Index Fund and ETF Ownership and the Market for Corporate Control

Ludwig Dobmeier, Renata Lavrova, Bernhard Schwetzler[*]

Abstract

If a bidder launches a takeover offer for a listed company being part of a stock market index, then index funds and exchange traded funds (ETF) as shareholders of this company cannot easily tender their shares without losing track of the index. This paper analyzes the impact of index fund and ETF ownership on the outcome of takeover offers in Germany. Based on a sample of 323 takeover offers of publicly listed German companies between 2006 and 2018, we document a significant negative impact of index fund and ETF ownership on the percentage of shares gained by a bidder during a takeover attempt. The fraction of outstanding shares eventually being tendered is decreasing with an increase in the stake of index funds and ETF: a one standard deviation increase in pre-offer index fund and ETF ownership reduces the fraction of outstanding shares gained by the bidder by 4.2 percentage points. For control-taking takeover bids with a bidder's toehold below 30%, this value increases to 9.5 percentage points. Thus, our results suggest the increasing importance of index funds and ETF to weaken the German market for corporate control.

---

[*] All HHL – Leipzig Graduate School of Management, Chair of Financial Management, Jahnallee 59, 04109 Leipzig, Germany, Phone +49 341 9851-685, Fax: +49 341 9851-689. We would like to thank Wilhelm Althammer for helpful comments.

Declarations

Funding: The authors received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest: The authors declare that they have no conflict of interest.

Availability of data and material: The data underlying the findings of this study is available upon request from the corresponding author, Bernhard Schwetzler.

Code availability: Custom STATA code generated and used during the study is available upon request from the corresponding author, Bernhard Schwetzler.

Author contributions: All authors contributed to the study conception and design. Material preparation, data collection, analysis and manuscript drafting were performed by Ludwig Dobmeier, Renata Lavrova and Bernhard Schwetzler. All authors read and approved the final manuscript. There are no other persons who satisfied the criteria for authorship but are not listed. All authors have approved the order of authors listed in the manuscript.

The authors confirm to have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including timing of publication, with respect to intellectual property.

Conflict of Interest: The authors declare that they have no conflict of interest.

Signed by all authors as follows:

Author name	Signature	Date
Ludwig Dobmeier		15.12.20
Renata Lavrova		15.12.20
Bernhard Schwetzler		15.12.20

1. Introduction

Index funds and exchange traded funds (ETF) are financial vehicles aiming to replicate the performance of particular stock market indices, with ETF being listed and traded on major stock exchanges intra-daily. Over the last 15 years index funds and ETF have seen a tremendous increase in popularity: Global Assets under Management (AuM) of ETF grew by approx. 19.2 percent per year between 2009 and 2019 to USD 6.35 tn. In the United States, AuM of ETF grew by approx. 18.9 percent annually, and in Germany by approx. 20.5 percent during the same period.[1] The combined ownership stake of the "Big Three" index fund and ETF providers (Black Rock, Vanguard, State Street Global Advisors) in S&P 500 companies in 2017 was 20.5 percent (Bebchuk & Hirst 2019b), while BlackRock alone owns on average 6 percent in each of the members of the German DAX.[2]

The increasing importance of index funds and ETF has sparked a lively academic discussion about its consequences for the corporate governance of the firms they are invested in (Appel et al. 2016; Schmidt & Fahlenbrach 2017; Appel et al. 2019; Bebchuk & Hirst 2019a; Heath et al. 2020). By construction, index funds and ETF cannot easily terminate their holdings by selling their shares in a company without simultaneously losing track of a given stock market index, in which the company is listed. Given the high hurdles for influence by "exit" the academic debate has largely concentrated on the influence by "voice": Research has been concentrating on the question whether, and if so, how index funds and ETF exercise control by their voting behavior and the associated consequences for corporate performance.

This study puts its focus on the "exit" channel: We study the impact of increasing index fund and ETF ownership on the market for corporate control as another potential way to influence corporate policy. The term "market for corporate control" coins the possibility of sub optimally managed companies becoming a target of a takeover attempt. The bidder aims to get control over the company, potentially replace incumbent management and reap the benefits from improving the performance of the company. Research on the impact of index fund and ETF ownership on the market for corporate control is scarce: Analyzing the impact of exogenous changes of ownership structure on corporate governance, Schmidt & Fahlenbrach (2017) find an increase of the ownership stake of passive funds to decrease the announcement returns on

---

[1] Global AuM increased from approx. USD 1.10 tn in 2009 to USD 6.35 tn in 2019 (ETFGI 2020). AuM in the United States increased from approx. USD 0.78 tn in 2009 to USD 4.40 tn in 2019 (Statista 2020). AuM in Germany increased from approx. EUR 0.11 tn in 2009 to 0.71 tn in 2019 (Deutsche Börse Group 2020).

[2] Ownership by BlackRock's dedicated index fund and ETF provider, iShares by BlackRock (Stocker 2019).

takeover bids of the respective companies. Specific studies on the role of passive index funds and ETF being shareholders of target companies still lack. Our study aims to fill this gap.

Facing high hurdles to exit their ownership stake, index funds and ETF may find it also difficult to tender their shares when a bidder launches a takeover offer on a company being part of a tracked index. Consequently, significant index fund and ETF ownership might reduce the number of shares available for a bidder during a bid, and might thus lower the probability for a successful completion of a takeover attempt.

Our results point towards index fund and ETF ownership significantly weakening the efficiency of the market for corporate control: Based on a sample of 323 takeover attempts in Germany between 2006 and 2018 we find a significant negative relationship between index fund and ETF ownership and the percentage of outstanding shares gained by a bidder during a takeover offer. A one standard deviation unit increase of the index fund and ETF ownership stake in the target company reduces the fraction of outstanding shares gained by a bidder by 4.2 percentage points. Examining the sub-sample of "control-taking" bids with a bidder's toehold below 30% we find an even stronger effect: A one unit standard deviation increase of index fund and ETF ownership reduces the fraction of outstanding shares gained by 9.5 percentage points. Notably, we find the negative effect on the fraction of shares tendered to be larger than the index fund and ETF shareholding itself: An index fund and ETF stake of 1% of the shares not owned by the bidder reduces the fraction of shares gained (also relating to the shares not owned by the bidder) by significantly more than 1%. We conclude from this result that index fund and ETF shareholdings also affect the tendering decision of other shareholders and/or the decisions of outside investors to sell or buy shares of the target company during the offer acceptance period. Our analysis further reveals that some index funds and ETF as owners actually exit their position and sell their shares in the target during the offer acceptance period: We find on average a 25% decrease in index fund and ETF ownership between the offer announcement and the end of the bid's acceptance period.

In April 2017, private equity firms Bain Capital and Cinven jointly launched a takeover offer for STADA Arzneimittel AG (STADA), a pharmaceutical company listed on the German stock exchange in Frankfurt. Starting with a minimum acceptance threshold of the takeover offer of 75% the bidders reduced the threshold conditional for the bid to 67.5% over the course of the offer period. Eventually, the offer failed to reach this threshold (actual acceptance rate was 65.5%) and was therefore annulled. The bidders had to launch a renewed offer with an increased premium and a further reduced threshold of 63%, which eventually was successful. As STADA

4

was part of the German MDAX index by the time of the bid, index funds and ETF had a 7.6% ownership stake in STADA (Refinitiv ownership data). In the German press, the stake of index funds and ETF in STADA was identified as one major reason for the bidders' difficulties to gain control in this takeover offer.[3]

We believe the German legal environment to be particularly well suited for analyzing the impact of increasing index fund and ETF ownership on the market for corporate control: First, the German corporate law places significantly higher hurdles for a bidder in a takeover to gain full control over the target company compared to other countries, e.g., the US: exercising full control over the target requires the signing of a domination and profit and loss transfer agreement (DPLA) based on a 75% vote on a target shareholder meeting. Squeezing out the minority shareholders even requires a 90% or 95% ownership stake of the majority shareholder. Control-taking takeover bids in Germany are thus regularly aiming to cross a certain minimum ownership threshold believed by the bidder to be sufficient for such a DPLA vote. Thus, compared to other countries, already smaller stakes of index fund and ETF ownership may prevent the bidder from reaching her goal to gain a certain level of ownership and control; as a result the German market for corporate control is particularly exposed to the effect of index funds and ETF not being able or willing to sell their shares. Second, the German takeover market is less developed compared to market-based economies like the UK and the US. Despite some steps towards stronger shareholder rights, hostile takeovers are still an exception.[4] Thus, any further weakening of the German market for corporate control as an "exit"-related governance device by the increase of index fund and ETF ownership might put an even higher weight on the importance of the "voice" channel. Thus the (disputed) effect of ETF ownership on corporate governance via this channel may be especially pronounced in Germany.

We further identify a set of other variables having a significant impact on the fraction of shares tendered as a measure of "completion" of takeover attempts in Germany for the full sample and the sub-sample of control-taking bids: We find the offer premium as well as target management support for the offer to have a positive effect on the percentage of shares gained in the bid.

---

[3] See "Das Drama um Stada: Warum ETF Übernahmen immer schwieriger machen" (Lindner 2017). The other reason for the difficulties of the bidder were hedge funds exploiting the situation caused by the reduced number of available shares, and acquiring shares after the takeover offer. This made it more difficult for the bidder to cross the communicated threshold.

[4] Throughout the entire sample only 17% of control-taking takeover attempts of publicly listed companies are being considered as hostile. Hostility is defined as target management or supervisory board explicitly providing a negative recommendation (Stellungnahme) to their shareholders whether to accept the offer or not.

Finally, we carry out additional analyses as robustness tests. First, in order to address potential endogeneity concerns, we run a two-stage endogenous treatment regression analysis incorporating the exogenous variation in the index membership as an instrument. Second, we run a fractional response regression analysis to allow for a non-linear relationship between our independent variables and the success of a takeover offer. Our main result stays intact: Index fund and ETF ownership significantly reduces the fraction of outstanding shares gained by a bidder during a takeover offer.

Our results have some important implications: Increasing index fund and ETF ownership is weakening the power of the market for corporate control as a device to discipline management and influence corporate policy. As index funds and ETF face significant additional cost when exiting their positions in companies being part of the index, they are less willing or able to tender their shares in a takeover offer. Thus, the hurdle for a bidder to gain control over a target increases with the increasing importance of index funds and ETF as corporate owners. Especially for Germany the effects are particularly strong, as the legal environment places a high hurdle for a bidder to gain full control over the target. We are however convinced that the effect derived in our study is important for other countries and legal systems as well: Though the barriers that need to be crossed by a bidder to fully control a target are lower, e.g., in the United States[5], the ownership stakes of index funds and ETF in US corporations are significantly higher than in Germany. Bebchuk & Hirst (2019b) report the combined ownership stake of the "Big Three" index fund and ETF providers (Black Rock, Vanguard, State Street Global Advisors) in S&P 500 companies in 2017 to be 20.5%. Thus, with index fund and ETF stakes of 25% to 30% in certain US listed companies, even crossing the 50% ownership threshold may become difficult for a bidder, if the funds are not tendering their shares.

Finally, the negative impact on the market for corporate control might be even stronger than our results suggest: We document a negative impact on the fraction of shares gained during an offer that has been made. Yet, another potential effect of increased index fund and ETF ownership on the takeover market is that the propensity of potential bidders to make an offer in the first place will be significantly reduced. Thus, the combined effect on the takeover market may be even more negative than our results suggest.

This paper makes several contributions to existing research: First, it is, to the best of our knowledge, the first study to analyze the effects of index fund and ETF ownership on the

---

[5] Under the Delaware code a 50% ownership allows for squeezing out the remainder of outstanding shareholders.

efficiency of the market for corporate control from the perspective of the target company. Second, our research adds to existing results on the impact of offer-related takeover success factors such as offer premium and management recommendation (Walkling 1985; Flanagan et al. 1998; Bessler & Schneck 2015). Third, we offer further insights on the impact of ownership structure on takeovers, such as the bidder's initial toehold (Jennings & Mazzeo 1993; Bris 2002), target ownership concentration (Köke 1999; Kobayashi 2007), and different target shareholder types (O'Sullivan & Wong 1999; Ferreira & Matos 2008; Achleitner et al. 2013).

The remainder of this paper is structured as following: Section 2 provides an overview of index fund and ETF ownership, as well as corporate governance and the market for corporate control. Section 3 presents data and describes dependent and independent variables. Section 4 provides baseline results and extensions of the baseline model. Section 5 concludes.

2. Index fund and ETF ownership, corporate governance and the market for corporate control

2.1. Index fund and ETF ownership and corporate governance

Research on corporate governance classifies the channels for owners to exert influence on corporations into "exit", i.e., selling the ownership stake or the threat of it, and "voice", i.e., communicating with management and voting on shareholder meetings (Shleifer & Vishny 1997; Broccardo et al. 2020). The majority of research analyzing the impact of index fund and ETF ownership on corporate governance considers "exit" not to be a viable option for these funds to exercise control (Edmans & Holderness 2017; Schmidt & Fahlenbrach 2017; Bebchuk & Hirst 2019a; Heath et al. 2020). By construction and as compared to other mutual funds, index funds and ETF cannot simply exit from their positions as long as the underlying stock is part of a tracked index. As a consequence, they cannot use the exit or the threat of it as a tool to exercise influence on corporate managers. In his 2017 letter to investors Larry Fink, CEO of BlackRock, the largest provider of index funds and ETF globally, stated that "BlackRock cannot express its disapproval by selling a company's securities as long as that company remains in the relevant index. As a result, our responsibility to engage and vote is more important than ever".[6]

The academic discussion of the effects of increasing index fund and ETF ownership on corporate governance has thus consequently been concentrating on the "voice" channel.

---

[6] Letter from Larry Fink, Annual letter to CEOs (BlackRock, Inc. 2018).

Evidence on the impact of increasing index fund and ETF ownership is mixed however: Appel et al. (2016) find a positive association between the ownership stake of passive funds with board independence, a decrease in takeover defense measures and a lower vote for management proposals in shareholder meetings finally resulting in improved firm performance. The majority of studies however find increasing index fund and ETF ownership to weaken the influence of shareholders on corporate decision making: Bebchuk & Hirst (2019a) find that ETF hardly engage in shareholder litigation and legal initiatives, which would strengthen shareholder influence, and generally vote with management (see also Bolton et al. 2020). Heath et al. (2020) compare corporate initiatives of ETF and voting behavior against the actions of active funds and conclude that ETF vote significantly more often with management in contentious topics. Schmidt & Fahlenbrach (2017) also find increasing ETF ownership to strengthen management/CEO influence and power. Appel et al. (2019) however show a positive indirect effect of increasing ETF ownership on corporate governance: Yielding an increased activity of active funds (measured by board representation, proxy fights and settlements) ETF ownership facilitates activists' ability to engage in costly forms of monitoring and thus improves corporate governance. Dobmeier et al. (2020) find a similar symbiotic relationship between index fund and ETF ownership and hedge funds in German corporate endgames, documenting that passivity of index funds and ETF stimulates hedge fund activities.

There are some good reasons for research to ignore the "exit" channel when analyzing the impact of index funds and ETF on corporate governance: For stock exchange-related indices, the composition of the index tracked is outside the fund's discretion.[7] The performance of index funds is judged by its ability to track the index as close as possible and to minimize the respective tracking error. Thus, selling a position of a stock being part of a tracked index exposes the fund to a significant risk of increasing tracking error. While some funds use synthetic replication strategies, and rely on derivatives (e.g., swaps, forwards, futures) instead of physically holding securities in the index, the majority of index funds and ETF stick to physical replication. The latter group of funds might indeed be able to sell their securities and replace them by a synthetic position. However, this would incur additional costs, in particular

---

[7] E.g., the composition of the S&P 500 is defined and reviewed by the New York Stock Exchange and NASDAQ. In contrast "thematic funds" are composed at the fund provider´s discretion. They invest into a portfolio of securities, that engage in emerging topics (detached from geographic, or sectoral definitions, e.g., artificial intelligence). However, once set up by the fund provider the composition of the thematic fund cannot easily be changed, as similar tracking and composition rules apply as for funds tracking stock exchange indices. Besides, the overall volume of thematic funds is relatively low, as they currently account for USD 58.6 bn, representing approx. 0.95% of the global ETF AuM (Global X Management Company LLC 2020).

over a longer time horizon, expose the fund to counterparty risk and, again, increase the risk of lower tracking quality. Besides, a long-term shift in the general tracking policy of the fund is required to be reported to investors.[8]

While exiting positions by selling them in the market thus is prohibitively expensive for funds physically owning underlying securities, tendering them (or selling them to another market participant) during a takeover offer may enable funds to avoid some of the risks and costs associated with a regular market exit:

- Exiting a position during a takeover offer by tendering it to the bidder allows the exit without having to consider potential negative side effects on the stock price (and thus sales proceeds) caused by additional supply of the shares.

