

Essays in Mutual Fund Research

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Synopsis

In what follows I am going to provide the synopsis (dt.: “Inhaltliche Zusammenführung”) of my cumulative dissertation “Essays in Mutual Fund Research”.¹ While all four essays of my dissertation are fully self-contained research articles within the strand of literature on mutual funds, information disclosure and regulation, this synopsis aims to provide an overarching understanding of the research area. In addition, the synopsis serves as an anchor to clarify interdependences of the papers and finally provide answers to the research questions addressed.

In my doctoral thesis, I demonstrate i) how the demand and supply side respond to the (first time) availability of product information for mutual funds and ii) how actions and personal characteristics of portfolio managers impact investors and fund management. Essays (1) and (2) extend the scarce evidence on the utility of investor information disclosure by means of a comprehensive investigation into the disclosure practices of the mutual fund industry. Using product information with different degrees of salience and obligation, ranging from comprehensive mandatory pre-contractual product information to complementary fund characteristics only disclosed by selective players, the essays document the importance of thoroughly written and designed information. Specifically, on the demand side, I analyze i) whether retail investors can understand mutual fund product information and ii) if investors are able to benefit from novel disclosure initiatives. Moreover, on the supply side, I show if and to what extent mutual fund companies react to novel disclosure regulations. Essays (3) and (4) shift the focus towards the individuals in charge of managing retail investors’ money, i.e. the portfolio managers, analyzing the impact of incentive mechanisms and personality traits on fund management and investor behavior.

The overarching contribution of my research is threefold. First, by addressing information salience and understandability, I shed light on retail investor limitations not explained by the classical efficient market framework assuming investors to be fully rational utility-maximizing decision-makers (e.g., Fama 1970). Thus, my research adds to the rich behavioral finance literature dealing with cognitive capacity and information

¹ The synopsis of the doctoral thesis is required by the Doctorate Regulations of the business and economics department of the University of Marburg (“Promotionsordnung des Fachbereichs Wirtschaftswissenschaften”) valid since June 8th, 2009. The respective requirement for the synopsis is detailed in §8.

processing constraints (e.g., Kozup et al. 2012, Agnew and Szykman 2005). Second, by analyzing investor behavior from an objective point of view, I contribute to the understanding of determinants which affect flows of mutual fund investor (e.g., Sirri and Tufano 1998, Barber et al. 2005). Third, methodically my research adds to the quantification of qualitative data in the finance domain (e.g., Loughran and McDonald 2016, 2019) by applying advanced textual analytics (essays (1), (3) and (4)), allowing to investigate large samples of written (verbal) information.

How do policy makers help consumers make sound investment decisions?

Regulations which require disclosure of information are among the most ubiquitous interventions in investor protection. The popularity of mandatory information disclosure follows standard economic theory which suggests that disclosure can help avoid instances of market failure in situations characterized by asymmetric information and a risk of misaligned incentives (e.g., Akerlof 1970, Ross 1973). However, although broadly advocated as an appropriate policy measure, there is a paucity of data supporting the efficiency of mandatory information disclosure. For example, individuals' information processing abilities have been shown to be limited and, thus, the increasing extent of mandatory information likely leads to an 'information overload', where the marginal utility of information for the decision-maker becomes negative (e.g., Eppler and Mengis 2004).

In my dissertation, I focus on investor information disclosed by actively managed equity mutual funds, since holdings in this asset class represent the by far largest fraction of household investments: in 2017, worldwide retail assets under management by equity mutual funds totaled at \$21.8 trillion with the large majority being actively managed (Investment Company Institute 2018). Moreover, disclosure requirements are pervasive for fund companies and the market is a prime candidate for unintended consequences of mandatory disclosure such as information overload: investors face a dizzying number of product options and each product carries a host of characteristics, which should be considered in order to make an informed decision. Especially when investing in an actively managed mutual fund which is tantamount to delegating the management of a securities portfolio. I investigate four types of investor information which regulatory authorities have qualified as decision-relevant when it comes to this delegation task.

