*****
	(-2.273)	**(-2.246)**	**(-2.977)**	**(-3.101)**
Capex to Total Assets		1.1142***		-0.5481***
		(10.009)		(-4.906)
Cash to Total Assets		-0.2245***		-0.5161***
		(-8.673)		(-22.689)
Debt to Total Assets		-0.0140**		-0.0005
		(-2.049)		(-0.079)
Firm Size	0.1683***	0.1620***	0.1952***	0.1841***
	(29.147)	(26.875)	(37.801)	(34.865)
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	819,847	819,847	965,070	965,070
R-squared	0.088	0.091	0.041	0.050

Panel A reports regression results on the relation between speculative takeover rumors and firm productivity measures for the sample of firms from OECD countries that spans the years 1994-2018. *Rumor* is an indicator variable that equals one for firms that have at least one rumor over the sample period, and zero otherwise. *Post* is an indicator that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. The variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)* measure firm productivity. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel B: Lead-lag estimation results

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)
Rumor * Post w/o Q0	**-0.0127***	**-0.0174****
	(-1.845)	**(-2.422)**
All controls and FE as in Panel A	Yes	Yes
Observations	819,847	965,070
R-squared	0.091	0.050

Panel C: Assessment of pre-rumor trends

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)
Rumor * Pre Q2	**-0.0042**	**0.0030**
	(-0.563)	**(0.400)**
Rumor * Pre Q1	**-0.0110**	**-0.0066**
	(-1.523)	**(-0.839)**
Rumor * Post Q0	-0.0151**	-0.0209***
	(-2.081)	(-2.776)
Rumor * Post Q1	-0.0117	-0.0209***
	(-1.602)	(-2.628)
Rumor * Post Q2	-0.0151**	-0.0119
	(-2.042)	(-1.486)
All controls and FE as in Panel A	Yes	Yes
Observations	819,847	965,070
R-squared	0.091	0.050

Panel B reports regression results on the relation between speculative takeover rumors and firm productivity measures for the sample of firms from OECD countries that spans the years 1994-2018. *Rumor* is an indicator variable that equals one for firms that have at least one rumor over the sample period, and zero otherwise. *Post w/o Q0* is an indicator that equals one for the two quarters after the rumor quarter (Q0), and zero otherwise. Panel C shows the results of assessment of pre-rumor trends along with the results for each post-rumor quarter separately. *Pre Q1* and *Pre Q2* are indicator variables that equal one for each of the two fiscal quarters prior to a speculative takeover rumor, and zero otherwise. *Post Q0*, *Post Q1*, and *Post Q2* are indicator variables that equal one for each of the three post-rumor quarters, and zero otherwise. The variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)* measure firm productivity. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel D: Controlling for analyst EPS estimates and firms seeking M&A

	ln(Sales to Employees$_{t-1}$)	ln(Sales to SG&A)
	(1)	(2)
Rumor * Post	**-0.0225*** **	**-0.0274*** **
	(-2.797)	**(-3.562)**
Analyst EPS Estimate (I/B/E/S)	0.3428***	0.2187***
	(27.936)	(20.405)
Seeking M&A	0.0049	0.0151
	(0.386)	(1.184)
All controls and FE as in Panel A	Yes	Yes
Observations	819,847	965,070
R-squared	0.098	0.052

Panel D reports regression results on the relation between speculative takeover rumors and firm productivity measures controlling for analyst sales estimates and for firms seeking M&A. The variable *Seeking M&A* equals one if a takeover rumor occurred in the same year in which a firm announces that it seeks a buyer or a target firm (or assets) to acquire, and zero otherwise. Information on firms seeking buyers or targets is retrieved from Capital IQ. *Analyst EPS Estimate (I/B/E/S)* is the average value of monthly I/B/E/S estimates on *EPS* for the next quarter. We replace missing I/B/E/S estimates with zero values and include an indicator variable in our regressions that accounts for this replacement. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Table 4: Matched samples and "exogenous" rumors

Panel A: Propensity score matching (on lagged firm characteristics, industries, and quarters)