- If the bidder aims to achieve full control over the target, e.g., in a public to private transaction, a successful bid is likely to be accompanied with a later removal of the stock from the index, as it does no longer meet the requirements of the index membership. As the index membership is expected to end soon, requiring the fund to sell its stake anyways (to adhere to the index composition), selling it during the offer acceptance period and closing the position temporarily may not yield a significant increase of tracking error.

- Finally, selling the stake during the offer acceptance period allows the fund to pocket in a premium on the stock price and amplify fund returns.

As the potential barrier of exiting a position during a takeover offer is lower than for a market exit, we also examine the propensity of index funds to exit their position during the acceptance period (Sect. 4.1).

Index funds and ETF could also influence takeover situations indirectly due to their engagement in securities lending. Funds regularly generate additional income by lending securities to other market participants, e.g., short sellers, and transferring associated ownership rights (including voting rights) to the borrower. Yet, security loans are required to be made on

---

[8] Based on the Guidelines for competent authorities and UCITS (Undertakings for Collective Investments in Transferable Securities) management companies (guidelines on ETFs and other UCITS issues), published by the European Securities and Markets Authority in 2014, UCITS regulated index fund and ETF providers are required to publish a prospectus for an index-tracking fund that (amongst others) provides investors with information on the used tracking mechanism and implications for investors with regards to index exposure and counterparty risk, as well as information on anticipated tracking error (sec. 9).

a flexible basis[9] and can be re-called by the lender at any point in time. Calling the shares enables the fund to fully engage in any right attached to the ownership, including the decision to tender, if it wishes to do so. Fund providers carefully weigh the decision to recall their shares at any important shareholder decision to pursue their investment stewardship function.[10] If they call back the shares, then there is no effect on our analysis. Our provider of ownership data (Refinitiv) records beneficial ownership of investors and assigns securities on loan to the lender and the German Bundesbank also requires that securities on loan have to be assigned to the lender. While the impact of securities lending of index funds and ETF on Refinitiv ownership data is difficult to detect, we believe its impact on takeover situations to be marginal: Conversations with fund managers suggest that most funds call back their shares if there is a takeover offer for one of their stocks. Additionally securities lending is more complex and less attractive for European funds than for US funds,[11] resulting in lower lending activities.[12]

The term "market for corporate control" coins the possibility of sub optimally managed companies becoming a target of a takeover attempt. The bidder aims to get control over the company, potentially replace incumbent management and reap the benefits from improving the performance of the company (Scharfstein 1988; Walsh & Kosnik 1993; Denis & Kruse 2000; Franks et al. 2001). Thus, a vivid takeover market with investors and managers systematically looking for undermanaged assets may serve as a tool to discipline management by imposing a takeover threat in case of low performance. In general, the role of index funds and ETF in the market for corporate control has only seen limited attention. There are only a few studies analyzing the impact of increased index fund and ETF ownership:

- With respect to the bidder, Schmidt & Fahlenbrach (2017) provide evidence for a negative effect on bidder´s takeover performance: An exogenous increase in ETF ownership yields a significant decline of M&A bidder announcement returns. The

---

[9] Based on Guidelines for competent authorities and UCITS management companies by European Securities and Markets Authorities, sec. 30. Besides, index funds and ETF only lend out a small fraction of owned securities. By June 30, 2020, assets in the amount of USD 24 tn were available for loans globally, while USD 1.96 tn were, in fact, on loan (BlackRock, Inc. 2020).

[10] BlackRock notes that it constantly monitors shares on loan via a dedicated Investment Stewardship team and formally analyzes whether or not to recall shares to exercise voting rights (BlackRock, Inc. 2020).

[11] Due to stricter UCITS-based regulation, requiring stricter collateral diversification and concentration limits.

[12] Shares not called back by the fund might have an impact on the outcome of the takeover offer, in particular investors borrow shares and speculate on an improved offer by the bidder. However, this does not have an impact on the results of our analysis: Based on Refinitiv rules, ownership data would still be allocated to an index fund or ETF if it lends securities. Yet, we measure the ownership stake of index funds and ETF before offer announcement and it is therefore exogenous of securities lending activities of borrowers, speculating on offer improvements.

authors conclude that costly monitoring, e.g., by analyzing proposed M&A transactions and potentially intervening, is not well performed by passive index funds.

- The impact of increasing ETF ownership in target corporations on the outcome of takeover offers has, to the best of our knowledge not yet been analyzed. While Appel et al. (2019) provide evidence that the probability of the firm becoming acquired by a third party is positively associated with increasing ETF ownership, they do not analyze the impact of ETF ownership of a given targeted company on the outcome of a takeover offer. Fich et al. (2015) study the effect of the target's ownership structure on the outcome of takeover bids. They find that ownership by "monitoring" shareholders (i.e., shareholders where the investment in the target constitutes a significant fraction of the investors' portfolio and who are thus incentivized to monitor) is related to higher target deal performance via an increased probability of deal completion and a higher final premium received. However their analysis is not related to passive index funds and ETF as target shareholders. Our study is the first to analyze the role of index funds and ETF as target shareholders in mergers and acquisitions.

2.2. Corporate governance in Germany and index fund and ETF ownership

Historically being described as a bank-based economy, Germany has long served as a role model for an "insider-based" corporate governance system with powerful banks (Franks & Mayer 2001; Hopt 2015): A high degree of ownership concentration coupled with significant ownership stakes of banks and insurance companies have insulated German stock-listed companies from the threat of hostile takeover offers until the early 2000's (Bessler et al. 2015b). Since then, several factors have moved the German governance regime closer to a market-based economy like the US and UK: Power and influence of German banks have been reduced significantly. After being exempted from taxation of realized capital gains in 2001, German banks and insurance companies started to sell their holdings in industry companies and the web of cross-holdings labelled as "Deutschland AG" started to dissolve. In the same period, international investors entered the German market replacing banks as shareholders. Even after the decline of banks as corporate shareholders Germany is still characterized by a high degree of ownership concentration and an important role of families or individuals as corporate owners (Franks & Mayer 2001; Edwards & Weichenrieder 2004; La Porta et al. 2008).

German corporate law and corporate governance offers a special environment for analyzing the growing importance of index funds and ETF. First, Germany's legal system is categorized

as a civil law system generally offering a lower level of shareholder protection and fostering a higher shareholder concentration (La Porta et al. 1999; Franks & Mayer 2001). In contrast to index funds and ETF, family blockholders are oftentimes able to extract private benefits and therefore have a strong incentive to engage in costly monitoring measures and improve corporate governance. Thus, the rise of index funds and ETF as another type of blockholders with lower incentives for costly monitoring may give rise to cooperation between the two different blockholders. Another important difference to other legal corporate frameworks is the German two tier board system with co-determination, granting labor unions 50% of the votes in the supervisory board (Franks & Mayer 2001; Hopt 2015).

For our study the most important feature of the German corporate governance system is the strong position of the management board combined with a high level of protection of minority shareholders and, as a consequence, the high hurdles for a bidder to gain full control over a target during a takeover offer. The German Stock corporation act (AktG) gives the management board (Vorstand) a high degree of autonomy and independence from its shareholders. Being selected by the supervisory board, it cannot be replaced by a simple shareholder vote. Additionally, even with a majority of votes a shareholder cannot directly influence corporate policy, e.g., by giving orders to the management board. Directly controlling and influencing management boards requires the signing of a domination and profit and loss transfer agreement (DPLA) between the corporation and its majority shareholder. The signing of a DPLA has to be approved by a 75% vote in a shareholder meeting (§ 293 AktG). Bidders in German takeovers aiming for control over a target thus often make offers conditional on a minimum acceptance rate, which is believed to be sufficiently high for such a vote.[13] DPLAs create a "contractual group" allowing the major shareholder to fully integrate the business of the "dominated" corporation. After signing a DPLA, the remaining minority shareholders have two options:

- Leave the company and sell their shares to the majority shareholder. The majority shareholder is required to make an offer to minority shareholders to purchase their shares and offer an appropriate compensation (§305 AktG). The minority then also has the right to file a court procedure to verify the compensation.

---

[13] For brevity, further statistics on conditional offers are reported in Appendix Table A.2.

- Stay in the company and receive a guaranteed dividend payment. Shareholders not accepting the offer may still remain invested in the company; they are entitled to receive a constant and guaranteed annual dividend payment from the company (§304 AktG).[14]

It is important to note here that even after exceeding the 75% vote threshold and signing a DPLA, majority owners are not able to squeeze out minority shareholders. Under German corporate law a minority squeeze out requires a 90% or 95% ownership stake in the company, depending on the legal type of squeeze out (§ 62 sec. 5 UmwG or § 327a AktG, respectively).[15]

The high hurdles for a bidder to gain full control makes Germany a well suited candidate for an analysis of the impact of index fund and ETF ownership on the outcome of a takeover offer. Given the high "stickiness" of shares owned by them, even low ownership stakes of index funds and ETF may have a substantial impact on the outcome of a takeover bid. The potential reduction of the number of available shares imposes a tighter constraint in Germany than in jurisdictions where a simple majority is sufficient to exercise direct influence on the target corporation.

For our study the German regulations have an important technical consequence: As a simple majority of votes does not allow majority shareholders to directly control corporate policy, and even signing a DPLA does not yet give majority shareholders the option to squeeze out the minority, defining a "successful" takeover offer as one having reached the majority of votes is not appropriate. Thus for this study we measure takeover "success" via the percentage of outstanding shares, not owned by the bidder, gained during the offer acceptance period:

$$Percentage\ of\ shares\ gained\ by\ the\ bidder$$
$$= \frac{\#\ of\ shares\ tendered\ during\ acceptance\ period}{\#\ of\ shares\ not\ under\ bidder's\ control\ at\ the\ offer}$$

This measure has several benefits. First, it does not rely on a particular threshold that may yield difficulties when discussing and interpreting the findings: defining "success" as crossing a 50% threshold giving the bidder majority of votes in shareholder meeting, a 75% stake allowing to sign a DPLA, and finally a 90% to 95% stake giving the opportunity to squeeze out minority shareholders yields significantly different results. Second, as it relates to the number of outstanding shares not yet under the bidder's control, it is restricted to the range between 0%

---

[14] The level of the guaranteed dividend is also subject to the verification by a court.

[15] This represents the predominant reason for the large number of takeover offers being made with the bidder already owning a stake of more than 75% of the company's shares. See Section 3.1 for further details.

and 100% and independent from the toehold of the acquirer when making the bid.[16] Finally, this measure is a continuous variable allowing our analysis to be performed with standard regression analysis and providing easily interpretable results.[17]

Note that our continuous variable does not necessarily relate to the bidder's perception of the success of his offer. Our sample contains in total 14 (conditional) offers with positive "success rates" that have finally been withdrawn by the bidder.

3.   Data selection and empirical design

3.1.   Data selection

The primary goal of this analysis is to examine bidders' success during takeover attempts and investigate the ability of bidders to secure outstanding shares during a takeover attempt and its determinants. For this, we use a data set of takeover attempts of publicly listed companies in Germany for the time span between 2006 and 2018 to construct our sample.

First, we extract all takeover attempts of publicly listed companies registered on the website of the BaFin. This limits our available time frame to the period after 1 January 2006, as no earlier complete takeover data is available.[18] In a first step, we identify 386 takeover attempts on 303 distinct target companies. To obtain takeover-related information (in particular, dates of the offer acceptance period, compensation offered during the offer, minimum acceptance rate, initial bidder toehold), we hand-collect deal-specific data from official takeover offer documents published on the BaFin website at registration of a takeover attempt. As the offer document also contains information about irrevocable undertakings and pre-negotiated transactions, we use this information to calculate the adjusted ownership stake of the bidder (toehold) at the beginning and end of the takeover offer acceptance period. Second, we match the original takeover attempt with official statements of the board of directors and supervisory board, available fairness opinions, and information related to the offer-outcome (e.g., exceedance of the minimum acceptance threshold, launch of a renewed offer) published on the

---

[16] Measuring the bid's success by the fraction of shares gained related to all shares outstanding, this figure would be distorted by the toehold of the bidder when making the takeover bid. An increase of ownership by 5% of all shares is a different "success" when starting from a toehold of 5% than starting from a toehold of 90%.

[17] Studies for US takeovers are measuring takeover success by an indicator variable set equal to one if the bidder gains the simple majority of shares. The analysis then rests on a probit/logit regression (Duggal & Millar 1994; Flanagan et al. 1998).

[18] Identification of takeover attempts has been stopped with takeovers that have been launched after 31 December 2018.

official federal publication website (Bundesanzeiger). In a next step, we complement takeover offer data with ownership information on target companies, using the Refinitiv Ownership and Profiles database (previously Thomson Reuters Eikon). This is the most complete database for equity insight into the ownership structure of German public companies, commonly used by academic researchers in both asset management and corporate governance fields (Aguilera et al. 2017; Benz et al. 2020). Ownership data is sourced from stock exchanges, regulatory bodies, institutions and various financial reports. To examine the tendering behavior of shareholders and obtain the shares secured by the bidder during the offer attempt, we gather ownership data for the end of month closest before official registration of a takeover attempt, as well as after the end of the offer acceptance period. Shareholder types are identified based on the investment (sub-) styles of a respective shareholder. In particular, we classify all shareholders with the investment style "Index" as relevant index funds/ETFs for our analysis.[19] We exclude companies with unavailable ownership and accounting data from our analysis and our final sample includes 323 takeover attempts and 293 distinct target companies. Table 1 provides an overview of the takeover distribution over time for the full sample. We split the sample into four different toehold clusters according to the bidders' initial toehold at the offer announcement date.[20] The first cluster contains offers made from a toehold below 30%; it represents the threshold that the German takeover code assumes as having control over the corporation (§ 29 sec. 2 WpÜG). The cluster between 30% and 50% captures bidders having crossed the control taking threshold according to WpÜG but have not yet secured majority in voting rights. As direct control of shareholders under German corporate law requires signing a DPLA with a 75% vote the third section covers toeholds between 50% and 75% ownership. Finally, the last cluster contains offers with a toehold above 75% and captures bidders likely positioning themselves for a squeeze out.

---

[19] Note that Refinitiv defines index funds as investors that create portfolios to match the composition of one or more of the broad-based indices, and make investment decisions solely by the makeup of the tracked index. Refinitiv classifies these investors based on their portfolio characteristics and based on its knowledge of their historical investment behavior.

[20] These figures do not contain the adjustment by irrevocable undertakings or pre-negotiated stakes and only include the initial toehold of the bidder. For regression analyses, irrevocable undertakings and pre-negotiated stakes are added to the initial toehold.

Table 1: Sample Distribution

| | Takeover attempts | | | | | |
| | Toehold below 30% | Toehold between 30% - 50% | Toehold between 50% - 75% | Toehold above 75% | | |
Year					Total	%
2006	11	3	10	10	34	10.5
2007	17	6	8	14	45	13.9
2008	11	9	8	8	36	11.1
2009	6	4	3	5	18	5.6
2010	8	4	3	5	20	6.2
2011	13	4	5	6	28	8.7
2012	14	3	4	6	27	8.4
2013	8	5	3	5	21	6.5
2014	10	2	5	7	24	7.4
2015	7	3	4	2	16	5.0
2016	11	4	5	3	23	7.1
2017	13	3	2	2	20	6.2
2018	5	1	2	3	11	3.4
Total	134	51	62	76	323	100.0

Panel B: Distribution by target industry

| | Takeover attempts | | | | | |
| | Toehold below 30% | Toehold between 30% - 50% | Toehold between 50% - 75% | Toehold above 75% | | |
Industry					Total	%
Basic Materials	1	0	0	0	1	0.3
Chemicals	1	0	3	4	8	2.5
Consumer Goods	16	4	8	18	46	14.2
Consumer Services	11	9	8	9	37	11.5
Financials	31	7	9	27	74	22.9
Health Care	11	9	3	1	24	7.4
Industrials	28	12	14	8	62	19.2
Oil & Gas	5	1	1	2	9	2.8
Technology	26	8	16	6	56	17.3
Telecommunications	0	1	0	0	1	0.3
Utilities	4	0	0	1	5	1.5
Others	0	0	0	0	0	0.0
Total	134	51	62	76	323	100.0

This table reports sample distributions. Panel A reports the sample distribution by year of the offer announcement, separated into four toehold clusters based on the bidder's initial toehold by the time of the offer announcement. Panel B reports the sample distribution by industry of target companies, classified according to Refinitiv industry classification and Cleary Gottlieb Steen & Hamilton LLP (2017), separated into four toehold clusters based on the bidder's initial toehold by the time of the offer announcement.