First and foremost, investor should understand the fund's key features. For this to be the case, mandatory product information has to be easy to understand for the average investor (essay 1). The introduction of *Key Investor Information Documents* (KIIDs) for mutual funds in the European Union is the regulator's response to the quest for a more comprehensible description of the essential product features and we examine if these documents live up to their purpose. Following Loughran and McDonald (2014), we assess the comprehensibility and regulatory compliance of KIIDs and thereby extend the scarce academic evidence on the importance of product information documents (e.g., Habschick et al. 2012, Oehler et al. 2014, Walther 2015). We use a comprehensive sample of roughly 38,000 product information documents for mutual funds pre and post the introduction of KIIDs to capture the regulations impact on fund information comprehensibility. We find that while mutual fund product information remains difficult to read requiring on average 13 years of formal education from readers, textual readability significantly improved with the introduction of KIIDs. Furthermore, we show that the introduction of KIIDs translated into a 'clearer' writing style. By contrast, we detect that the relative usage of financial jargon increased in the new short form disclosure document. Moreover, the improvement on readability and the significant reduction in length seem to be achieved at the expense of an appealing font. Only half of the KIIDs comply with regulators' guidelines on font type and size. Taken together, we document mixed results on the regulations' effectiveness in creating clear and comprehensible pre-contractual information that enable retail investor to read and understand those documents.

Second, unlike index funds, actively managed funds sell the potential to beat their benchmark (usually a market index) and investors who select this type of mutual fund are typically looking for an opportunity to outperform the market index. However, actively managed funds usually charge significantly higher fees than passive funds (e.g., Morningstar 2018). This cost difference may be justified by the fund manager's effort to manage the portfolio in a way which creates an opportunity to generate excess returns. Thus, assessing the fees charged by an actively managed fund in light of the actual level of activeness is a worthwhile screening exercise for investors: prior literature documents substantial underperformance for funds with low levels of activeness (e.g., Petajisto 2013, Cremers et al. 2016, Cremers and Pareek 2016). However, and even though fund

companies employ Active Share (AS)², a metric to capture the degree to which a fund deviates from its benchmark, for a variety of purposes³ and provide AS information to institutional investors, they did not disclose it to retail investors and were not required to do so by regulators. The lack of equal access to AS information can be regarded as an information asymmetry, which prevents retail investors from fully evaluating the potential value proposition of an actively managed equity fund.⁴ Consequently, the New York Attorney General (NYOAG) revealed dubious index-hugging practices and unequal access to AS information for several of the largest US mutual funds and subsequently imposed disclosure of AS on them (NYOAG 2018). We make use of this unique intervention and thereby extend the few existing studies on funds' activeness (essay 2). In particular, we are the first to demonstrate if and how individual investors react to AS information *once they (can) learn about it*. We find that retail investors strongly respond to the NYOAG intervention, but not in the way intended by the regulators. We document a significant increase in investor flows into funds of fund companies affected by the intervention. The effect is most pronounced in the days after the intervention became public. However, rather than 'rationally' re-allocating assets away from 'high fee/low activeness' and into truly actively managed funds, investors are subject to a media attention bias. Fund companies that are prominently covered in the press following the disclosure intervention experience high net inflows, irrespective of the degree of AS. These findings are hard to square with the notion that retail investors have understood the concept behind AS and rationally traded on this newly available information. On the supply side, we do not observe a change in portfolio management habits following the intervention. Even for funds with the lowest AS levels—i.e. arguably those funds with the highest pressure to act in an attempt to legitimate 'active' fees—we do not observe any measurable effort to increase AS post-intervention. In sum, our evaluation of the NYOAG intervention documents a number of unintended consequences and reveals substantial limits to the effectiveness of this disclosure initiative.

² Introduced by Cremers and Petajisto (2009).

³ Fund companies commonly use AS statistics to track fund performance and fund risk as well as in the selection and evaluation of fund managers (cf. NYOAG 2018, p.10f).

⁴ Note that, while constituting highly relevant information, AS does not reflect all of the information an investor may want to consider when making a mutual fund investment decision. Moreover, the usefulness of AS as a measure of activeness has been criticized by several fund companies (e.g., Vanguard 2012, AQR 2015, Fidelity 2017). Yet, we observe that all these companies have always provided their professional and institutional investors with AS statistics, i.e. militating for a certain utility of the metric.