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)
Rumor * Post	**-0.0160****	**-0.0219*****
	(-2.386)	**(-3.334)**
Capex to Total Assets	1.5637***	-0.2777
	(8.603)	(-1.507)
Cash to Total Assets	-0.1624***	-0.4408***
	(-3.862)	(-12.164)
Debt to Total Assets	0.0183	0.0032
	(1.319)	(0.274)
Firm Size	0.1541***	0.1809***
	(18.101)	(23.379)
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	420,835	481,696
R-squared	0.123	0.050

Panel A reports regression results for a propensity score matched sample. Propensity scores are obtained from a Probit regression of the dependent variable *Rumor*Post* on firm control variables lagged by one quarter, (two-digit SIC) industry fixed effects, and quarter fixed effects. We use the propensity scores from the Probit regression to perform a nearest neighbor matching without replacement. The regression model we use in this table is identical to that shown in Table 2 Panel A and it is based on all firm-quarters of all matched firms. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel B: Entropy balancing

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)
Rumor * Post	**-0.0137****	**-0.0250*****
	(-2.481)	**(-4.169)**
All controls and FE as in Panel A	Yes	Yes
Observations	819,117	963,701
R-squared	0.883	0.859

Panel B reports regression results for an entropy balanced sample using the entropy balancing method proposed by Hainmueller (2012). This sample is weighted based on the entropy balance technique, so that mean and variance for firm control variables, (two-digit SIC) industries, and fiscal quarters are the same for the takeover rumor and non-rumor observations. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel C: Within-treatment group estimation – Results for firms with speculative takeover rumors only

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)
Post	**-0.0152****	**-0.0254*****
	(-2.360)	**(-3.928)**
All controls and FE as in Panel A	Yes	Yes
Observations	181,648	202,572
R-squared	0.115	0.057

Panel C reports regression results on the relation between speculative takeover rumors and firm productivity measures for rumored firms only, i.e., for those firms that were subject to a speculative takeover rumor at least once over the sample period. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel D: Within-treatment group estimation – Results for U.S. targets subject to "exogenous" speculative rumors only

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)
Post	**-0.1311*** **	**-0.0945** **
	(-2.692)	**(-2.269)**
Capex to Total Assets	0.3454	0.0085
	(0.224)	(0.007)
Cash to Total Assets	0.2637	-0.3532
	(0.933)	(-1.413)
Debt to Total Assets	0.0509	-0.4674***
	(0.294)	(-3.071)
Firm Size	0.1330**	0.0713
	(2.077)	(1.354)
Firm Age	-0.1677*	-0.0066
	(-1.986)	(-0.100)
R&D to Total Assets	1.3177	1.3033
	(0.947)	(0.870)
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	3,687	3,154
R-squared	0.362	0.140

Panel D reports regression results on the relation between speculative takeover rumors and firm productivity measures for rumored U.S. target firms only, i.e., for those firms that were subject to a speculative exogenous takeover rumor at least once over the sample period. Information on rumors and rumor sources is hand-collected from the scoop articles covering the rumor on the internet or in newspapers. Rumors are defined as exogenous if the article states that the rumor is speculation or if the rumor originates from social media or if the source of the rumor is mentioned to be anonymous. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Table 5: Firms subject to one vs. multiple rumors

Treated group:	Firms subject to one rumor only		Firms subject to multiple rumors	
	ln(Sales to Employees$_{t-1}$)	ln(Sales to SG&A)	ln(Sales to Employees$_{t-1}$)	ln(Sales to SG&A)
	(1)	(2)	(3)	(4)
Rumor * Post	**-0.0280****	**-0.0252****	**-0.0063**	**-0.0164***
	(-2.535)	**(-2.470)**	**(-0.727)**	**(-1.889)**
Capex to Total Assets	1.1141***	-0.5480***	1.1147***	-0.5478***
	(10.008)	(-4.905)	(10.013)	(-4.903)
Cash to Total Assets	-0.2245***	-0.5161***	-0.2245***	-0.5161***
	(-8.671)	(-22.687)	(-8.672)	(-22.688)
Debt to Total Assets	-0.0140**	-0.0005	-0.0140**	-0.0005
	(-2.050)	(-0.082)	(-2.050)	(-0.081)
Firm Size	0.1619***	0.1840***	0.1619***	0.1840***
	(26.864)	(34.855)	(26.865)	(34.852)
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	819,847	965,070	819,847	965,070
R-squared	0.091	0.050	0.091	0.050