Panel A reports takeover attempts by the year of offer announcement differentiated into the four toehold clusters. The majority of offers took place in the toehold cluster below 30% (41.5%). Compared to other countries an unusually high number of takeover offers is made by

a shareholder already having a majority position (42.7%). Especially the toehold cluster with a toehold above 75% ownership shows the second highest number of takeover offers (23.5%) of the four clusters; despite already having full control over the target company and potentially already having signed a DPLA, the majority owner still launches an offer to minority shareholders to take over their shares.[21] Again, the reason for this unusual constellation is the high threshold for a squeeze out of the minority shareholders even after a DPLA has been signed: a squeeze out of the remaining minority requires a stake of 90% or 95%, respectively. Thus, under German corporate law takeover offers are also an important part of strategies in "endgames" of gaining corporate control. In our subsequent analysis we will especially focus on the cluster below 30% toehold: As the bidder does not yet have but aims to obtain control over the target, this situation relates closest to the "market for corporate control".

Panel B presents takeover attempts across target industry. While the sample covers all industries, it is most noteworthy that Financial Services has had the highest takeover activity with 22.9% of takeovers. The high number of takeover attempts could be explained by industry consolidation after the Financial Crisis (Rao-Nicholson & Salaber 2015). Finally, takeover attempts in Technology and Industrials are on a high level with a combined share of 36.5%, which is in line with documented high takeover activity levels in these two industries within existing literature (Schoenberg & Reeves 1999; Campa & Moschieri 2009).

3.2. Variables and descriptive statistics

We consider two groups of independent variables that should serve as determining factors for bidders' ability to secure outstanding shares from remaining shareholders during takeover attempts: *target company ownership structure* and *takeover-related variables*. In the following, we provide a brief overview of the considered variables and the rationale for selection of these variables.[22] Summary statistics of the analyzed takeover attempts are reported in Table 2.

Dependent variable. The percentage of shares gained by the bidder is 0.346 in the full sample and is 0.432 in the sub-sample of takeover attempts with a toehold below 30%, indicating that bidders are more successful in obtaining shares in control-taking bids.

Target company ownership structure. The composition of the ownership structure of target companies should significantly determine bidders' ability to secure shares during a takeover,

---

[21] E.g., Skion GmbH launched a takeover offer to the minority shareholders of Altana AG while already owning a 91.7% stake in the target company.

[22] Detailed variable definitions are reported in Appendix Table A.3.

as different shareholder types should impact this ability, based on varying levels and directions of engagement in takeover processes. We therefore consider the relative ownership stakes of several investor types.[23] As our main hypothesis is the negative impact of index fund/ETF ownership on the percentage of shares gained by the bidder, the relative ownership *stake of index funds and ETF* serves as main independent variable. Index fund and ETF ownership in the sample is on average 0.9 percentage points in the full sample, and 1.5 percentage points in the sub-sample of control-taking bids and thus relatively low. Yet, even low, unavailable ownership stake could potentially prevent bidders from exceeding desired ownership thresholds. The *stake of individual shareholders* (single individuals or families) is considered, as existing literature points to a decreased willingness to tender shares in a takeover attempt (Flanagan et al. 1998). Individual shareholders favor the private benefits associated with ownership and control (Achleitner et al. 2013) and are likely to support target management during hostile takeover attempts (O'Sullivan & Wong 1999). *Strategic shareholders* should negatively influence shares obtained during takeovers, as tendering and investment decisions are closely linked to a strategic assessment of the investment itself, likely irrespective of the offer being financially attractive. In contrast, the impact of *foreign shareholders* in takeover situations is less clear-cut. On the one hand, they are associated with higher monitoring activities in target companies, which should positively affect firm value and decrease tendering likelihood (Ferreira & Matos 2008). On the other hand, foreign shareholders negatively impact firm performance, exposing companies to takeover attempts of outsiders (Al-Thuneibat 2018). We further consider *institutional shareholders,* as institutional ownership reduces the probability of successful defense mechanisms during bids (Sudarsanam 1995). Eakins (1993) highlights an increased propensity of institutional shareholders tendering shares in takeovers. Hamdani and Yafeh (2012) however note that institutional owners usually use their voting rights in favor of incumbent management, indicating a negative impact on takeover success. We also take into account the impact of blockholders and use the *Herfindahl-Hirschman ownership index* to measure relative ownership concentration.[24] Literature shows that concentrated ownership should reduce agency problems as large shareholders exert effective

---

[23] Investors are classified according to Refinitiv investor classification. We rely on this classification, to ensure consistency with obtained ownership data.

[24] We use relative ownership concentration, measured by the Herfindahl-Hirschman ownership index, instead of the number of blockholders. As size and number of invested shareholders of takeover target companies in the sample vary significantly, use of the relative ownership concentration enables improved comparability in the sample.

monitoring activities to ensure that management acts in shareholders' best interest (Shleifer & Vishny 1986; Sudarsanam 1995; Demsetz & Villalonga 2001). As blockholders reap non-pecuniary benefits out of their investment, they may be less willing to accept an offer than for dispersed shareholders, resulting in higher takeover costs (Kobayashi 2007). Thus, the percentage of shares gained should be negatively related to shareholder concentration. Finally, we include the *bidder's toehold* before offer announcement, as toeholds are shown to increase takeover success by improving bidders' negotiation position and reducing uncertainty about takeover outcome (Walkling 1985; Jennings & Mazzeo 1993; Betton & Eckbo 2000; Jenkinson & Ljungqvist 2001; Bris 2002). Toeholds reduce the number of targeted shares during takeovers and mitigate the problem of other shareholders free-riding on target value appreciation (Grossman & Hart 1980; Shleifer & Vishny 1986; Stulz 1988; Singh 1998). Yet, toeholds are associated with certain costs, resulting in bidders preferably launching bids without a toehold (Betton et al. 2009): Takeover failure is shown to reduce the value of toehold shares (Strickland et al. 2010). In addition, costs from legal obligations occur with toehold acquisition in Germany. Investors have to notify the company and BaFin when exceeding an ownership threshold of 3.0% (§21 WpÜG). They are also required to make a mandatory and unconditional takeover bid for all remaining outstanding shares if they have crossed the threshold of 30% ownership (§35 sec. 1, and §29 sec. 2 WpÜG).

Takeover-related variables. Several variables linked to the takeover bid are considered, as they might directly influence the tendering behavior of existing shareholders. *Offer premium*, measured in excess of the average target stock price in the period until three months prior to the offer[25] is considered as existing literature highlights the positive relationship between premium and successful takeovers (Walkling 1985; Giammarino & Heinkel 1986; Fishman 1988; Hirshleifer & Png 1989; Hirshleifer & Titman 1990; Sudarsanam 1995; Bessler & Schneck 2015; Bessler et al. 2015b). *Target management recommendation* is included in the analyses, as German takeover regulation requires management of a takeover target company to publish a statement about the adequacy of a takeover offer (§27 WpÜG) and provide a recommendation for shareholders to accept or reject the offer. The recommendation allows management to

---

[25] There is a variety of approaches to measure the offer premium: The proposals range from the excess of the offer price over the 42-trading day average stock price (Schwert 1996; Bates & Becher 2017), to the excess over the 60-trading day average stock price (Betton & Eckbo 2000), to the excess over the 20-trading day average stock price (Cao et al. 2016). As we examine takeover attempts governed by German takeover legislation, we define offer premium in line with §5 sec. 1 German Securities Acquisition and Takeover Act Offer Ordinance (WpÜGAV), which specifies the average stock price of the target company three months prior to takeover offer announcement as minimum offer price.

express its opinion on the offer and is an integral part of German takeover law settings potentially influencing the tendering behavior of shareholders and thus the percentage of shares gained by a bidder.[26] Existing literature also highlights the importance of *negotiated share transfers* as corporate control tool (Barclay & Holderness 1991) and its positive influence on takeover success (Wright et al. 2007). Bidders frequently approach important target shareholders prior to launching an offer to close an agreement on the transfer of shares and voting rights, or acceptance of the bid. Thus, we consider *negotiated transfers of shareholder stakes* (pre-negotiated stakes) *and irrevocable undertakings.*[27] *Offer competition*, proxied by an indicator variable if a competing bid exists, increases takeover uncertainty and decreases the success of a bid. Bidders might then be urged to launch a higher bid and potentially overpay for takeover targets which benefits other shareholders (Walkling & Edmister 1985; Varaiya & Ferris 1987; Khanna 1997). *Method of payment* may also affect takeovers and Branch and Yang (2003) document an increased likelihood of takeover completion for cash offers, as they do not carry any risk for target shareholders but reveal more information about the true value of the target (Hansen 1987; Sudarsanam 1995; Chang & Suk 1998). German takeover law allows some particular changes/improvements of takeover offer conditions, e.g., increasing the premium offered (§ 21 WpÜG), resulting in launch of a renewed takeover offer and *multiple bidding rounds*. For our analysis, we aggregate all bidding rounds into one and include an indicator variable for multiple bidding rounds.[28] We also control for different *offer types* as the German takeover law differentiates between voluntary and mandatory takeover offers. *Bidder characteristics* are also considered and bidders are distinguished between financial and strategic bidders, as they differ with respect to the objectives and properties of a takeover bid (Fidrmuc et al. 2012; Gorbenko & Malenko 2014; Caiazza & Volpe 2015). *Macroeconomic crises* also have a significant impact on takeover activity: During the Financial Crisis global volume of

---

[26] The statement of the management board usually includes a joint statement with the supervisory board. In our sample, 89.4% of statements were joint statements of management and supervisory board. As labor unions are granted 50% of votes in supervisory boards based on the Co-Determination Act of 1976 in Germany, we assume that the (joint) statement of the supervisory board reflects employees' perspective on the takeover offer.

[27] Irrevocable undertakings and pre-negotiated stakes are closely related to initial bidder toeholds. Shareholders having signed such a contract are required to tender their shares at given conditions. We adjust our dependent variable from above to reflect the fact that these shares are already under control of the bidder: We increase the bidder's toehold by adding the shares of the pre-negotiated stakes and reduce the number of outstanding shares not yet under bidder's control by subtracting the pre-negotiated stakes.

[28] Our sample contains eight cases (sub-sample of bidders with a toehold below 30%: six cases) with three bidding rounds (two changes of conditions) and 45 cases (sub-sample below 30%: 29) with two bidding rounds (one change of conditions).

M&A transactions has declined from USD 4,920 bn in 2007 to USD 2,187 bn in 2009 (Institute for Mergers, Acquisitions and Alliances 2020). In our analysis, we incorporate an indicator variable for past crisis periods (Financial Crisis 2008 and 2009 and the European Crisis 2012. Finally, we incorporate *target firm size*, proxied by the natural logarithm of market capitalization.[29] The impact of target size on takeovers is, however, ambiguous. On the one hand, takeover attempts on large targets involve dealing with a diverse shareholder base, potentially making takeovers more complex. Yet, this also reduces the dependency on one specific, or several blockholders, as shares could be obtained from a larger shareholder group.

Table 2: Summary statistics

Panel A: Full sample						
	N	Mean	S.D.	Q1	Median	Q3
Dependent variable						
Percentage shares gained	323	0.346	0.309	0.062	0.257	0.623
Explanatory variables						
Target company ownership structure						
Stake index funds	323	0.009	0.027	0.000	0.000	0.000
Stake individual shareholder	323	0.064	0.160	0.000	0.000	0.044
Stake strategic shareholder	323	0.170	0.298	0.000	0.003	0.262
Stake foreign shareholder	323	0.195	0.253	0.001	0.083	0.323
Stake institutional shareholder	323	0.200	0.222	0.009	0.124	0.327
Herfindahl-Hirschman ownership index	323	0.127	0.271	0.001	0.022	0.111
Toehold	323	0.422	0.324	0.087	0.393	0.716
Takeover variables						
Offer premium	323	0.188	0.247	0.002	0.108	0.293
Management recommendation	323	0.579	0.494	0.000	1.000	1.000
Competing offer	323	0.034	0.182	0.000	0.000	0.000
Method of payment	323	0.941	0.236	1.000	1.000	1.000
Multiple round	323	0.142	0.350	0.000	0.000	0.000
Mandatory offer	323	0.303	0.460	0.000	0.000	1.000
Minimum acceptance rate	323	0.220	0.415	0.000	0.000	0.000
Financial bidder	323	0.467	0.500	0.000	0.000	1.000
Strategic bidder	323	0.446	0.498	0.000	0.000	1.000
Foreign bidder	323	0.437	0.497	0.000	0.000	1.000
Bidder largest shareholder	323	0.678	0.468	0.000	1.000	1.000
Crisis	323	0.251	0.434	0.000	0.000	1.000
Size	323	4.811	2.175	3.461	4.647	6.067

---

[29] The definition of firm size is in line with other corporate governance- and ownership-related research papers in Germany (Bessler et al. 2008; Mietzner & Schweizer 2014; Bessler et al. 2015a).

Panel B: Toehold below 30%

	N	Mean	S.D.	Q1	Median	Q3
Dependent variable						
Percentage shares gained	134	0.432	0.344	0.069	0.391	0.795
Explanatory variables						
Target company ownership structure						
Stake index funds	134	0.015	0.032	0.000	0.000	0.014
Stake individual shareholder	134	0.076	0.140	0.000	0.000	0.113
Stake strategic shareholder	134	0.222	0.358	0.000	0.095	0.355
Stake foreign shareholder	134	0.253	0.244	0.037	0.196	0.418
Stake institutional shareholder	134	0.247	0.217	0.064	0.206	0.391
Herfindahl-Hirschman ownership index	134	0.175	0.258	0.019	0.064	0.179
Toehold	134	0.098	0.117	0.000	0.034	0.200
Takeover variables						
Offer premium	134	0.238	0.250	0.052	0.172	0.353
Management recommendation	134	0.642	0.481	0.000	1.000	1.000
Competing offer	134	0.060	0.238	0.000	0.000	0.000
Method of payment	134	0.873	0.334	1.000	1.000	1.000
Multiple round	134	0.254	0.437	0.000	0.000	1.000
Mandatory offer	134	0.022	0.148	0.000	0.000	0.000
Minimum acceptance rate	134	0.440	0.498	0.000	0.000	1.000
Financial investor	134	0.433	0.497	0.000	0.000	1.000
Strategic investor	134	0.485	0.502	0.000	0.000	1.000
Foreign bidder	134	0.448	0.499	0.000	0.000	1.000
Bidder largest shareholder	134	0.239	0.428	0.000	0.000	0.000
Crisis	134	0.231	0.423	0.000	0.000	0.000
Size	134	5.564	2.061	4.031	5.377	6.988

This table reports summary statistics for dependent, independent and control variables used in the analyses of determinants of success of takeover attempts of publicly listed companies in Germany between 2006 and 2018. Panel A reports summary statistics for the full sample, Panel B reports summary statistics for the sub-sample of bidders with a toehold below 30%.

3.3. Methodology

To examine the relation between index funds and ETF in the shareholder structure of a target company on the shares gained by a bidder during a takeover attempt, we use an Ordinary Least Squares (OLS) regression approach and construct a model with the following specification:

$$
\begin{aligned}
Percentage\ Shares\ Gained_{ij} \\
= \beta_0 + \beta_1 \times Stake\ Index\ Funds_{ij} \\
+ \beta_2 \times Shareholder\ Ownership\ Stakes_{ij} + \beta_3 \\
\times Herfindahl - Hirschman\ Ownership\ Index_{ij} \\
+ \beta_4 \times Takeover\ Variables_{ij} + \lambda \times Controls_{ij} + \nu_j + \varepsilon_{ij}
\end{aligned}
$$

where i denotes target firms, j denotes target industries, ν_j represents industry fixed effects and ε_{ij} is an error term. *Percentage Shares Gained$_{ij}$* is the dependent variable, indicating the percentage of shares secured by the bidder after the end of the takeover offer acceptance period.

Stake Index Funds$_{ij}$ is the relative proportion of index funds and ETF in targets' ownership structure. The resulting β_1 estimate captures its impact on the percentage of shares gained during the takeover. The vector *Shareholder Ownership Stakes$_{ij}$* contains the accumulated relative ownership stakes of individual, strategic, foreign and institutional investors[30], as well as the bidder's initial toehold. *Takeover Variables$_{ij}$* includes offer premium and management recommendation. *Controls$_{ij}$* is a vector of takeover-related control variables that includes takeover bid-related characteristics (competing offer, method of payment, multiple bidding rounds, mandatory offer, minimum acceptance rate, bid during crisis times, size), bidder-related characteristics (financial bidder, strategic bidder, foreign bidder, largest shareholder). Standard errors are clustered by offer announcement year to account for potential time-series dependence (Ferreira & Matos 2008; Petersen 2009).