Third, investors face ongoing uncertainty about the standard of care fund managers exercise when managing their savings and whether they act in their best interest. Following the rationale "(...) *that a portfolio manager's ownership of a fund provides a direct indication of his or her alignment with the interests of shareholders in that fund*" (SEC 2004, section II, part D), managers of US mutual funds are required to disclose the amount of their private investments in all funds they manage. However, information about the beneficial holdings of portfolio managers (their *skin-in-the-game*) is far from readily accessible for the average retail investor. Instead, managers' private investments are disclosed in a supplementary fund information document that is only provided upon request and, at best, can be considered a secondary source for the average investor.⁵ Yet, interestingly, fund managers regularly use another medium to *voluntarily* disclose *skin-in-the-game* to their investors: the *Letter to the Shareholder* (LS).⁶ The LS is a non-mandatory—however commonly enclosed—component of the mutual fund's semi-annual or annual report.⁷ It is typically authored by the fund management, addresses the fund shareholders directly and thus constitutes a key element in communication with their shareholders (e.g., Hillert et al. 2016, Chu and Kim 2019). Unlike prior studies (e.g., Khorana et al. 2007, Ma et al. 2019, Evans 2008, Ibert 2018), who find that funds with managerial ownership yield higher risk-adjusted returns, I exploit verbal signaling of the managers in the LS to analyze aggregate investor fund flows applying advanced textual analytics (essay 3). With this, I contribute to prior research on the effects of fund manager *skin-in-the-game* by observing how retail investors *respond* to their managers' signaling activities. I find that signaling of *skin-in-the-game* in the LS triggers substantial net inflows from retail investors. The effect is most sizeable in the days after investors receive the LS and persistent throughout time. On the other side, I show that retail investors' asset allocation is unaltered by the actual amount invested by fund managers—an information

⁵ The Statement of Additional Information (SAI) frequently counts more than 50 pages and details numerous regulatory aspects. Furthermore, the SEC defines the SAI on its webpage as "[conveying] information about an open- or closed-end fund that is not necessarily needed by investors to make an informed investment decision, but that some investors find useful." (cf. SEC 2019 – Defined Terms).

⁶ Examples of how *skin-in-the-game* is communicated are, e.g., "I remain a significant investor in the fund alongside you" or "I am committed to invest a substantial part of my private wealth in the fund" and addressing fund investors as "fellow shareholders".

⁷ Note that LSs (contained in the SEC Form N-CSR and N-CSRS) need to be certified by the executive committee and are required by law to present a "fair and truthful picture" of the general economic outlook as well as the fund's future strategy, i.e. no untrue or misleading statement should be made in the letter. In a related study using LS data, Hillert et al. (2016) collect LSs for 78% of (semi) annual mutual fund reports.

the average retail investors most probable is unable (or unwilling) to find. Finally, I document that signaling of fund managers in the LS affects only retail investors. Professional investors, on the other hand, regularly have access to licensed fund data providers and potentially can easily obtain valuable information on fund manager investments.

Fourth and lastly, we explore the consequences of a well-researched personality trait –narcissism– on fund managers’ portfolio management. Unlike ‘hard facts’ of a fund, such as past performance, cost or investment style, investors do know little about their fund managers personality. Yet, looking into the literature on corporate managers (e.g., Chatterjee and Hambrick 2007, Kumar and Goyal 2015, Aktas et al. 2016), personality traits might also affect the job of fund managers. Applying text-mining techniques on verbatim fund manager interviews retrieved from *The Wall Street Transcript*, we find that narcissism is even more severe among professional fund managers than in the corporate context. We show that narcissistic fund managers are significantly more likely to deviate from their advertised investment style. Moreover, we document that while the realized performance of narcissistic fund manager is virtually identical to their non-narcissistic counterparts, we find that they exhibit a worse risk-return profile. Furthermore, we identify that large funds, i.e. those associated with higher compensation and prestige in the business, are more often managed by narcissistic managers, which is in line with prior literature documenting ‘empire-building’ behavior of narcissists. Given our evidence pointing to a rather negative relation of narcissism on portfolio management, we would expect investors to refrain investing with a narcissistic manager. However, we find that this is not the case. Most probable, investors do not know about personal traits of their fund managers and consequently are unable to act upon this information.