This table reports regression results on the relation between speculative takeover rumors and firm productivity measures for firms subject to one rumor (columns 1 and 2) as well as for firms subject to multiple rumors (columns 3 and 4). *Rumor* is an indicator variable that equals one for firms that have at least one rumor over the sample period, and zero otherwise. *Post* is an indicator that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Table 6: Takeover speculation and employee attention (U.S. firms only)

	Ln(1 + Downloads of focal rumor firm filings from EDGAR via focal rumor firm IP addresses)	
	(1)	(2)
Rumor * Post	**0.0501*** **	**0.0544*** **
	(3.166)	**(2.968)**
Capex to Total Assets	-0.0076	-0.2351
	(-0.047)	(-0.925)
Cash to Total Assets	-0.0414*	-0.0870**
	(-1.817)	(-2.477)
Debt to Total Assets	0.0080***	0.0048
	(2.584)	(0.922)
Firm Size	0.0472***	0.0614***
	(6.103)	(5.987)
Firm Age		-0.0635***
		(-2.683)
R&D to Total Assets		0.5952***
		(3.571)
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	320,721	257,781
R-squared	0.057	0.062

This table reports regression results on the relation between a firm's involvement in a speculative takeover rumor and attention paid to the rumor firm by its own employees, as approximated by rumor firm filings downloaded from the EDGAR server by IP addresses of the rumor firm. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post* is an indicator that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. *Ln(1 + Downloads of focal rumor firm filings from EDGAR via focal rumor firm IP addresses)* is the natural logarithm of 1 plus the number of filings by the focal rumor firm that were downloaded from the EDGAR server via IP addresses that belong to the focal rumor firm. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Table 7: Takeover speculation and firm productivity – Cross-sectional variation

Panel A: Targets vs. acquirers

	ln(Sales to Employees$_{t-1}$)	ln(Sales to SG&A)
	(1)	(2)
Rumor * Post * Target	**-0.0282*** **	**-0.0177** **
	(-3.442)	**(-2.214)**
Rumor * Post * Acquirer	**0.0102**	**-0.0231** **
	(0.956)	**(-2.199)**
All controls and FE as in Table 3	Yes	Yes
Observations	819,847	965,070
R-squared	0.091	0.050

Panel A reports regression results on the relation between speculative takeover rumors and firm productivity measures for target and acquirer firms separately. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post*Target* (*Post*Acquirer*) equals one for the fiscal quarter in which a target (acquirer) firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. Firm controls and fixed effects are identical to those used in Table 3. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel B: OECD collective bargaining coverage and employment protection legislation (EPL)

	ln(Sales to Employees$_{t-1}$)		ln(Sales to SG&A)	
	(1)	(2)	(3)	(4)
Rumor * Post * Collective Bargaining	**0.0005****		**0.0001**	
	(2.277)		**(0.380)**	
Rumor * Post * EPL		**0.0122***		**0.0062**
		(1.807)		**(0.969)**
Rumor * Post	**-0.0334*****	**-0.0362*****	**-0.0238****	**-0.0325*****
	(-2.996)	**(-2.684)**	**(-2.488)**	**(-2.605)**
Other interaction terms	Yes	Yes	Yes	Yes
All controls and FE as in Table 3	Yes	Yes	Yes	Yes
Observations	819,814	704,465	964,668	846,896
R-squared	0.091	0.082	0.050	0.048

Panels B reports regression results on the relation between speculative takeover rumors and firm productivity measures and the interaction with measures of employee rights (i.e., collective bargaining coverage and the degree of employment protection). *Collective Bargaining* measures the percentage of employees with the right to bargain as reported by OECD. Thus, it is a ratio of the number of employees covered by the collective agreement and the overall number of wage earners and salaried employees. *EPL* is the Employment Protection Legislation index provided by OECD that quantifies the procedures and costs related to individual and collective dismissals. Larger values of this index correspond to higher employee protection. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor in our sample, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. Firm controls and fixed effects are identical to those used in Table 3. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel C: Long-term orientation