4. Results

4.1. Tendering behavior of index funds

Whereas some index funds and ETF track indices without physically owning all stocks constituting an index, the funds physically replicating the index, might be able to sell their owned securities and potentially replace their ownership positions synthetically, e.g., by a using a derivatives portfolio. Thus, we investigate index funds' and ETFs' actual divestment behavior during German takeover offers to obtain further insights. We do this by analyzing the change in index fund and ETF ownership over the course of the acceptance period after a takeover offer has been published for all 82 final round offers with index fund and ETF ownership in the target company. Table 3 reports the divestment behavior of index funds and ETF and shows the average number and ownership stake of these funds at the beginning and end of the acceptance period of a takeover offer on the company level (Panel A) and individual fund level (Panel B).

---

[30] Stake of institutional investors comprises relative holdings of all other institutional investors excluding index funds and ETF.

Table 3: Divestment behavior of index funds and ETF

Panel A: Takeover target companies						
	N	Mean	S.D.	Q1	Median	Q3
Number of invested index funds and ETFs						
Before takeover offer acceptance period	82	11.451	10.182	2.000	8.500	20.000
After takeover offer acceptance period	82	9.878	9.506	2.000	6.500	17.000
Total number of divested funds	82	1.573	2.362	0.000	1.000	3.000
Ownership stake of index funds and ETFs						
Before takeover offer acceptance period	82	0.022	0.031	0.002	0.012	0.028
After takeover offer acceptance period	82	0.017	0.026	0.001	0.007	0.019
Total divested ownership stake	82	0.006	0.012	0.000	0.001	0.006
Panel B: Individual index funds and ETFs						
Ownership stake						
Before takeover offer acceptance period	949	0.002	0.006	0.000	0.000	0.001
After takeover offer acceptance period	820	0.002	0.006	0.000	0.000	0.001

This table reports divestment statistics of index funds and ETF during takeover attempts of publicly listed companies in Germany. Throughout the entire sample, index funds and ETF have been invested in 82 target companies by the time of offer announcement of a bidding company. Monthly ownership data is used and obtained from Refinitiv. Only final bidding rounds are considered. Panel A reports the divestment behavior aggregated on target companies. Panel B reports the divestment behavior of individual index funds and ETF.

As reported in Panel A, the average number of index funds and ETF and the average stake of equity ownership decrease substantially during the acceptance period. The average number of index funds and ETF invested decreases by 1.57 (13.7%) from 11.45 to 9.88 and the average equity stake decreases by 0.5 percentage points (24.8%) from 2.22% to 1.67%.[31] On the index fund and ETF level, we document 949 funds that were invested before offer announcement and 820 invested after offer announcement, and the stake of the individual index fund or ETF decreases from 0.20% to 0.17%. Thus, a significant part of index funds and ETF as owners reduced their positions during the offer period, or even closed all positions. There are two potential explanations for these results: First, in some cases, the target loses index membership during the course of the offer period due to increasing acceptance rates and thus the fund is required to divest its stake. This is the case, if index membership is conditional on a certain free float and the index is frequently monitoring this condition and adjusting the index.[32] The DAX indices are adjusted after the initial or latest after the additional acceptance period: As soon as the free float of the company falls below ten percent, the company is removed from the index.

---

[31] Note that our data mark an index fund still being invested and part of the target's ownership structure at the beginning of the acceptance period if it decides to sign an irrevocable commitment. We only adjust the toehold and our success measure for irrevocable undertakings.

[32] E.g., during the course of the takeover offer of KKR for Axel Springer SE, the free float of the target company fell below the threshold of 5% resulting in removal of the target company from the German MDAX index (Handelsblatt 2019; Deutsche Börse Group 2019).

Secondly, the legal protection of minority shareholders by German corporate law places index funds and ETF (and all other target shareholders) in a particular dilemma: When signing a DPLA the majority shareholder is required to offer a compensation to minority shareholders, which usually is – combined with a potential increase in appraisal proceedings – even higher than the offer price. Not accepting the takeover offer and speculating on the later signing of a DPLA has thus become a viable strategy of investors. Yet, in case of a conditional offer, a significant number of shareholders has to accept the offer to make it effective and thus enable the signing of a DPLA.[33] In this case, index funds and ETF would also have an incentive to tender a part of their stake, too. Finally, it has to be noted that it is not clear who is the new owner of the divested stake of index funds and ETF. Whereas index funds might enter into irrevocable agreements with the bidder[34], it is also possible that the funds have sold their shares in the market where eventually hedge funds speculating on offer improvements have bought them.

4.2. Multivariate results

4.2.1. Full sample results

Full sample regressions are reported in Table 4. Model (1) only includes the stake index funds and ETF and control variables as independent variables and depicts a negative relationship between the index fund and ETF stake and the percentage of shares gained by the bidder during the takeover. The coefficient for stake index funds and ETF in this model is statistically insignificant; the significance level increases when accounting for other categories of shareholders in the target company (model (2)). Consistent with the findings of Antoniou et al. (2019) we observe a high positive correlation between the stake of index funds and ETF and the stake of other institutional investors.[35] The stakes of these types of shareholders in the target company are also highly correlated with the share of foreign investors in its ownership structure. This reinforces that other shareholder stakes need to be considered in our analysis to avoid potentially misleading results from omitted variables. Model (3) only considers the bidder's

---

[33] A theoretical solution to this dilemma would be that all shareholders cooperate and tender the proportional share of their equity stake necessary to cross the communicated offer threshold. However such a behavior might be considered as "acting in concert" under the German takeover code WpÜG.

[34] E.g., in the merger of Linde AG and Praxair, Inc., several index funds signed "irrevocable acceptance obligations" with the bidder so that they could commit their shares for tendering without concerns about tracking error or liquidity.

[35] For brevity, correlations are reported in Appendix Table A.10.

initial toehold, Herfindahl-Hirschman ownership index and controls as independent variables, while model (4) combines all target- and bidder-related variables. Model (5) describes the full model specification including all target-, offer- and bidder-related control variables. The results of regression models (4) and (5) support our hypothesis that index funds and ETF have a significant and negative impact on shares gained by a bidder during the offer: coefficient estimates are significant at a 5%- and 10%-level, respectively. We interpret this finding as the result of the relatively low propensity of index funds and ETF to tender shares during a takeover attempt, as tendering shares would deter index replication. It is important to note that we observe a negative effect of the size of the combined stake held by all index funds and ETF on the amount of shares obtained by the bidder, but not of the presence of these funds in target companies. The sole presence of index funds and ETF in the target ownership structure (without considering stake size) does not have a significant influence the percentage of shares gained.[36]

Boone & White (2015) find that institutional ownership, in particular index fund ownership, increases transparency and information disclosure and reduces information asymmetries between underlying securities and market participants. Glosten et al. (2020) further highlight that ETF ownership increases the informativeness of securities in the short-term, especially when limited information is available, "by improving the link between short-run fundamentals and stock prices" (p.1). In contrast, Antoniou et al. (2019) find evidence that high ETF ownership in firms yields less informative stock prices. Therefore, the impact of index fund and ETF ownership on the informational efficiency of stock prices of underlying securities is not clear-cut. Market participants, as well as company management, might therefore consider additional sources of information to make an assessment of these securities. During takeover attempts on companies with index fund and ETF ownership, target shareholders might therefore rely stronger on the statement of target company management on the takeover for a reliable assessment of potential benefits and management attitude of a takeover, and to make a tendering decision. Therefore, we analyze the relationship between management recommendation and the stake of index funds and ETF and extend model specification (5) with an interaction term of Stake index funds and ETF and Management recommendation (model (6)).

---

[36] See Appendix Table A.4 for regression results on index fund presence, and presence of respective shareholder types.

Table 4: Baseline regression results

			Dependent variable: Percentage shares gained			
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-1.105	-1.657*		-1.707**	-1.543*	-2.894***
	(0.755)	(0.787)		(0.767)	(0.834)	(0.833)
Stake individual shareholder		0.217*		0.213*	0.166	0.172
		(0.103)		(0.108)	(0.132)	(0.127)
Stake strategic shareholder		-0.162***		-0.143***	-0.106*	-0.110**
		(0.049)		(0.045)	(0.050)	(0.049)
Stake foreign shareholder		-0.046		-0.042	-0.040	-0.048
		(0.077)		(0.079)	(0.076)	(0.075)
Stake institutional shareholder		0.155		0.140	0.089	0.081
		(0.147)		(0.146)	(0.148)	(0.148)
Toehold			-0.037	-0.048	-0.098*	-0.108**
			(0.052)	(0.059)	(0.050)	(0.047)
Herfindahl-Hirschman ownership index			-0.131**	-0.098	-0.065	-0.067
			(0.056)	(0.058)	(0.064)	(0.064)
Offer premium					0.152*	0.153*
					(0.074)	(0.076)
Management recommendation					0.149***	0.136***
					(0.029)	(0.025)
Stake index funds and ETF x Management recommendation						1.822
						(1.125)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.291	0.320	0.297	0.326	0.392	0.397
Adjusted R^2	0.239	0.260	0.243	0.262	0.329	0.332
N	323	323	323	323	323	323

This table reports estimates from multivariate OLS regressions. The dependent variable is percentage shares gained by the bidder and indicates one bidder's ability to secure targeted shares in a takeover attempt. Explanatory variables are specified in Appendix Table A.3. Controls include crisis, competing offer, bidder as largest shareholder, size of the target company, method of payment, minimum acceptance rate, mandatory offer, multiple round, strategic bidder, financial bidder and foreign bidder. Standard errors are clustered by offer announcement year and are reported in parentheses. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

We find a negative relation between index fund and ETF ownership and the percentage of shares gained by the bidder in all our estimation models; in model (4) and (6) the coefficient estimate is significant on a 5%- and 1%-level, respectively. Thus, our results on all takeover offers already support our main hypothesis. Note that all coefficient estimates are greater than one. This implies that for every increase of index fund and ETF ownership, the decrease in the percentage of shares gained by the bidder is even higher than the index fund and ETF stake itself. Thus, the size of index funds' and ETF stake in a target company is likely to affect the tendering decision of other shareholders.

Throughout all models, we find that the shares gained by the bidder is negatively related to the relative accumulated stake of all strategic investors. The observed relationship is statistically significant at the 1%-level in models (2) and (4), at 5%-level in model (6) and at 10%-level in model (5). This suggests that strategic shareholders may potentially distract bidders from a successful takeover, as their strategic objective of the investment may result in a decreased willingness to tender shares. The stake of individual shareholders has a positive coefficient and is significant at the 10%-level in models (2) and (4), while foreign shareholders and (remaining) institutional shareholder do not have a significant impact on the percentage of shares gained by the bidder. The results of our regressions suggest a negative relation of ownership concentration in the target's shareholder structure and the percentage of obtained shares; however, the coefficient is not statistically significant if the different shareholder types are included in the model (models (4) – (6)).

Our results also suggest a significant negative relationship between the percentage of shares gained by the bidder and initial toehold of the bidder in the full model (5), with the coefficient being significant at the 10%-level. A large toehold implies that the number of obtainable shares during the bid is relatively small, which results in an acquisition of these shares in relative terms being rather challenging. The negative coefficient for the toehold also partially originates from the effect of irrevocable undertakings closed prior to a takeover offer on the percentage of remaining shares obtained by the bidder.[37]

In line with other empirical studies on the success of takeover attempts, we find a strong positive influence of offer premium and (positive) management recommendation on the percentage of shares gained during the bid, significant at the 10%- and 1%-levels, respectively. According to our findings, an increase in offer premium by 10 percentage points (c.p.) yields on average a 1.52 percentage point increase in the percentage of shares gained by the bidder. Our results in model (5) suggest that the bids with positive recommendation from the management have on average 14.9 percentage point higher percentage of shares gained than other bids (c.p.).

In model (6) we interact the recommendation of target management with the stake held by index funds and ETF to analyze whether the credibility of the statement is related to the fund

---

[37] When separating toehold and irrevocable undertakings, we find a negligible effect of toehold on the percentage of shares gained by the bidder and a strong negative relation between irrevocable undertakings and the obtained shares. Results are not reported here for brevity.

ownership. We do find a positive interaction effect of management recommendation and the stake held by index funds and ETF, but without statistical significance.

Overall, our regression results for the full sample demonstrate solid explanatory power, given an adjusted R-squared of 0.329 for model specification (5). Control variables appear to absorb all observable offer- and ownership-related characteristics. Since our dependent variable is censored by construction in the lower level at value [0] and at the upper level at value [1], we additionally run a Tobit regression model with the same variables and check for the robustness of our findings. The results for Tobit estimations offer similar coefficients and significance levels for our models and reinforce our findings (see Appendix Table A.5).

4.2.2. Sub-sample results: control-taking bids

As we are interested in the impact of index fund and ETF ownership on the market for corporate control, we now concentrate on the analysis of control-taking takeover bids made from a bidder not yet having control over the target company. Following the German takeover code, we define bids with a bidder toehold less than 30% as "control-taking" and rerun our OLS regression analysis on the 134 takeover offers meeting this requirement. Table 5 reports the results for the same model specification as discussed for the full sample.

Table 5: Sub-sample regression results – control-taking offers with toehold below 30%

	Dependent variable: Percentage shares gained					
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-2.901***	-3.727***		-3.828***	-3.024***	-3.604**
	(0.743)	(0.823)		(0.889)	(0.743)	(1.333)
Stake individual shareholder		0.646***		0.556**	0.580**	0.576**
		(0.172)		(0.183)	(0.206)	(0.208)
Stake strategic shareholder		-0.124**		-0.027	0.036	0.032
		(0.048)		(0.046)	(0.039)	(0.039)
Stake foreign shareholder		0.091		0.098	0.008	0.009
		(0.123)		(0.103)	(0.116)	(0.119)
Stake institutional shareholder		0.138		0.111	0.060	0.057
		(0.235)		(0.191)	(0.187)	(0.193)
Toehold			-0.181*	-0.170*	-0.241***	-0.236***
			(0.097)	(0.093)	(0.074)	(0.072)
Herfindahl-Hirschman ownership index			-0.339***	-0.298*	-0.213	-0.209
			(0.110)	(0.145)	(0.127)	(0.125)
Offer premium					0.159**	0.161**
					(0.067)	(0.068)
Management recommendation					0.269***	0.255***
					(0.037)	(0.049)
Stake index funds and ETF x Management recommendation						0.934
						(1.520)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.444	0.514	0.456	0.540	0.663	0.665
Adjusted R^2	0.340	0.402	0.348	0.423	0.569	0.567
N	134	134	134	134	134	134

This table reports estimates from multivariate OLS regressions. The dependent variable is percentage shares gained by the bidder. This table contains sub-sample regressions using the sub-sample of bidders with a toehold below 30%. Explanatory variables are explained in Appendix Table A.3. Controls are the same as specified in Table 4. Standard errors are clustered by offer announcement year and are reported in parentheses. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

The results of our analysis show even stronger support for our hypothesis for this sub-sample: The coefficient estimates for Stake index funds and ETF are negative and significant at the 1%- and 5%-level. The full model (5) suggests that an increase of the relative stake of index funds and ETF by one standard deviation will lead to a 9.54 percentage point drop in the percentage of shares obtained by the bidder. In contrast, an increase of offer premium by one standard deviation will lead to only 3.99 percentage point increase the percentage of obtained shares. Again, the implications from the change in index fund and ETF ownership are significantly larger than the ownership stake itself: In the full model (5) a 1% index fund and ETF ownership stake yields a 3% lower percentage of shares obtained by the bidder.

As the shareholder structure for targets in the sample of control-taking bids is significantly different compared to the full sample, we observe significant differences in the respective coefficient estimates: the stake of individual shareholders has a significantly positive effect on the percentage of gained shares whereas the coefficient of strategic shareholders turns insignificant in the full model (5). The effects of the stake held by foreign shareholders and of stake of institutional shareholders other than index funds and ETF are negligible for the percentage of shares gained in statistical and economic significance. The bidder's toehold has a significant and negative, the premium offered a significant and positive effect on the percentage of obtained shares.

For bids with positive management recommendations, percentage of shares obtained by the bidder is 26.9 percentage points higher (significant at the 1% confidence level). As in the full sample analysis, we also investigate the effect of management recommendation conditional to the stake of index funds and ETF. The findings for the sub-sample are similar to the full sample regression results and are reported in model (6). Although the coefficient of the interaction term has the hypothesized sign, the effect is statistically insignificant.

Overall, our model (5) shows high explanatory power for the sub-sample analysis as depicted by an adjusted R-squared of 0.569. Results from the corresponding Tobit regression analysis confirm the findings for the sub-sample of control-taking bids.