Taken together, the findings of my essays stress the importance of salient information disclosure in order for retail investors to arrive at a wise investment decision. The empirical evidence provided highlights certain shortcoming in current disclosure practices and regulations. Essay (1) indicates that summary product information accompanied by formatting and language guidelines are a first step in the right direction to ensure investors comprehensibility of product information for mutual funds. However, we still detect linguistic barriers that potentially prevent investors from reading and understanding relevant product characteristics. Essay (2) provides insights on the effect

of a non-standardized information disclosure intervention. As can be inferred from investors' (non-) response to the availability of information on funds' activeness, we observe that local interventions that address information asymmetries and therefore should benefit retail investors decision making, prove almost inefficient when not requiring a standardized, comparable and well-thought through information layout. Essay (3) supports this notion in documenting a prevalent mismatch between information availability and information usage. Finally, essay (4) points on the importance of personality traits. For retail investors it might be important to know more about the character of their fund managers given the evidence that personality traits, such as narcissism, affect day-to-day portfolio management. In sum, decision relevant information for investors, from the explanation of funds' investment style in the prospectus (essay 1), funds' 'true' degree of activeness (essay 2), an indication of manager private wealth investment (essay 3) or hints on the managers personality (essay 4), remains useless as long as the understandability, salience and transparency of disclosure stays low.

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Deutschsprachige Zusammenfassung

Nachfolgend findet sich die deutschsprachige Zusammenfassung meiner kumulativen Dissertation zum Thema „Essays in Mutual Fund Research“.* Thematisch widmet sich jedes Essay hierbei einer eigenständigen und abgeschlossenen Fragestellung im Forschungsfeld Investmentfonds, Privatanleger und Regulierung. Übergreifend versucht die dargelegte Dissertation zu eruieren, welchen Einfluss die (verpflichtende) Bereitstellung von entscheidungsrelevanten Informationen auf den Anleger hat. Dabei untersuche ich i) ob Produktinformationen für den Privatanleger verständlich sind, ii) wie lokale Interventionen zur Bereitstellung von entscheidungsrelevanten Informationen auf Angebots- wie Nachfrageseite wirken sowie iii) welchen Einfluss strategisches „Signaling“ durch Fondsmanager auf Privatanleger hat. Ferner wird in einem angeschlossenen Essay untersucht, iv) wie sich Persönlichkeitsmerkmale von Fondsmanagern auf deren Anlageentscheidungen auswirken. Entgegen bestehender Literatur im Forschungsfeld, welche sich überwiegend auf die Untersuchung von Akteuren unter Laborbedingungen in kleinen Stichproben konzentriert, ist den Essays meiner kumulativen Dissertation gemein, die Anlegerreaktion im realen Kapitalmarktumfeld quantitativ zu messen. Zielsetzung ist somit ein besseres Verständnis der Auswirkungen von Informationsbereitstellung auf breiter Basis zu schaffen. Dies ist insbesondere vor dem Hintergrund a) eines zunehmenden Angebots von Finanzmarktprodukten sowie b) beschränkter Informationsaufnahme- und Verarbeitungskapazitäten auf Seiten der Anleger relevant. Sparer, die bisher über klassische Giro- und Sparkonten den Aufbau von Vermögen verfolgten, sehen sich im aktuellen Niedrigzinsumfeld gezwungen in alternative Anlageninstrumente umzuschichten. Offene Investmentfonds sind hierbei zunehmend das Instrument der Wahl. In den USA, wo im Vergleich zu Europa das Bewusstsein für das Risiko-Rendite Verhältnis seit Langem in der Anlagekultur der Sparer verankert ist, hält Stand 2018 bereits jeder zweite Haushalt Anteile an einem Investmentfonds (ICI 2019). Parallel mit dem steigenden Investitionsvolumen durch Privatanleger steigt auch das Angebot. Ende 2018 sind über 118.000 offene Investmentfonds weltweit zum Verkauf zugelassen (ICI 2019). Von Seiten der Regulierer werden in diesem Zuge ausgedehnte

* Die Bestimmungen hierzu ergeben sich gemäß §8 (3) der Promotionsordnung des Fachbereichs Wirtschaftswissenschaften der Philipps-Universität Marburg vom 8. Juni 2009.