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)
Rumor * Post * Long-Term Orientation	**0.0006***	**0.0006****
	(1.907)	**(2.327)**
Rumor * Post	**-0.0392****	**-0.0472*****
	(-2.449)	**(-3.178)**
Other interaction terms	Yes	Yes
All controls and FE as in Table 3	Yes	Yes
Observations	819,847	965,070
R-squared	0.091	0.050

Panel C reports regression results of the relation between speculative takeover rumors and firm productivity measures and the interaction with the level of cultural long-term orientation. *Long-Term Orientation* is the LTO index provided by Geert Hofstede that measures the extent to which a culture is long-term oriented. Higher values of this index correspond to higher long-term orientation. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor in our sample, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)* and *ln(Sales to SG&A)*. Firm controls and fixed effects are identical to those used in Table 3. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel D: Summary statistics

	N	Mean	P25	P50	P75	SD
Collective Bargaining	1,882,961	29.7375	13.1000	16.7000	34.6000	24.7456
EPL	1,682,832	1.4784	0.6731	1.3149	2.0561	0.8072
Long-Term Orientation	1,884,116	39.8030	26.0000	26.0000	51.0000	21.3033

Table 8: Stock returns around announcements of speculative takeover rumors

Panel A: Buy-and-hold abnormal returns

Event window	BHAR	t-statistic
(2...240)	-0.0497	-11.0012***
(2...180)	**-0.0469**	**-12.3057*** **
(1...1)	0.0036	6.6713***
(0...0)	**0.0227**	**27.9768*** **
(-1...-1)	0.0034	9.3116***
(-40...-2)	**0.0051**	**2.5659** **

Panel A reports event study results for 9,379 distinct speculative takeover rumors. Average buy-and-hold abnormal returns (*BHAR*) are reported for seven event windows along with the test statistic on their significance. Daily BHAR for each firm is calculated as the difference between the realized and the expected buy-and-hold total return. Expected returns are calculated using the market-adjusted return model and the FTSE World index. Total returns are from the Refinitiv Datastream database. All BHAR are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel B: Cumulative average abnormal returns

Event window	CAAR	t-statistic
(2...180)	**-0.0486**	**-7.7109*** **
(0...0)	**0.0224**	**27.6504*** **
(-40...-2)	**0.0014**	**0.6351**

Panel B reports event study results for 9,340 distinct speculative takeover rumors. Cumulative average abnormal returns (*CAAR*) are reported for several event windows along with the test statistic of their significance. Daily AR for each firm is calculated as the difference between the realized and the expected total return. Expected returns are calculated using the market model with an event window from -220 to -40 trading days and the FTSE World index. Total returns are from the Refinitiv Datastream database. All CAAR are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Panel C: Targets vs. acquirers

	Targets			Acquirers			
Event window	N	BHAR	t-statistic	N	BHAR	t-statistic	Mean difference
(2...240)	5,524	**-0.0633**	-10.4009***	3,555	**-0.0286**	-4.3315***	**-0.0347*** **
(2...180)	5,615	**-0.0601**	-11.7165***	3,577	**-0.0260**	-4.6990***	**-0.0341*** **
(0...0)	5,771	**0.0314**	26.8763***	3,608	**0.0086**	9.3855***	**0.0228*** **

Panel C reports event study results for rumored target and acquirer firms separately. Average buy-and-hold abnormal returns (*BHAR*) are reported for five event windows along with the test statistic of their significance. The differences in means are reported in the last column. Daily BHAR for each firm is calculated as the difference between the realized and the expected buy-and-hold total return. Expected returns are calculated using the market-adjusted return model and the FTSE World index. M&A rumor data is from the Zephyr database. Total returns are from the Refinitiv Datastream database. All BHAR are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