To emphasize the significance of the observed negative relationship between index funds and ETF holdings and success of takeover attempts, we further examine their implication on the final takeover outcome. For that, we estimate the effect of index funds´ and ETF stake on the probability of the bidder to gain a controlling stake in a target company. Common practice in empirical research of US and European takeover bids is to define a deal completion (successful takeover outcome) as an acquisition of at least 50% target shares by the bidder (Branch & Yang 2003; Betton et al. 2009; Bessler & Schneck 2015). Following this approach, we first set the dependent variable *Takeover outcome* to be equal to 1 for takeover offers where the bidder obtained at least 50% of shares after the end of the offer (i.e., offer was not annulled as all offer conditions were met), and equal to 0 in all other cases. We reduced our sample to offers where the bidder did not yet have a 50% stake (toehold below 50%). The results of a logistic regression with *Takeover outcome* as a dependent binary variable are presented in Appendix Table A.6 (model (1)). The findings confirm that the large stake of index funds and ETF in the target ownership structure significantly reduces the chances for the bidder to gain control over a target company. As highlighted in Section 2.2, the German corporate governance

system is distinguished by higher hurdles for a bidder to gain control, and an acquisition of 50% stake cannot always be perceived as a successful takeover outcome. Therefore, we adjust the *Takeover outcome* variable setting it equal to 1 for takeover offers where the bidder obtained at least 65% of shares after the end of the offer (i.e., offer was not annulled as all offer conditions were met), and equal to 0 in all other cases. In this case, the regression results also confirm the significance of index fund and ETF ownership stake for reducing the likelihood of a bidder gaining a control (Appendix Table A.6, model (2)). Therefore, index funds and ETF ownership has a negative implication not only for the offer acceptance rate in particular, but also for the takeover outcome (deal completion) in general.

4.3. Robustness tests

4.3.1. Endogeneity

First, to address potential endogeneity concerns we employ an instrumental variable approach (IV), similar to Aghion et al. (2013) and Antoniou et al. (2019) by using a firm's inclusion into a market index as an instrumental variable. For the sample of German takeovers, a suitable alternative is the German HDAX index (successor to the DAX100 index).[38] The constituents of DAX, MDAX and TecDAX indices are likely to have larger index fund and ETF presence in their shareholder structures. Besides, inclusion in the HDAX is not driven by performance considerations as membership depends on market capitalization and turnover of the particular stock. Thus, the relevance and exclusion requirements of a valid IV are met.

Table 6 reports results for the IV analysis for the full sample and sub-sample (Panel A and Panel B, respectively). First stage regressions reveal a positive relation between index inclusion and the index fund and ETF stake in the target company (statistically significant at the 1%-level for both full sample and sub-sample). We perform the Cragg and Donald (1993) F-test for each IV regression to check for weak instruments; with reported F-statistics well above 10 and an adjusted R^2 above 50%, we conclude that our instrument meets the validity requirement. Second stage results confirm our findings from Section 4.2, suggesting an even stronger negative effect of index fund and ETF ownership on shares gained by the bidder. The coefficient is statistically significant at the 1%-level for the full sample and for the control-taking sub-sample.

---

[38] HDAX consists of all member companies of the DAX, MDAX, and TecDAX indices.

Table 6: Instrumental variable regression results

	Panel A: Full sample		Panel B: Sub-sample (toehold < 30%)	
	1st stage	2nd stage	1st stage	2nd stage
Index and ETF inclusion	0.032***		0.027***	
	(0.006)		(0.005)	
Stake index funds and ETF		-2.081***		-6.406***
		(0.761)		(1.511)
Stake individual shareholder	0.002	0.166	0.012	0.615***
	(0.005)	(0.122)	(0.011)	(0.161)
Stake strategic shareholder	-0.008**	-0.110***	-0.010	0.019
	(0.003)	(0.043)	(0.006)	(0.039)
Stake foreign shareholder	0.019**	-0.029	0.016	0.056
	(0.008)	(0.071)	(0.019)	(0.121)
Stake institutional shareholder	0.020	0.101	0.014	0.125
	(0.012)	(0.140)	(0.014)	(0.172)
Toehold	0.009	-0.099**	0.010	-0.256***
	(0.006)	(0.044)	(0.007)	(0.070)
Herfindahl-Hirschman ownership index	0.000	-0.066	0.003	-0.223**
	(0.003)	(0.057)	(0.010)	(0.109)
Offer premium	-0.002	0.151**	0.002	0.154**
	(0.005)	(0.068)	(0.010)	(0.063)
Management recommendation	-0.003	0.148***	-0.010*	0.246***
	(0.002)	(0.025)	(0.005)	(0.032)
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
R^2	0.574	0.391	0.645	0.624
Adjusted R^2	0.531	0.328	0.546	0.519
Weak Instrument Test (F-statistics)	32.28		33.80	
N	323	323	134	134

This table reports estimates from two-stage least squares (2SLS) instrumental variable regressions. The dependent variable in the first stage is index fund stake, and percentage shares gained by the bidder in the second stage. Panel A reports regression results for the full sample. Panel B reports regression results for the sub-sample of bidders with a toehold below 30%. Explanatory variables are specified in Appendix Table A.3. Controls are the same as specified in Table 4. Standard errors are clustered by offer announcement year and reported in parentheses. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

Further, the high coefficient of the Stake index funds and ETF suggests that index fund and ETF ownership is likely to disrupt takeover success and reduce the percentage of shares gained during a bid indirectly by also affecting the tendering decision of other shareholders. In particular, it may affect the investment decisions of activist investors, i.e., hedge funds, who acquire substantial stakes in a target company during the offer acceptance period. In our data sample, we find that the index fund and ETF stake is highly correlated with the hedge funds' stake, as indicated by a 50.3% correlation coefficient. In order to separately analyze the impact of hedge funds we subtract its stake from the stake of other institutional shareholders and include it separately as an additional control variable. The regression results are presented in Appendix Table A.7; they confirm the hypothesis that the negative impact on the percentage of

shares gained by the offer is caused by the stake of the index fund and ETF prior to offer announcement, and not by the stake of the hedge funds. We suppose that a large size of index fund and ETF ownership increases the probability of hedge fund interference after a takeover announcement. Analyzing this hypothesis, however is beyond the scope of our analysis.

Finally, we limit the probability of an endogeneity problem arising from omitted variables by applying alternative specification models with additional control variables and re-defined ownership characteristics. First, we consider accounting fundamentals of takeover target companies as they should impact shareholders' tendering decisions and bidders' ability to secure outstanding shares. Therefore, we consider relative valuation levels of target companies by using the market-to-book ratio, and incorporate leverage of target companies, as it should serve as a disciplining device for target management to stimulate efficient management of the company's resources (Jensen 1986). Profitability of target companies is incorporated using net margin as proxy for operating profitability, as well as return on equity as proxy for efficient use of shareholders' resources. We also take into account the influence of dividend yield, as dividend payments should also serve as a disciplining device to target management and alternative corporate governance mechanisms (Da Silva et al. 2004). Regression results are reported in Appendix Table A.8 and confirm the negative coefficient and significance of the index fund and ETF stake. Further considered control variables that relate to the takeover offer itself are the issuance of a fairness opinion and changes to offer conditions (increase of offer premium, decrease of acceptance threshold). With regards to ownership characteristics of target companies, our findings are robust to controls for size of free float, widely-held indicator[39] and number of blockholders. As an alternative to the applied classification of target shareholders, we also apply a more granular approach: categorizing all investors into index funds, pension funds, financial institutions, corporate (strategic) investors, individual shareholders, venture capital/private equity funds and others, all regression models report similar coefficients and significance levels of the index fund and ETF stake and support our findings.

4.3.2. Fractional response regression

Our standard OLS regression analysis from above assumes a linear relationship between the percentage of shares gained by the bidder as dependent variable and the different independent variables. The values of the percentage of shares gained in the full sample are confined to a

---

[39] Relative fraction of all target shareholders holding less than 5% ownership stake.

[0;1] interval and display a high skewness towards the lower boundary.[40] Thus, the assumption of a linear relationship may not be appropriate. As a robustness check for our results, we apply a fractional regression analysis as a non-linear alternative suitable for our dependent variable (Papke & Wooldridge 1996; Mullahy 2015). The method estimates a logistic regression function using a quasi-maximum likelihood estimator (QMLE). We follow the same structure of the analysis as described in Section 4.2. The results of fractional regression coefficients of the full sample are presented in Table 7. Marginal effects are calculated at mean values of covariates and listed below the coefficients.

Table 7: Fractional response regression results – full sample

	Dependent variable: Percentage shares gained					
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-5.907*	-9.182**	-6.637*	-9.519**	-8.561**	-15.168**
	(3.562)	(3.891)	(3.456)	(3.829)	(3.757)	(6.170)
Marginal effects	*-1.171**	*-1.792***	*-1.308**	*-1.850***	*-1.611***	*-1.763***
	(0.705)	*(0.752)*	*(0.678)*	*(0.737)*	*(0.702)*	*(0.741)*
Stake individual shareholder		1.482***		1.519***	1.263**	1.310**
		(0.542)		(0.544)	(0.586)	(0.577)
Marginal effects		*0.289***		*0.295***	*0.238***	*0.246***
		(0.105)		*(0.105)*	*(0.110)*	*(0.108)*
Stake strategic shareholder		-1.164***		-1.119***	-0.931**	-0.965**
		(0.417)		(0.434)	(0.441)	(0.442)
Marginal effects		*-0.227****		*-0.218***	*-0.175***	*-0.181***
		(0.080)		*(0.084)*	*(0.083)*	*(0.083)*
Stake foreign shareholder		-0.205		-0.184	-0.127	-0.176
		(0.417)		(0.421)	(0.438)	(0.436)
Marginal effects		*-0.040*		*-0.036*	*-0.024*	*-0.033*
		(0.082)		*(0.082)*	*(0.083)*	*(0.082)*
Stake institutional shareholder		0.709		0.626	0.376	0.335
		(0.511)		(0.516)	(0.525)	(0.525)
Marginal effects		*0.138*		*0.122*	*0.071*	*0.063*
		(0.100)		*(0.010)*	*(0.099)*	*(0.099)*
Toehold			-0.268	-0.318	-0.547*	-0.598*
			(0.320)	(0.313)	(0.309)	(0.311)
Marginal effects			*-0.053*	*-0.062*	*-0.103**	*-0.112**
			(0.063)	*(0.061)*	*(0.058)*	*(0.058)*
Herfindahl-Hirschman ownership index			-0.826	-0.563	-0.369	-0.384
			(0.502)	(0.415)	(0.395)	(0.393)
Marginal effects			*-0.163**	*-0.109*	*-0.069*	*-0.072*
			(0.097)	*(0.080)*	*(0.074)*	*(0.073)*
Offer premium					0.718**	0.725**
					(0.328)	(0.328)
Marginal effects					*0.135***	*0.136***
					(0.061)	*(0.061)*
Management recommendation					0.733***	0.659***

[40] 22.9% of the observations have share percentages obtained by the bidder of below 0.05.

	(1)	(2)	(3)	(4)	(5)	(6)
					(0.175)	(0.179)
Marginal effects					*0.141****	*0.142****
					(0.033)	*(0.033)*
Stake index funds and ETF x Management recommendation						8.973
						(6.817)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.098	0.111	0.103	0.113	0.135	0.137
N	323	323	323	323	323	323

This table reports estimates from fractional logistic regressions. The table reports coefficient estimates and marginal effects for each variable for the full sample. Coefficient estimates and marginal effects for the sub-sample below 30% are reported in Appendix Table A.9. The dependent variable is percentage shares gained by the bidder. Explanatory variables are specified in Appendix Table A.3. Controls are the same as specified in regression analysis in Table 4. Reported numbers in italics are the marginal effects and corresponding standard errors. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

As the results in Table 7 suggest, the marginal effect of index fund and ETF holdings on the percentage of shares gained by a bidder is negative and highly statistically significant for all model specifications and similar in magnitude to the linear regression results. To illustrate the economic significance of this effect based on the full model (5), a one standard deviation increase in the stake of index funds and ETF yields a decrease of the share percentage gained by 4.36 percentage points, compared to a one standard deviation increase in the offer premium causing a 3.33 percentage point increase in shares obtained. In general, all reported marginal effects of other determining factors are in line with the results of the OLS model from above. The marginal effects of strategic and individual stakes on the share percentage gained increase in their statistical significance level.

Similar to the OLS analysis, model (6) estimates the effects of management recommendation conditional to the stake of index funds by including an interaction term in the regression. However, the interpretation of the coefficient estimates requires additional care: The coefficient of the interaction effect in a non-linear model does not equal the marginal effect of the interaction term (Ai & Norton 2003). In a non-linear model the marginal effect can only be investigated by observing the specific values of the model covariates. We thus calculate the average marginal effects of management recommendation on the percentage of shares gained at various values for the Stake index funds and ETF variable. The marginal effects are calculated at mean values of all other covariates and are reported in Table 8.

Table 8: Conditional marginal effects on percentage shares gained – management recommendation

Stake index funds and ETF	Full sample (1)	Sub-sample (toehold < 30%) (2)
= 0.00%	0.126***	0.215***
= 0.50%	0.132***	0.217***
= 1.00%	0.139***	0.219***
= 1.50%	0.145***	0.220***
= 2.00%	0.150***	0.221***
= 2.50%	0.156***	0.222***
= 3.00%	0.161***	0.222***
= 3.50%	0.165***	0.222***
= 4.00%	0.170***	0.222***
= 4.50%	0.174***	0.221***
= 5.00%	0.177***	0.220***
= 5.50%	0.181***	0.218***
= 6.00%	0.183***	0.216***
= 6.50%	0.186***	0.214***
= 7.00%	0.188***	0.212***
= 7.50%	0.191***	0.209***
= 8.00%	0.192***	0.206***
N	323	134

This table reports marginal effects from fractional logistic regressions in Table 8 (model (6)) at different values of Stake index funds and ETF and at mean values of other covariates. Model specification (1) reports regression results for the full sample. Model specification (2) reports regression results for the sub-sample of bidders with a toehold below 30%. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

For the full sample, the marginal effect of management recommendation is positive, significant at the 1%-level and increasing with the increase of the relative stake of index funds and ETF. It remains highly significant at each level of the conditional variable. Figure 1 graphically illustrates the marginal effects of management recommendation on the percentage of shares gained for increasing index fund and ETF stakes in target companies.
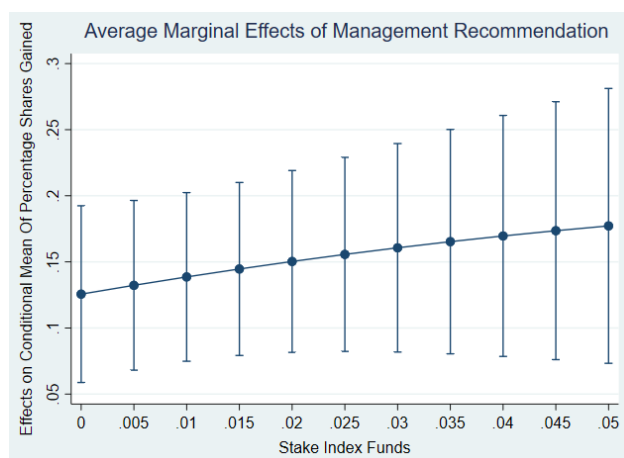
Figure 1: Marginal effects of management recommendation on the percentage of shares gained conditional to index fund and ETF ownership stake

For the sub-sample of control-taking takeover bids, we obtain similar conditional effects: Positive management recommendation has a positive marginal impact at an increasing index fund and ETF ownership stake. Overall, based on coefficient signs and directions of the independent variables, results from applying fractional regression methodology support our findings. Additionally, the results of our marginal analysis based on the logistic model suggest that the index fund and ETF stake in a target's ownership structure positively influences the (positive) impact of the management recommendation on the percentage of shares gained during the takeover. This further reinforces the relevance of the deal recommendation of management and outstanding shareholders relying on it.

5.   Conclusion

This study analyses the influence of index fund and ETF ownership on the percentage of shares gained by a bidder during public bids and the subsequent success of takeover attempts of publicly listed companies in Germany between 2006 and 2018. As index funds and ETF are required to track a particular index, they will find it difficult to tender their shares if a firm being part of this index becomes target of a takeover offer. We thus hypothesize a negative influence of index fund and ETF ownership on takeover outcomes.

By analyzing the tendering behavior of index funds and ETF we find a significant fraction of funds divesting their stakes: Tracking ownership data along the acceptance period of the offer for 82 cases with index fund and ETF ownership, we find index funds' and ETFs' average ownership stake to decrease from 2.2% by one quarter to 1.7%, presumably due to index adjustments or by replacing their positions synthetically and tendering physical shares. Yet, approximately 75% of index funds and ETFs hold on to their shares during a takeover attempt.

Despite the occasional ability and obvious willingness of some index funds and ETF to tender, our focal regression analysis still strongly supports our hypothesis: There is a negative relationship between index fund and ETF ownership and the percentage of shares gained during a takeover in Germany. By performing an OLS regression analysis, we find that the coefficient estimate of index fund and ETF ownership is negative and significant at a 5%- and a 1%-confidence level in the full regression model of the full sample and the sub-sample of control-taking bids, respectively. Besides our main result, we find the remaining independent variables to have the expected impact on the dependent variable.