Veröffentlichungspflichten für die Angebotsseite etabliert, um den Anleger in die Lage zu versetzen sich vor der Investitionsentscheidung ein möglichst umfassendes Bild des Angebots zu machen. Allerdings trifft das zunehmende Angebot gepaart mit einer Fülle an bereitgestellten Informationen auf limitierte Informationsaufnahme- und Verarbeitungskapazitäten der Privatanleger. Dies führt nicht selten dazu, dass ein „Mehr an Information“ nicht zwangsläufig zu einer besseren Information des Anlegers führt. Die vorliegende Thesis analysiert daher verbindliche wie freiwillige Informationsbereitstellung im Investmentfondskontext und ordnet deren Effektivität unter Einbezug der Investorenreaktion ein.

Die Erkenntnisse der Dissertation legen nahe, dass gutgemeinte Regulierung zum Anlegerschutz häufig nicht die erhoffte Wirkung erzielen. Es scheint entscheidend, dass die Bereitstellung von Informationen den Anleger befähigen auf deren Basis einfach, vergleichbar und transparent abzuwägen. Neben der reinen Bereitstellung unterstreichen die Studien der Dissertation dabei, dass Format und Salienz von großer Bedeutung für den Anleger sind. Im Speziellen wird durch die Essays aufgezeigt, dass i) die Einführung kompakter Dokumente für die Zusammenfassung von Produktinformationen für Investmentfonds zwar deren Verständlichkeit verbessert hat, jedoch das generelle Sprachniveau weiterhin als schwierig einzustufen ist, ii) lokale Initiativen des Regulierers, welche die Angebotsseite zu mehr Transparenz hinsichtlich des Leistungsumfangs von Investmentfonds verpflichten, wirkungslos bleiben solange keine Standardisierung und Vergleichbarkeit geschaffen wird, iii) Informationen, die die Anreizsysteme von Fondsmanagern belegen, nur dann wahrgenommen werden können, wenn diese salient veröffentlicht werden und schließlich iv) Charakterzüge des Fondsmanagers eine zentrale Rolle im Portfoliomanagement spielen und somit als wichtige Information für Anleger erachtet werden sollten. Allen Essays ist gemein, dass unter Verwendung von Textdaten qualitative Informationen in quantitative Merkmale übersetzt und so Teil des Untersuchungsgegenstandes werden. Nachfolgend finden sich die jeweils ins Deutsche übersetzten Abstracts („Klappentexte“) der vier Essays meiner kumulativen Dissertation.

Essay (1): Double Dutch finally fixed? A large-scale investigation into the readability of mandatory financial product information

Mit der Einführung von zusammenfassenden Produktinformationsblättern (dt.: PIBs / en.: KIID) für Investmentfonds in 2012, unterstreicht die europäische Finanzregulierung die Wichtigkeit einfacher und verständlicher Sprache in der Beschreibung von Finanzprodukten. Zielsetzung ist es dem Privatanleger einen einfacheren und transparenteren Zugang zu Produktinformation für Investmentfonds zu verschaffen. Wir bewerten, ob durch die Einführung von PIBs sowie zugehörige Richtlinien zur Standardisierung und Vereinfachung der Sprache die Verständlichkeit von Informationen für Investmentfonds verbessert wurde. Mittels Methoden automatisierter Textanalyse untersuchen und bewerten wir hierbei erstmals quantitativ im Rahmen einer Vollerhebung alle in Deutschland zum Verkauf registrierten Investmentfonds. Wir stellen fest, dass Produktinformationen für Investmentfonds als „schwer lesbar“ einzustufen sind und vom Anleger ein hohes Maß an Bildung erfordern. Jedoch beobachten wir im Rahmen der Einführung von PIBs eine signifikante Verbesserung der Dokumentenverständlichkeit im Vergleich zu vorherigen Regulierungen. Dabei sind die sprachlichen Verbesserungen insbesondere durch einfachere Syntax und einen kohärenteren Schreibstil getrieben. Andererseits erkennen wir einen Anstieg in der Verwendung von branchenspezifischen Fachjargon sowie eine teilweise Missachtung von Designanforderungen. Diese Effekte erschweren insbesondere Privatanlegern mit geringer Branchenkenntnis die effiziente Aufnahme und Verarbeitung von Produktinformation im Rahmen des Entscheidungsprozesses. Wir diskutieren unsere Ergebnisse und schlagen mögliche Verbesserungen zur Offenlegung von Produktinformationen für Investmentfonds vor.