APPENDICES

Appendix A: Alternative productivity measures

	Operating Ratio = *(Oper. Exp. + COGS)/Sales* (1)	Gross Profit Margin = *(Sales - COGS)/Sales* (2)
Rumor * Post	**0.1176****	**-0.0313***
	(2.099)	**(-1.913)**
Capex to Total Assets	4.5837***	-1.4669***
	(4.004)	(-4.283)
Cash to Total Assets	3.2833***	-1.1561***
	(13.725)	(-14.472)
Debt to Total Assets	0.2224***	-0.0008
	(3.073)	(-0.034)
Firm Size	-0.7394***	0.1784***
	(-17.407)	(12.750)
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	1,178,145	1,148,894
R-squared	0.011	0.008

This table reports regression results on the relation between speculative takeover rumors and alternative firm productivity measures, i.e., *Operating Ratio* and *Gross Profit Margin*. *Rumor* is an indicator variable that equals one for firms that have at least one rumor over the sample period, and zero otherwise. *Post* is an indicator that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Appendix B: Controls for quarter*industry or quarter*country fixed effects

Panel A: Baseline estimation results with firm and quarter*industry fixed effects

	ln(Sales to Employees$_{t-1}$)	ln(Sales to SG&A)	Operating Ratio	Gross Profit Margin
	(1)	(2)	(3)	(4)
Rumor * Post	**-0.0168****	**-0.0231*****	**0.1294****	**-0.0337****
	(-2.502)	**(-3.507)**	**(2.299)**	**(-2.052)**
Firm controls as in Table 3	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Quarter*Industry FE	**Yes**	**Yes**	**Yes**	**Yes**
Observations	819,656	964,231	1,177,176	1,148,171
R-squared	0.104	0.060	0.016	0.010

Panel B: Baseline estimation results with firm and quarter*country fixed effects

	ln(Sales to Employees$_{t-1}$)	ln(Sales to SG&A)	Operating Ratio	Gross Profit Margin
	(1)	(2)	(3)	(4)
Rumor * Post	**-0.0186*****	**-0.0201*****	**0.1170****	**-0.0286***
	(-2.774)	**(-3.056)**	**(2.071)**	**(-1.729)**
Firm controls as in Table 3	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Quarter*Country FE	**Yes**	**Yes**	**Yes**	**Yes**
Observations	819,847	965,070	1,178,145	1,148,894
R-squared	0.097	0.066	0.020	0.010

The two panels report regression results on the relation between speculative takeover rumors and firm productivity measures accounting for *Quarter*Industry* fixed effects (Panel A) or *Quarter*Country* fixed effects. Industries refer to one-digit SIC industries. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm productivity measures include the variables *ln(Sales to Employees$_{t-1}$)*, *ln(Sales to SG&A)*, *Operating Ratio*, and *Gross Profit Margin*. *Operating Ratio* is defined as the sum of operating expenses and costs of goods sold divided by sales. *Gross Profit Margin* is defined as the difference between sales and costs of goods sold divided by sales. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter-industry fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Appendix C: Covariate balance for PSM-matched sample

Variables	(1) Takeover rumor sample	(2) Matched sample	(3) Difference (t-statistic)
Variables used for matching (ex industries):			
Capex to Total Assets$_{t-1}$	0.0123	0.0123	-0.0000 (-0.1181)
Cash to Total Assets$_{t-1}$	0.1440	0.1399	0.0041 (2.3125)**
Debt to Total Assets$_{t-1}$	0.5923	0.6004	-0.0081 (-1.6324)
Firm Size$_{t-1}$	7.1430	7.1505	-0.0074 (-0.2770)
Year Quarter	209.7816	209.5746	0.2070 (1.2141)
Pre-rumor growth rates for dependent variables:			
ln(Sales to Employees$_{t-1}$) Growth Rate$_{t-2 \text{ to } t-1}$	0.0005	0.0005	0.0000 (0.0316)
ln(Sales to SG&A) Growth Rate$_{t-2 \text{ to } t-1}$	0.0136	0.0907	-0.0771 (-0.7473)