Although some funds tender their shares, we estimate coefficients for the stake of index funds and ETF that are well above one. This means the influence of index fund and ETF

ownership on the percentage of shares gained by a bidder is even higher than the fund ownership itself and might influence the investment behavior of other investors. Obviously, index fund and ETF ownership also affects the decision to tender of other shareholders and/or the decision of outside investors to step in and acquire target shares in the market after an offer is announced. There might be a particularly noteworthy relationship between index funds and ETF and hedge funds: While Appel et al. (2019) document that increasing index fund and ETF ownership facilitates higher monitoring activity of activist funds, a recent analysis provides evidence for a similar "symbiosis" effect in German takeover situations (Dobmeier et al. 2020): The reduction of the number of obtainable shares due to index fund and ETF ownership may stimulate hedge fund intervention in takeover offers. In the case of the takeover offer for STADA, hedge funds acquired significant stakes of the target company after the offer was made public and successfully bid up the offer price. Thus, in contrast to the results of Appel et al. (2019) the symbiosis between index funds/ETF and hedge funds in takeover offers increases the cost of a takeover offer, reduces the probability of takeover success and does not yield an improvement of corporate governance.

In total our results suggest the increase in index fund and ETF ownership to yield a significant weakening of the market for corporate control. This negative effect may even be amplified by the following observation: Our results document a negative effect of index fund and ETF ownership on the outcome of takeover offers in the past. Given the general increase of index fund and ETF ownership stakes in recent years and its negative effect on takeover success and the fraction of shares gained, we assume that the propensity of a potential bidder to launch a takeover offer will be lower if the target is a member of an index and has several index funds/ETF as shareholders.

Overall, the lower efficiency of the market for corporate control may weaken shareholder influence in German corporations. Significant index fund and ETF ownership may even work as a takeover deterrent supporting management entrenchment. Can this negative effect be compensated by stronger monitoring efforts from index funds and ETF? Despite the "voice instead exit" quote from Larry Fink, CEO of BlackRock, there is no clear evidence for this, at least in the US: Bebchuk and Hirst (2019a) analyze voting behavior of index funds and do not find evidence for a stronger propensity to support proposals in opposition to management. In fact, Heath et al. (2020) find evidence that index funds support management and demonstrate a lower likelihood of voting against management proposal in corporate governance matters, which further strengthens the position of incumbent management. For Germany, index fund

and ETF ownership stakes are still relatively low. Thus, the direct impact of ownership of these funds on corporate governance is still to be investigated.

6. Appendix

Table A.1: Calculation of relative ownership concentration

$$Relative\ ownership\ concentration =$$

$$= \frac{\sum(Ownership\ stake_i)^2}{(1 - Stake\ under\ bidder's\ control\ at\ the\ offer)^2}$$

with $Ownership\ stake_i = \frac{\#\ shares\ owned\ by\ shareholder_i}{\#\ total\ shares\ outstanding}$

and $Stake\ under\ bidder's\ control\ at\ the\ offer = \frac{\#\ shares\ under\ bidder's\ control\ at\ the\ offer}{\#\ total\ shares\ outstanding}$

Table A.2: Overview of offers conditional on minimum acceptance rate

	N	Minimum acceptance rate	
		Average	Median
Offers conditional on minimum acceptance rate			
First round offers	83	63.23%	75.00%
Thereof completed	46	63.92%	69.80%
Thereof withdrawn	9	69.00%	75.00%
Thereof revised	28	60.25%	75.00%
Offers with revision of minimum acceptance rate during acceptance period	20	60.99%	75.00%
New Offers with revised minimum acceptance rate			
Second round offers	11	50.64%	50.01%
Thereof completed	5	48.90%	50.00%
Thereof withdrawn	3	55.84%	50.01%
Thereof revised	3	48.34%	50.01%
Third round offers	3	36.66%	30.00%
Thereof completed	3	36.66%	30.00%

This table reports an overview of offers that were conditional on a minimum acceptance rate of target shareholders. Throughout the entire sample (323 offers with regard to only last rounds), 71 last round offers were conditional on a minimum acceptance rate, of which 11 offers had an even higher acceptance rate in the first round.

Table A.3: Variable definitions

Dependent variable

Variable	Source	Description
Percentage shares gained	Own construction, takeover offer document published on BaFin website	Number of shares tendered during acceptance period divided by number of shares not under bidder's control at the offer.

Independent variables

Target ownership structure variables

Variable	Source	Description
Stake index funds and ETF	Refinitiv Ownership and Profile	Number of shares index funds and ETF own in target company divided by number of shares not under bidder's control by the time of the offer.
Stake individual shareholder	Refinitiv Ownership and Profile	Number of shares individual shareholders (i.e., individual persons and families) own in target company divided by number of shares not under bidder's control by the time of the offer.
Stake strategic shareholder	Refinitiv Ownership and Profile	Number of shares strategic shareholders own in target company divided by number of shares not under bidder's control by the time of the offer.
Stake foreign shareholder	Refinitiv Ownership and Profile	Number of shares foreign shareholders (i.e., cross-border shareholder without presence in German-speaking countries) own in target company divided by number of shares not under bidder's control by the time of the offer.
Herfindahl-Hirschman ownership index	Refinitiv Ownership and Profile	Ownership concentration, measured as accumulated sum of individual shareholders' number of shares divided by squared number of shares not under bidder's control by the time of the offer (see Appendix Table A.1 for further details on the calculation methodology).
Toehold	Refinitiv Ownership and Profile, takeover offer document published on BaFin website	Number of shares bidder owns in the target company (including number of shares secured through irrevocable undertakings and pre-negotiated share transfers) divided by total number of outstanding shares prior to the offer.

Takeover variables

Variable	Source	Description
Offer premium	Takeover offer document published on BaFin website	Percentage takeover premium on three-month weighted average target share price, according to §5 WpÜGAV.
Management recommendation	Statement of board of directors, Bundesanzeiger	Indicator variable set equal to one if target management provides a positive recommendation on the takeover offer (i.e., recommends accepting the offer), zero otherwise.
Competing offer	Takeover offer document published on BaFin website	Indicator variable set equal to one if a competing bid exists, zero otherwise.
Method of payment	Takeover offer document published on BaFin website	Indicator variable set equal to one if the offer consideration is made in cash, zero otherwise.
Multiple round	Takeover offer document published on BaFin website	Indicator variable set equal to one if bidder has made changes to the original bid thus extending the acceptance period of the offer.
Mandatory offer	Takeover offer document published on BaFin website	Indicator variable set equal to one if bidder had to make a mandatory offer, zero otherwise.
Minimum acceptance rate	Takeover offer document published on BaFin website	Indicator variable set equal to one if takeover attempt is conditional on a minimum rate of shareholders accepting the takeover offer.
Financial bidder	Refinitiv Ownership and Profile	Indicator variable set equal to one if bidder is a financial investor (incl. private equity) according to Refinitiv classification and zero otherwise.
Strategic bidder	Cleary Gottlieb Steen & Hamilton LLP, Refinitiv Ownership and Profile	Indicator variable set equal to one if target and bidder operate in same industry according to Cleary Gottlieb Steen & Hamilton LLP industry classification.
Foreign bidder	Refinitiv Ownership and Profile	Indicator variable set equal to one if bidder is foreign and operates from non-German-speaking country and zero if bidder

		is from German-speaking country (Germany, Austria, Switzerland).
Bidder largest shareholder	Refinitiv Ownership and Profile	Indicator variable set equal to one if bidder is the largest shareholder before the official takeover announcement, zero otherwise.
Crisis	Takeover offer document published on BaFin website	Indicator variable set equal to one if takeover offer was made in Financial Crisis years 2008 and 2009 or European Crisis year 2012.
Size	Takeover offer document published on BaFin website	Natural logarithm of equity market value (in EUR mn), calculated as total shares outstanding multiplied with offered share price by the time of the offer.

This table reports the dependent, independent and control variables used in the analyses, including used sources.

Table A.4: Linear regression results on shareholder presence

Panel A: Index fund presence

	Dependent variable: Percentage shares gained			
	(1)	(2)	(3)	(4)
Index fund and ETF presence	0.068*	0.057	0.043	0.023
	(0.035)	(0.042)	(0.043)	(0.037)
Stake individual shareholder		0.219**	0.215*	0.166
		(0.097)	(0.102)	(0.128)
Stake strategic shareholder		-0.144**	-0.127**	-0.093*
		(0.054)	(0.050)	(0.052)
Stake foreign shareholder		-0.088	-0.083	-0.076
		(0.092)	(0.094)	(0.092)
Stake institutional shareholder		0.099	0.092	0.048
		(0.151)	(0.149)	(0.150)
Toehold			-0.028	-0.086
			(0.068)	(0.055)
Herfindahl-Hirschman ownership index			-0.084	-0.055
			(0.053)	(0.063)
Offer premium				0.156*
				(0.075)
Management recommendation				0.149***
				(0.026)
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
R^2	0.291	0.312	0.316	0.383
Adjusted R^2	0.239	0.252	0.251	0.320
N	323	323	323	323

Panel B: Presence of shareholder types

	Dependent variable: Percentage shares gained			
	(1)	(2)	(3)	(4)
Index fund and ETF presence	0.068*	0.080**	0.056	0.028
	(0.035)	(0.032)	(0.039)	(0.034)
Individual shareholder presence		0.088*	0.086*	0.074
		(0.044)	(0.043)	(0.044)
Strategic shareholder presence		-0.053	-0.053	-0.039
		(0.062)	(0.068)	(0.065)
Foreign shareholder presence		-0.022	-0.029	-0.036
		(0.035)	(0.038)	(0.041)
Institutional shareholder presence		-0.028	-0.031	-0.037
		(0.075)	(0.068)	(0.065)
Toehold			-0.049	-0.110
			(0.087)	(0.065)
Herfindahl-Hirschman ownership index			-0.119**	-0.081
			(0.052)	(0.061)
Offer premium				0.154*
				(0.075)
Management recommendation				0.158***
				(0.026)
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Constant	Yes	Yes	Yes	Yes
R^2	0.291	0.302	0.311	0.385
Adjusted R^2	0.239	0.241	0.246	0.322
N	323	323	323	323

This table reports estimates from multivariate OLS regressions. The dependent variable is percentage shares gained by the bidder. Panel A reports the impact of index fund presence and reports regression estimates where the main explanatory variable is presence of index funds (indicator variable, set equal to 1 if index funds and ETF are invested in a target by the time of the offer announcement and 0 otherwise). All other explanatory variables are the same as in Table 4. Panel B reports the impact of presence of all shareholder types and presents regression estimates where shareholder stake variables from Table 4 are replaced by presence variables of the respective funds (indicator variable, set equal to 1 if the respective shareholder type is invested in a target by the time of the offer announcement and 0 otherwise). All other explanatory variables are the same as in Table 4. Controls for both panels are the same as specified in Table 4. Standard errors are clustered by offer announcement year and are reported in parentheses. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

Table A.5: Tobit regression results

Panel A: Full sample

	Dependent variable: Percentage shares gained					
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-1.102	-1.646**			-1.696**	-1.530*	-2.886***
	(0.729)	(0.756)		(0.735)	(0.797)	(0.788)
Stake individual shareholder		0.216**		0.213**	0.165	0.171
		(0.098)		(0.103)	(0.125)	(0.120)
Stake strategic shareholder		-0.162***		-0.143***	-0.106**	-0.110**
		(0.047)		(0.043)	(0.047)	(0.047)
Stake foreign shareholder		-0.048		-0.045	-0.043	-0.051
		(0.074)		(0.075)	(0.073)	(0.072)
Stake institutional shareholder		0.155		0.140	0.088	0.080
		(0.141)		(0.140)	(0.141)	(0.141)
Toehold			-0.037	-0.049	-0.099**	-0.109**
			(0.051)	(0.056)	(0.047)	(0.045)
Herfindahl-Hirschman ownership index			-0.131**	-0.098*	-0.064	-0.067
			(0.055)	(0.056)	(0.061)	(0.061)
Offer premium					0.153**	0.154**
					(0.070)	(0.073)
Management recommendation					0.150***	0.137***
					(0.028)	(0.024)
Stake index funds and ETF x Management recommendation						1.828*
						(1.071)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
N	323	323	323	323	323	323

Panel B: Sub-sample toehold below 30%

	Dependent variable: Percentage shares gained					
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds	-2.884***	-3.701***		-3.806***	-2.981***	-3.544***
	(0.682)	(0.747)		(0.793)	(0.660)	(1.178)
Stake individual shareholder		0.640***		0.548***	0.570***	0.567***
		(0.158)		(0.168)	(0.187)	(0.188)
Stake strategic shareholder		-0.122***		-0.026	0.040	0.035
		(0.043)		(0.041)	(0.035)	(0.034)
Stake foreign shareholder		0.081		0.085	-0.011	-0.010
		(0.114)		(0.097)	(0.111)	(0.114)
Stake institutional shareholder		0.144		0.118	0.068	0.066
		(0.213)		(0.170)	(0.167)	(0.172)
Toehold			-0.189**	-0.178**	-0.253***	-0.248***

	(1)	(2)	(3)	(4)	(5)	(6)
			(0.086)	(0.084)	(0.066)	(0.065)
Herfindahl-Hirschman ownership index			-0.341***	-0.300**	-0.213*	-0.210*
			(0.100)	(0.130)	(0.113)	(0.111)
Offer premium					0.160***	0.161***
					(0.059)	(0.060)
Management recommendation					0.275***	0.261***
					(0.034)	(0.045)
Stake index funds and ETF x Management recommendation						0.905
						(1.332)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
N	134	134	134	134	134	134

This table reports estimates from multivariate tobit regressions. Panel A reports regression estimates for the full sample. Panel B reports regression estimates for the sub-sample of bidders with a toehold below 30%. The dependent variable is percentage shares gained by the bidder. Explanatory variables are explained in Appendix Table A.3. Controls are the same as specified in Table 4. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

Table A.6: Logit regression results – probability of a successful takeover outcome

Dependent variable:	(1) Takeover outcome (above 50%)		(2) Takeover outcome (above 65%)	
	Bidder's toehold below 50%		Bidder's toehold below 65%	
	Coefficients	*Marginal effects*	Coefficients	*Marginal effects*
Stake index funds and ETF	-23.792*	*-2.433**	-20.338**	*-1.715**
	(12.156)	*(1.269)*	(10.245)	*(0.734)*
Stake individual shareholder	0.624	*0.064*	0.155	*0.013*
	(1.885)	*(0.194)*	(1.287)	*(0.108)*
Stake strategic shareholder	1.080	*0.110**	0.987**	*0.083****
	(0.670)	*(0.060)*	(0.434)	*(0.031)*
Stake foreign shareholder	0.739	*0.076*	-1.191	*-0.100*
	(1.352)	*(0.138)*	(1.119)	*(0.090)*
Stake institutional shareholder	0.280	*0.029*	0.856	*0.072*
	(1.715)	*(0.175)*	(1.535)	*(0.124)*
Toehold	2.808***	*0.287****	2.329**	*0.196****
	(0.726)	*(0.072)*	(1.047)	*(0.064)*
Herfindahl-Hirschman ownership index	-2.426**	*-0.248**	-0.953	*-0.080*
	(1.115)	*(0.105)*	(0.921)	*(0.082)*
Offer premium	1.378*	*0.141**	1.433**	*0.121****
	(0.729)	*(0.077)*	(0.678)	*(0.048)*
Management recommendation	1.808***	*0.205****	1.630***	*0.146****
	(0.358)	*(0.027)*	(0.547)	*(0.042)*
Industry FE	Yes	*Yes*	Yes	*Yes*
Controls	Yes	*Yes*	Yes	*Yes*
Constant	Yes	*Yes*	Yes	*Yes*
Pseudo R^2	0.513		0.544	
N	182	*182*	222	*222*

This table reports estimates from a logit regression using the sub-sample of bidders with a toehold below 50% in model (1) and sub-sample of bidders with a toehold below 65% in model (2). The dependent variable is takeover outcome, which is a dummy variable. In model (1), takeover outcome is set equal to 1 for takeover offers where the bidder obtained at least 50% of shares after the end of the offer (i.e., offer was not annulled as all offer conditions were met), and equals 0 in all other cases. In model (2), takeover outcome is set equal to 1 for takeover offers where the bidder obtained at least 65% of shares after the end of the offer (i.e., offer was not annulled as all offer conditions were met), and equals 0 in all other cases. Explanatory variables are specified in Appendix Table A.3. Controls are the same as specified in Table 4. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