This table reports mean values and difference-in-means tests for takeover rumor and matched observations from the PSM-matched sample to assess covariate balance. We use the observations obtained from the regression *ln(Sales to SG&A)*. *Year Quarter* is a count variable that captures the quarter fixed effects we use for the PSM matching. All variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Appendix D: Results for North America only

	ln(Sales to Employees$_{t-1}$) (1)	ln(Sales to SG&A) (2)	Operating Ratio (3)	Gross Profit Margin (4)
Rumor * Post	**-0.0342*** **	**-0.0167***	**0.1902***	**-0.0705** **
	(-3.045)	**(-1.888)**	**(1.918)**	**(-2.072)**
Capex to Total Assets	0.9677***	-0.2747**	4.5249***	-0.7913*
	(6.907)	(-2.201)	(3.099)	(-1.761)
Cash to Total Assets	-0.2936***	-0.5539***	5.9632***	-1.6129***
	(-8.859)	(-19.696)	(15.368)	(-13.173)
Debt to Total Assets	0.0116	0.0046	0.1387	0.0286
	(1.254)	(0.496)	(1.017)	(0.722)
Firm Size	0.1395***	0.1073***	-0.1756***	0.0509**
	(17.678)	(15.629)	(-2.621)	(2.483)
Firm Age	-0.1122***	0.0067	-0.0996	0.0319
	(-11.992)	(0.896)	(-1.274)	(1.313)
R&D to Total Assets	-2.5340***	-4.0004***	33.6177***	-9.8905***
	(-10.114)	(-17.883)	(8.903)	(-8.463)
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	508,550	463,788	569,396	569,677
R-squared	0.106	0.068	0.017	0.015

This table reports the results on the relation between M&A rumors and firm productivity/profitability for firms headquartered in the USA and Canada only. It further contains two additional control variables *R&D to Total Assets* and *Firm Age*. *Firm Age* is the natural logarithm of the difference between the respective sample year plus one and a firm's IPO year (if not available, first year with stock data in CRSP). All firms are from our sample covering the years 1994-2018. The accounting data is from Compustat Global and Compustat North America. The M&A rumors are obtained from the Zephyr database. *Post-Treatment* is an indicator variable that is equal to one for the fiscal quarter in which a M&A transaction has been rumored as well as for two subsequent quarters and zero otherwise. *Gross Profit Margin* is defined as (Sales - Costs of Goods Sold)/Sales. *Pre-Tax Profit Margin* equals Pre-Tax Income/Sales. *Operating Ratio* is defined as (Operating Expenses + Costs of Goods Sold)/Sales. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

Appendix E: Takeover speculation and firm profitability

	Pre-Tax ROA	Pre-Tax Profit Margin
	(1)	(2)
Rumor * Post	**-0.0095*** **	**-0.1416** **
	(-9.166)	**(-2.060)**
Capex to Total Assets	-0.3076***	-5.4574***
	(-15.788)	(-4.103)
Cash to Total Assets	-0.0306***	-3.2420***
	(-9.075)	(-11.842)
Debt to Total Assets	-0.1226***	-0.6513***
	(-80.736)	(-7.424)
Firm Size	0.0435***	0.7921***
	(55.330)	(16.117)
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	1,426,295	1,181,158
R-squared	0.291	0.010

This table reports regression results on the relation between speculative takeover rumors and firm profitability measures for our full sample. *Rumor* is an indicator variable that equals one for firms that have at least one speculative takeover rumor over the sample period, and zero otherwise. *Post* is an indicator variable that equals one for the fiscal quarter in which a firm becomes involved in a rumor as well as for the two subsequent quarters, and zero otherwise. Firm profitability measures include the variables *Pre-Tax ROA* and *Pre-Tax Profit Margin*. *Pre-Tax ROA* is defined as the ratio of pre-tax income and total assets. *Pre-Tax Profit Margin* is defined as the ratio of pre-tax income and sales. All variables are winsorized at the 1st and 99th percentiles. All regression specifications include quarter fixed effects, firm fixed effects, and a constant (not reported). Standard errors are clustered at the firm level. ***, **, and * denote statistical significance at the 1%-, 5%-, and 10%-level, respectively.

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