Table A.7: Baseline regression results incl. hedge fund stake

	Dependent variable: Percentage shares gained					
	Full sample			Sub-sample (toehold < 30%)		
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-1.694**	-1.786**	-1.626*	-3.713***	-3.800***	-3.017***
	(0.736)	(0.736)	(0.785)	(0.779)	(0.855)	(0.701)
Stake individual shareholder	0.217*	0.214*	0.166	0.665***	0.575***	0.592**
	(0.103)	(0.108)	(0.131)	(0.163)	(0.176)	(0.209)
Stake strategic shareholder	-0.162***	-0.143***	-0.107**	-0.130**	-0.031	0.033
	(0.049)	(0.044)	(0.048)	(0.047)	(0.045)	(0.039)
Stake foreign shareholder	-0.047	-0.044	-0.042	0.131	0.145	0.038
	(0.080)	(0.082)	(0.079)	(0.115)	(0.106)	(0.117)
Stake institutional shareholder	0.154	0.137	0.085	0.139	0.108	0.058
	(0.146)	(0.145)	(0.150)	(0.237)	(0.194)	(0.186)
Stake hedge funds	0.181	0.196	0.147	-0.651	-0.680	-0.408
	(0.315)	(0.311)	(0.295)	(0.802)	(0.818)	(0.518)
Toehold		-0.050	-0.101*		-0.154	-0.230**
		(0.059)	(0.052)		(0.100)	(0.082)
Herfindahl-Hirschman ownership index		-0.098	-0.065		-0.306**	-0.218*
		(0.058)	(0.064)		(0.135)	(0.121)
Offer premium			0.152*			0.162**
			(0.073)			(0.068)
Management recommendation			0.149***			0.265***
			(0.029)			(0.035)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.320	0.326	0.392	0.520	0.545	0.665
Adjusted R^2	0.257	0.259	0.327	0.403	0.424	0.568
N	323	323	323	134	134	134

This table reports estimates from multivariate OLS regressions, additionally testing the impact of the stake of hedge funds. Models (1) to (3) report regression results for the full sample, models (4) to (6) report regression results for the sub-sample of bidder's with a toehold below 30%. The dependent variable is percentage shares gained by the bidder. Stake hedge funds represents the ownership stake of hedge funds by the time of the takeover offer announcement. Stake institutional shareholders represents the ownership of all other institutional shareholders excluding index funds/ETF and hedge funds. All other explanatory variables are explained in Appendix Table A.3. Controls are the same as specified in Table 4. Standard errors are clustered by offer announcement year and are reported in parentheses. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

Table A.8: Baseline regression results with accounting fundamentals

Panel A: Full sample

	Dependent variable: Percentage shares gained					
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-1.138	-1.618*		-1.668**	-1.501*	-2.883***
	(0.746)	(0.777)		(0.760)	(0.840)	(0.745)
Stake individual shareholder		0.216*		0.215*	0.165	0.173
		(0.109)		(0.111)	(0.140)	(0.134)
Stake strategic shareholder		-0.151**		-0.135**	-0.099*	-0.103*
		(0.050)		(0.045)	(0.053)	(0.053)
Stake foreign shareholder		-0.073		-0.067	-0.077	-0.084
		(0.076)		(0.076)	(0.079)	(0.077)
Stake institutional shareholder		0.167		0.152	0.105	0.097
		(0.147)		(0.147)	(0.154)	(0.154)
Toehold			-0.032	-0.046	-0.095*	-0.105**
			(0.047)	(0.055)	(0.044)	(0.042)
Herfindahl-Hirschman ownership index			-0.123*	-0.090	-0.052	-0.055
			(0.060)	(0.060)	(0.068)	(0.067)
Offer premium					0.212***	0.213**
					(0.067)	(0.070)
Management recommendation	0.001**	0.001**	0.001**	0.001**	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market-to-book ratio	0.132**	0.128**	0.118*	0.120**	0.135**	0.135**
	(0.053)	(0.051)	(0.057)	(0.054)	(0.058)	(0.057)
Leverage	-0.000	-0.000	-0.000	-0.000	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Return on equity	0.004	0.003	0.004	0.003	-0.001	-0.001
	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)
Operating profitability	-0.015	-0.027	-0.040	-0.080	0.025	-0.005
	(0.263)	(0.270)	(0.264)	(0.277)	(0.302)	(0.310)
Dividend yield					0.139***	0.125***
					(0.026)	(0.023)
Stake index funds and ETF x Management recommendation						1.863
						(1.077)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.309	0.336	0.312	0.341	0.410	0.415
Adjusted R^2	0.245	0.265	0.247	0.266	0.338	0.341
N	323	323	323	323	323	323

Panel B: Sub-sample toehold below 30%

	Dependent variable: Percentage shares gained					
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-2.846***	-3.666***		-3.792***	-2.973***	-3.793**
	(0.717)	(0.852)		(0.918)	(0.744)	(1.254)

Stake individual shareholder	0.714***		0.625***	0.593**	0.594**	
	(0.158)		(0.176)	(0.209)	(0.209)	
Stake strategic shareholder	-0.125**		-0.016	0.041	0.035	
	(0.049)		(0.070)	(0.046)	(0.046)	
Stake foreign shareholder	0.005		-0.003	-0.005	-0.009	
	(0.145)		(0.123)	(0.117)	(0.115)	
Stake institutional shareholder	0.168		0.154	0.058	0.056	
	(0.238)		(0.181)	(0.180)	(0.184)	
Toehold		-0.175	-0.170	-0.239***	-0.231***	
		(0.098)	(0.097)	(0.076)	(0.075)	
Herfindahl-Hirschman ownership index		-0.348***	-0.334**	-0.220	-0.220	
		(0.097)	(0.146)	(0.131)	(0.132)	
Offer premium				0.171**	0.168**	
				(0.068)	(0.072)	
Management recommendation				0.251***	0.229***	
				(0.046)	(0.064)	
Market-to-book ratio	0.000	0.001	0.001	0.002***	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.099	0.041	0.090	0.049	0.051	0.048
	(0.100)	(0.098)	(0.101)	(0.106)	(0.088)	(0.087)
Return on equity	0.028	0.010	0.027	0.001	0.019	0.015
	(0.038)	(0.041)	(0.037)	(0.034)	(0.040)	(0.040)
Operating profitability	0.014	0.017	0.011	0.012	0.003	0.003
	(0.011)	(0.010)	(0.010)	(0.008)	(0.008)	(0.008)
Dividend yield	-1.674	-2.222*	-1.747	-2.372*	-0.888	-1.178
	(1.386)	(1.132)	(1.262)	(1.114)	(1.078)	(1.004)
Stake index funds and ETF x Management recommendation						1.295
						(1.513)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.466	0.540	0.479	0.569	0.668	0.671
Adjusted R^2	0.336	0.405	0.346	0.433	0.554	0.553
N	134	134	134	134	134	134

This table reports estimates from multivariate OLS regressions. The dependent variable is percentage shares gained by the bidder. This analysis includes additional accounting fundamentals: *Market-to-book ratio* is defined as year-end share price divided by book value per share in the year prior to the takeover offer. *Leverage* is defined as sum of long-term debt, short-term debt and current portion of long-term debt divided by sum of total capital and short-term debt and current portion of long-term debt in the year prior to the takeover offer, in percent. *Return on equity* is defined as annual net income divided by average of current year's and last year's common equity in the year prior to the takeover offer, in percent. *Operating profitability* is defined as net margin: annual net income divided by revenue in the year prior to the takeover offer, in percent. *Dividend yield* is defined as annual gross dividend per share divided by year-end share price in the year prior to the takeover offer, in percent. All other explanatory variables and control variables are the same as in Table 4. Panel A reports full sample results, Panel B reports results for the sub-sample of bidders with a toehold below 30%. Standard errors are clustered by offer announcement year and are reported in parentheses. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

Table A.9: Fractional response regression – sub-sample toehold below 30%

	Dependent variable: Percentage shares gained					
	(1)	(2)	(3)	(4)	(5)	(6)
Stake index funds and ETF	-14.840**	-21.014***	-17.969***	-22.144***	-17.101***	-19.879***
	(6.034)	(5.542)	(5.887)	(5.483)	(4.385)	(7.494)
Marginal effects	*-2.858****	*-3.828****	*-3.328****	*-3.947****	*-2.831****	*-2.729****
	(1.136)	*(0.972)*	*(1.047)*	*(0.932)*	*(0.687)*	*(0.608)*
Stake individual shareholder		4.256***		3.885***	4.120***	4.055***
		(0.780)		(0.804)	(0.864)	(0.840)
Marginal effects		*0.775****		*0.692****	*0.682****	*0.670****
		(0.139)		*(0.145)*	*(0.142)*	*(0.138)*
Stake strategic shareholder		-1.423***		-1.034*	-0.502	-0.526
		(0.525)		(0.603)	(0.552)	(0.553)
Marginal effects		*-0.259****		*-0.184**	*-0.083*	*-0.087*
		(0.093)		*(0.107)*	*(0.091)*	*(0.091)*
Stake foreign shareholder		0.303		0.180	-0.036	-0.042
		(0.764)		(0.727)	(0.791)	(0.779)
Marginal effects		*0.055*		*0.320*	*-0.006*	*-0.007*
		(0.139)		*(0.130)*	*(0.131)*	*(0.129)*
Stake institutional shareholder		0.592		0.568	0.238	0.230
		(0.849)		(0.797)	(0.882)	(0.879)
Marginal effects		*0.108*		*0.101*	*0.039*	*0.038*
		(0.155)		*(0.142)*	*(0.146)*	*(0.145)*
Toehold			-1.184***	-1.062**	-1.317***	-1.291***
			(0.455)	(0.452)	(0.431)	(0.430)
Marginal effects			*-0.219****	*-0.189***	*-0.218****	*-0.214****
			(0.083)	*(0.080)*	*(0.070)*	*(0.069)*
Herfindahl-Hirschman ownership index			-2.283***	-1.709***	-1.108**	-1.106**
			(0.662)	(0.652)	(0.544)	(0.542)
Marginal effects			*-0.423****	*-0.305****	*-0.183***	*-0.183***
			(0.012)	*(0.011)*	*(0.090)*	*(0.090)*
Offer premium					0.891**	0.899**
					(0.370)	(0.378)
Marginal effects					*0.148***	*0.149***
					(0.061)	*(0.063)*
Management recommendation					1.345***	1.255***
					(0.319)	(0.344)
Marginal effects					*0.240****	*0.238****
					(0.054)	*(0.054)*
Stake index funds x Management recommendation						4.787
						(7.644)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes

Pseudo R^2	0.172	0.210	0.198	0.223	0.267	0.267
N	134	134	134	134	134	134

This table reports estimates from fractional logistic regressions. Coefficient estimates and marginal effects for each variable are estimated for the sub-sample of bidders with a toehold below 30%. The dependent variable is percentage shares gained by the bidder. Explanatory variables are specified in Appendix Table A.3. Controls are the same as specified in the regression analysis in Table 4. Reported numbers in italics are the marginal effects and corresponding standard error. Statistical significance is represented at the 1% (***), 5% (**), and 10% (*) level.

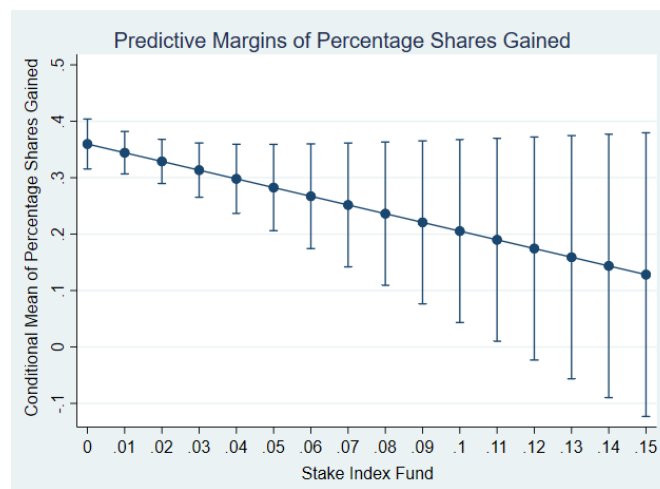**Figure 2**: **Predictive margins of percentage of shares gained – full sample**

Figure 3: **Predictive margins of percentage of shares gained – sub-sample below 30%**
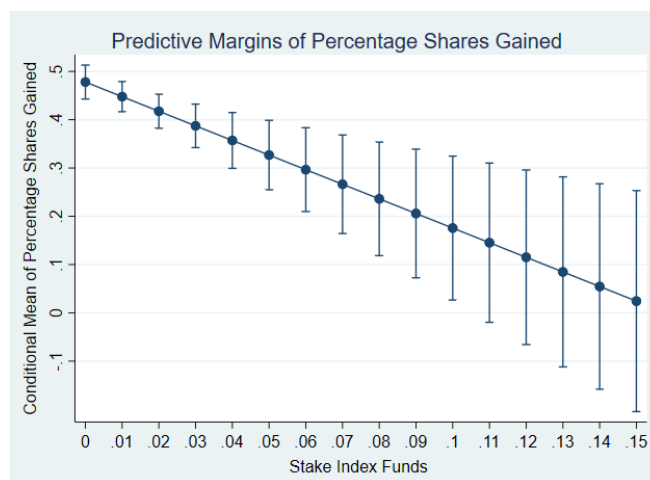
Table A.10: Correlation matrix for explanatory and control variables

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
[1] Stake index funds and ETF	1.000																			
[2] Stake individual shareholder	-0.100*	1.000																		
[3] Stake strategic shareholder	-0.143**	0.4601***	1.000																	
[4] Stake foreign shareholder	0.420***	0.151***	0.171***	1.000																
[5] Stake institutional shareholder	0.476***	-0.146***	-0.196***	0.635***	1.000															
[6] Toehold	-0.191***	-0.056	-0.133**	-0.285***	-0.265***	1.000														
[7] Herfindahl-Hirschman ownership index	-0.104*	0.154***	0.342***	0.119**	-0.058	-0.216***	1.000													
[8] Offer premium	0.037	-0.006	-0.056	0.047	0.122**	-0.111**	-0.028	1.000												
[9] Management recommendation	0.067	0.015	-0.144***	0.037	0.144***	0.017	-0.102*	0.322***	1.000											
[10] Competing offer	-0.029	0.028	0.059	0.094*	-0.014	-0.175***	0.142**	0.075	0.022	1.000										
[11] Crisis	-0.101*	0.056	-0.003	-0.028	0.017	-0.008	0.027	0.179***	-0.034	-0.030	1.000									
[12] Largest shareholder	-0.192***	-0.095*	-0.160***	-0.177***	-0.153***	0.455***	-0.210***	-0.170***	-0.158***	-0.090	-0.014	1.000								
[13] Size	0.512***	-0.167***	-0.075	0.339***	0.425***	-0.168***	-0.052	0.050	0.127**	0.060	-0.075	-0.277***	1.000							
[14] Method of payment	-0.281***	0.036	0.077	-0.095*	-0.086	0.208***	0.048	-0.019	-0.114**	0.047	0.147***	0.194***	-0.192***	1.000						
[15] Minimum acceptance rate	0.201***	0.017	-0.051	0.061	0.124**	-0.376***	0.062	0.251***	0.184***	0.025	-0.020	-0.466***	0.218***	-0.328***	1.000					
[16] Mandatory offer	-0.175***	-0.041	-0.087	-0.212***	-0.255***	0.281***	-0.163***	-0.172***	-0.261***	-0.123**	0.124**	0.426***	-0.366***	0.168***	-0.349***	1.000				
[17] Multiple round	0.279***	0.015	-0.026	0.139**	0.126**	-0.237***	0.028	0.084	0.008	0.218***	-0.012	-0.174***	0.212***	-0.045	0.128**	-0.266***	1.000			
[18] Financial bidder	-0.126**	0.115**	0.138**	0.068	-0.014	-0.009	0.099*	-0.136**	-0.133**	0.029	0.023	0.088	-0.199***	0.161***	-0.113**	0.029	-0.062	1.000		
[19] Foreign bidder	0.087	0.017	-0.057	0.135**	0.113**	0.008	0.014	0.188***	0.140**	0.041	-0.064	0.019	0.144***	0.069	0.157***	-0.150***	0.105*	0.049	1.000	
[20] Strategic investor	0.170***	-0.093*	-0.092	0.002	0.032	-0.010	-0.115**	0.095*	0.099*	-0.031	-0.008	-0.102*	0.211***	-0.205***	0.114**	-0.035	0.025	-0.772***	-0.012	1.000

This table reports the Pearson correlations between all independent variables and control variables used in the regression analyses. Variables are defined in Appendix Table A.3.

References

Achleitner, A.-K., A. Betzer, M. Goergen, and B. Hinterramskogler. 2013. Private Equity Acquisitions of Continental European Firms: the Impact of Ownership and Control on the Likelihood of Being Taken Private. *European Financial Management 19(1)*, 72-107.

Aghion, P., J. Van Reenen, and L. Zingales. 2013. Innovation and Institutional Ownership. *American Economic Review, 103(1)*, 277-304.

Aguilera, R. V., K. A. Desender, M. L. P. Lamy, and J. H. Lee. 2017. The Governance Impact of a Changing Investor Landscape. *Journal of International Business Studies*, *48(2),* 195-221.

Ai, C., and E.C. Norton. 2003. Interaction Terms in Logit and Probit Models. *Economics Letters, 80(1)*, 123-129.

Al-Thuneibat, A. 2018. The Relationship between the Ownership Structure, Capital Structure and Performance. *Journal of Accounting - Business & Management, 25(1)*, 1-20.

Antoniou, C., A. Subrahmanyam, and O. Tosun. 2019. ETF Ownership and Corporate Investment. *Working Paper*.

Appel, I. R., T. A. Gormley, and D. B. Keim. 2016. Passive Investors, Not Passive Owners. *Journal of Financial Economics, 121(1)*, 111-141.

Appel, I. R., T. A. Gormley, and D. B. Keim. 2019. Standing on the Shoulders of Giants: The Effect of Passive Investors on Activism. *Review of Financial Studies, 32(7)*, 2720-2774.

Barclay, M. J., and C. G. Holderness. 1991. Negotiated Block Trades and Corporate Control. *The Journal of Finance, 46(3)*, 861-878.

Bates, T., and D. A. Becher. 2017. Bid Resistance by Takeover Targets: Managerial Bargaining or Bad Faith? *Journal of Financial and Quantitative Analysis, 52(3)*, 837-866.

Bebchuk, L., and S. Hirst. 2019a. Index Funds and the Future of Corporate Governance: Theory, Evidence, and Policy. *Columbia Law Review, 119(8)*, 2029-2146.

Bebchuk, L., and S. Hirst. 2019b. The Specter of the Giant Three. *Boston University Law Review,* 99, 721-741.

Benz, L., A. Jacob, S. Paulus, and M. Wilkens. 2020. Herds on Green Meadows: the Decarbonization of Institutional Portfolios. *Journal of Asset Management*, *21(1),* 13-31.

Bessler, W., and C. Schneck. 2015. Excess Premium Offers and Bidder Success in European Takeovers. *Eurasian Economic Review, 5(1)*, 23-62.

Bessler, W., W. Drobetz, and J. Holler. 2008. Capital Markets and Corporate Control: Empirical Evidence from Hedge Fund Activism in Germany. *Working Paper*.

Bessler, W., W. Drobetz, and J. Holler. 2015a. The Returns to Hedge Fund Activism in Germany. *European Financial Management, 21(1)*, 106-147.

Bessler, W., C. Schneck, and J. Zimmermann. 2015b. Bidder Contests in International Mergers and Acquisitions: The Impact of Toeholds, Preemptive Bidding, and Termination Fees. *International Review of Financial Analysis, 42*, 4-23.

Betton, S., and E. B. Eckbo. 2000. Toeholds, Bid Jumps, and Expected Payoffs in Takeovers. *The Review of Financial Studies, 13(4)*, 841-882.

Betton, S., E. B. Eckbo, and K. Thorburn. 2009. Merger Negotiations and the Toehold Puzzle. *Journal of Financial Economics, 91(2)*, 158-178.

BlackRock, Inc. 2018. *Larry Fink's Annual Letter to CEOs – 2018.* New York City: BlackRock, Inc.

BlackRock, Inc. 2020. *Securities Lending Viewed through the Sustainability Lens.* https://www.blackrock.com/corporate/literature/publication/securities-lending-viewed-through-the-sustainability-lens.pdf.

Bolton, P., T. Li, E. Ravina, and H. Rosenthal. 2020. Investor Ideology. *Journal of Financial Economics, 137(2)*, 320-352.

Boone, A. L., and J. White. 2015. The Effect of Institutional Ownership on Firm Transparency and Information Production. *Journal of Financial Economics, 117(3)*, 508-533.

Branch, B., and T. Yang. 2003. Predicting Successful Takeovers and Risk Arbitrage. *Quarterly Journal of Business & Economics, 42(1)*, 3-17.

Bris, A. 2002. Toeholds, Takeover Premium, and the Probability of Being Acquired. *Journal of Corporate Finance, 8(3)*, 227-253.

Broccardo, E., O. Hart, and L. Zingales. 2020. Exit vs. Voice. *Working Paper*.

Caiazza, R., and T. Volpe. 2015. M&A Process: a Literature Review and Research Agenda. *Business Process Management Journal, 21(1)*, 205-220.

Campa, J. M., and C. Moschieri. 2009. The European M&A Industry: Trends, Patterns and Shortcomings. *Academy of Management Perspectives, 23(4).* 71-87.

Cao, C., B. A. Goldie, B. Liang, and L. Petrasek. 2016. What is the Nature of Hedge Fund Manager Skills? Evidence from the Risk-Arbitrage Strategy. *Journal of Financial and Quantitative Analysis, 51(3)*, 929-957.

Chang, S., and D. Y. Suk. 1998. Failed Takeovers, Methods of Payment and Bidder Returns. *The Financial Review, 33(2)*, 77-84.

Cleary Gottlieb Steen & Hamilton LLP. 2017. Public Bids and Squeeze-Outs, A Statistical Survey (2002-2016). Frankfurt, Cologne: *Cleary Gottlieb Steen & Hamilton LLP*.

Cragg, J. C., and S. Donald. 1993. Testing Identifiability and Specification in Instrumental Variable Models. *Economic Theory, 9(2)*, 222-240.

Da Silva, L. C., M. Goergen, and L. Renneboog. 2004. *Dividend Policy and Corporate Governance.* Oxford: Oxford University Press.

Demsetz, H., and B. Villalonga. 2001. Ownership Structure and Corporate Performance. *Journal of Corporate Finance, 7(3)*, 209-233.

Denis, D. J., and T. A. Kruse. 2000. Managerial Discipline and Corporate Restructuring Following Performance Declines. *Journal of Financial Economics, 55(3)*, 391-424.

Deutsche Börse Group. 2019. *Unscheduled Adjustment in MDAX.* https://deutsche-boerse.com/dbg-en/media/press-releases/Unscheduled-adjustment-in-MDAX-1611870.

Deutsche Börse Group. 2020. 20 Years ETF Trading on Xetra. *Frankfurt am Main: Deutsche Börse Group.*

Dobmeier, L., R. Lavrova, and B. Schwetzler. 2020. Determinants of Hedge Fund Investment in Corporate Endgames. *Working Paper.*

Duggal, R., and J. A. Millar. 1994. Institutional Investors, Antitakeover Defenses and Success of Hostile Takeover Bids. *The Quarterly Review of Economics and Finance, 34(4)*, 387-402.

Eakins, S. 1993. Institutional Investor Support of Managers: An Investigation of Tender Offers. *Quarterly Journal of Business and Economics, 32(3)*, 75-84.

Edmans, A., and C. G. Holderness. 2017. Blockholders: A Survey of Theory and Evidence. In B. Hermalin, and M. Weisbach, *The Handbook of the Economics of Corporate Governance, Vol. 1* (pp. 541-636). North Holland.

Edwards, J., and A. Weichenrieder. 2004. Ownership Concentration and Share Valuation. *German Economic Review, 5(4)*, 143-171.

ETFGI. 2020. *ETFGI Reports Assets in the Global ETFs and ETPs Industry which Will Turn 30 Years Old in March Started the New Decade with a Record 6.35 Trillion US Dollars.* https://etfgi.com/news/press-releases/2020/01/etfgi-reports-assets-global-etfs-and-etps-industry-which-will-turn-30.

Ferreira, M. A., and P. Matos. 2008. The Colors of Investors' Money: The Role of Institutional Investors Around the World. *Journal of Financial Economics, 88(3)*, 499-533.

Fich, E. M., J. Harford, and A. L. Tran. 2015. Motivated Monitors: The Importance of Institutional Investors' Portfolio Weights. *Journal of Financial Economics, 118(1)*, 24-48.

Fidrmuc, J. P., R. Paap, P. Roosenboom, and T. Teunissen. 2012. One Size Does Not Fit All: Selling Firms to Private Equity versus Strategic Acquirers. *Journal of Corporate Finance, 18(4)*, 828-848.

Fishman, M. J. 1988. A Theory of Preemptive Takeover Bidding. *RAND Journal of Economics 19(1)*, 88-101.

Flanagan, D. J., J. P. D'Mello, and K. O'Shaughnessy. 1998. Completing the Deal: Determinants Of Successful Tender Offers. *The Journal of Applied Business Research, 14(3)*, 21-32.

Franks, J., and C. Mayer. 2001. Ownership and Control of German Corporations. *The Review of Financial Studies, 14(4)*, 943-977.

Franks, J., C. Mayer, and L. Renneboog. 2001. Who Disciplines Management in Poorly Performing Companies? *Journal of Financial Intermediation, 10(3-4)*, 209-248.

Giammarino, R. M., and R. L. Heinkel. 1986. A Model of Dynamic Takeover Behavior. *The Journal of Finance, 41(2)*, 465-480.

Global X Management Company LLC. 2020. *Thematic ETF Report: Q3 2020.* https://www.globalxetfs.com/content/files/Thematic-ETF-Report-Q3-2020-1.pdf.

Glosten, L., S. Nallareddy, and Y. Zou. 2020. ETF Activity and Informational Efficiency of Underlying Securities. *Management Science*, Forthcoming.

Gorbenko, A. S., and A. Malenko. 2014. Strategic and Financial Bidders in Takeover Auctions. *The Journal of Finance, 69(6)*, 2513-2555.

Grossman, S. J., and O. D. Hart. 1980. Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation. *The Bell Journal of Economics, 11(1)*, 42-64.

Hamdani, A., and Y. Yafeh. 2012. Institutional Investors as Minority Shareholders. *Review of Finance, 17(2)*, 691-725.

Handelsblatt. 2019. *Axel Springer verlässt MDax – Cancom rückt auf.* https://www.handelsblatt.com/finanzen/maerkte/marktberichte/medienkonzern-axel-springer-verlaesst-mdax-cancom-rueckt-auf/24945098.html.

Hansen, R. G. 1987. A Theory for the Choice of Exchange Medium in Mergers and Acquisitions. *The Journal of Business, 60(1)*, 75-95.

Heath, D., D. Macciocchi, R. Michaely, and M. C. Ringgenberg. 2020. Do Index Funds Monitor? *Working Paper*.

Hirshleifer, D., and I. P. Png. 1989. Facilitation of Competing Bids and the Price of a Takeover Target. *The Review of Financial Studies, 2(4)*, 587-606.

Hirshleifer, D., and S. Titman. 1990. Share Tendering Strategies and the Success of Hostile Takeover Bids. *Journal of Political Economy, 98(2)*, 295-324.

Hopt, K. J. 2015. Corporate Governance in Europe: A Critical Review of the European Commission's Initiative on Corporate Law and Corporate Governance. *New York University Journal of Law & Business, 12(1)*, 139-158.

Institute of Mergers, Acquisitions and Alliances. 2020. *M&A Statistics*. https://imaa-institute.org/mergers-and-acquisitions-statistics/.

Jenkinson, T., and A. Ljungqvist. 2001. The Role of Hostile Stakes in German Corporate Governance. *Journal of Coprorate Finance, 7(4)*, 397-446.

Jennings, R. H., and M. A. Mazzeo. 1993. Competing Bids, Target Management Resistance, and the Structure of Takeover Bids. *Review of Financial Studies, 6(4)*, 883-909.

Jensen, M. C. 1986. Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *The American Economic Review, 76(2)*, 323-329.

Khanna, N. 1997. Optimal Bidding for Tender Offers. *The Journal of Financial Research, 10(3)*, 323-342.

Kim, E. H., E. Maug, & C. Schneider, C. 2018. Labor Representation in Governance as an Insurance Mechanism. *Review of Finance, 22(4).* 1251-1289.

Kobayashi, M. 2007. Ownership Structure, Shareholder Intervention, and Success in Takeovers. *Japan and the World Economy 19(4)*, 425-440.

Köke, F. J. 1999. New Evidence on Ownership Structures in Germany. *Working Paper.*

La Porta, R., F. Lopez-de-Silanes, and A. Shleifer. 1999. Corporate Ownership around the World. *Journal of Finance, 1999, 54(2)*, 471-517.

La Porta, R., F. Lopez-de-Silanes, and A. Shleifer. 2008. The Economic Consequences of Legal Origins. *Journal of Economic Literature, 46(2)*, 285-332.

Lindner, H. G. 2017. *Das Drama um Stada: Warum ETFs Übernahmen immer schwieriger machen.* finanzjournalisten.de. https://www.finanzjournalisten.de/das-drama-um-stada-warum-etfs/.

Mietzner, M., and D. Schweizer. 2014. Hedge Funds versus Private Equity Funds as Shareholder Activists in Germany - Differences in Value Creation. *Journal of Economics and Finance, 38 (2)*, 181-208.

Mullahy, J. 2015. Multivariate Fractional Regression Estimation of Econometric Share Models. *Journal of Economic Methods, 4(1),* 71-100.

O'Sullivan, N., and P. Wong. 1999. Board Composition, Ownership Structure and Hostile Takeovers: Some UK Evidence. *Accounting and Business Research, 29(2)*, 139-155.

Papke, L. E., and J. M. Woolridge. 1996. Econometric Methods for Fractional Response Variables with an Application to 401(K) Plan Participation Rates. *Journal of Applied Econometrics, 11(6)*, 619-632.

Petersen, M. A. 2009. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies, 22(1)*, 435-480.

Rao-Nicholson, R., and J. Salaber. 2015. Impact of the Financial Crisis on Banking Acquisitions: A Look at Shareholder Wealth. *International Journal of the Economics of Business, 22(1)*, 87-117.

Scharfstein, D. 1988. The Disciplinary Role of Takeovers. *Review of Economic Studies, 55(2)*, 185-199.

Schmidt, C., and R. Fahlenbrach. 2017. Do Exogenous Changes in Passive Insitutional Ownership Affect Corporate Governance and Firm Value? *Journal of Financial Economics, 124(2)*, 285-306.

Schoenberg, R., and R. Reeves. 1999. What Determines Acquisition Activity within an Industry? *European Management Journal, 17(1)*, 93-98.

Schwert, G. W. 1996. Markup Pricing in Mergers and Acquisitions. *Journal of Financial Economics, 41(2)*, 153-192.

Shleifer, A., and R. W. Vishny. 1986. Large Shareholders and Corporate Control. *Journal of Political Economy, 94(3)*, 461-488.

Shleifer, A., and R. W. Vishny. 1997. A Survey of Corporate Governance. *The Journal of Finance, 52(2)*, 737-783.

Singh, R. 1998. Takeover Bidding with Toeholds: The Case of the Owner's Curse. *The Review of Financial Studies, 11(4)*, 679-704.

Statista. 2020. *Total net assets of Exchange Traded Funds (ETFs) in the United States from 2002 to 2019*. https://www.statista.com/statistics/295632/etf-us-net-

assets/#:~:text=The%20statistic%20presents%20the%20total,trillion%20U.S.%20doll
ars%20in%202019.

Stocker, F. 2019. *Die Neue Macht der Drei Finanzkolosse*. Welt. https://www.welt.de/wirtschaft/article197577169/Blackrock-State-Street-Vanguard-Die-neue-Macht-der-drei-Finanzgiganten.html.

Strickland, D., D. R. Martin, and J. F. Cotter. 2010. Toeholds as an M&A Strategy. *The Journal of Corporate Accounting & Finance, 21(5)*, 57-61.

Stulz, R. 1988. Managerial Control of Voting Rights: Financing Policies and the Market for Corporate Control. *Journal of Financial Economics, 20(1-2)*, 25-54.

Sudarsanam, P. S. 1995. The Role of Defensive Strategies and Ownership Structure of Target Firms: Evidence from UK Hostile Takeover Bids. *European Financial Management, 1(3)*, 223-240.

Varaiya, N. P., and K. R. Ferris. 1987. Overpaying in Corporate Takeovers: The Winner's Curse. *Financial Analysts Journal, 43(3)*, 64-70.

Walkling, R. A. 1985. Predicting Tender Offer Success: A Logistic Analysis. *Journal of Financial Analysis and Quantitative Analysis, 20(4)*, 461-478.

Walkling, R. A., and R. O. Edmister. 1985. Determinants of Tender Offer Premiums. *Financial Analysts Journal, 41(1)*, 27-37.

Walsh, J. P., and R. D. Kosnik. 1993. Corporate Raiders and Their Disciplinary Role in the Market for Corporate Control. *Academy of Management Journal, 36(4)*, 671-700.

Wright, M., C. Weir, and A. Burrows. 2007. Irrevocable Commitments and Going Private. *European Financial Management, 13(4)*, 757-775.