Essay (2): Leveling the playing field? The effect of disclosing fund manager activeness to individual investors

Seit April 2018 sind eine Reihe der größten US-Investmentfondsanbieter verpflichtet, Privatanlegern neben den Kosten mehr Informationen zur Leistung des Fonds offenzulegen. Im Speziellen erfordert die von der New Yorker Oberstaatsanwaltschaft eingeführte Intervention erstmals den Ausweis der ‘wahren Aktivität‘ des Fondsmanagements für aktiv gemanagte Investmentfonds. Wir bewerten die Reaktion der

Privatanleger und die angebotsseitige Reaktion der Branche auf diese Intervention. Wir stellen fest, dass Anleger die neuen Informationen nicht rational in ihre Handelsstrategien übersetzen. Vielmehr beobachten wir, dass die Aufmerksamkeit der Privatanleger und folglich deren Investitionsverhalten im Zuge der Intervention durch die Medien („Media Attention Bias“) beeinflusst wird: Fondsgesellschaften, welche von der Intervention betroffen sind, erfahren einen signifikanten Mittelzufluss, welcher im unmittelbaren Zusammenhang mit dem Medienecho zur Intervention steht. Darüber hinaus stellen wir fest, dass die Verpflichtung zur Veröffentlichung der wahren Fondsaktivität zu keinerlei Veränderungen auf der Angebotsseite führt. Selbst für als *aktiv gemanagt* beworbene Fonds, die allerdings einen hohen Grad an Überschneidung mit dem gewählten Benchmark Index aufweisen und somit einer passiven Anlagestrategie nahekommen, ist kein messbarer Effekt auf die Managementaktivität zu beobachten. Wir diskutieren unsere Ergebnisse und schlagen mögliche Alternativen zur Offenlegung der Fondsaktivität vor.

Essay (3): skin-in-the-game: Investors' reaction to fund managers' strategic signaling of mutual fund ownership

„*skin-in-the-game*“ (*sitg*) – private Beteiligungen des Fondsmanagements am eigenen Fonds – ermöglichen es, Interessen von Fondsmanagern und Anlegern durch Risikopartizipation in Einklang zu bringen. Seit 2005 sind amerikanische Fondsmanager verpflichtet ihre Anteile an selbst verwalteten Fonds offenzulegen. Jedoch kann diese Information für Privatanleger als unzugänglich betrachtet werden, da sie weder standardisiert noch transparent ausgewiesen wird. Wir verwenden einen alternativen, für Privatanleger deutlich zugänglicheren Kommunikationskanal, über den Fondsmanager regelmäßig *'sitg'* signalisieren: Aktionärsbriefe im (halb-) jährlichen Fondsreporting. Aus diesen lässt sich (zumeist) zwar nicht das exakte Investment des Managers ableiten, sehr wohl enthalten diese aber (oftmals) eine verbale Indikation, ob durch das Fondsmanagement privat Anteile gehalten werden. Mit Hilfe von Textanalyse untersuchen wir eine große Stichprobe an Aktionärsbriefen von Investmentfonds (~ 16.000 Beobachtungen) und zeigen erstmals, dass Privatanleger auf bewusstes „Signaling“ des Fondsmanagers reagieren. Wir finden signifikante Mittelzuflüsse durch Privatanleger im unmittelbaren Zusammenhang mit der Veröffentlichung von Aktionärsbriefen, die verbal *'sitg'* kommunizieren. Der beobachtete Effekt ist besonders

nach schwacher Performance, im Bullenmarkt sowie bei Fonds, welche nur durch einen Manager verwaltet werden, ausgeprägt. Im Gegensatz dazu beobachten wir, dass Privatanleger nicht auf den tatsächlich vom Management investierten Betrag, der alleinig durch Sekundärquellen und spezialisierte Fondsdatenprovider ausgewiesen wird, reagieren. Unsere Ergebnisse unterstreichen die Notwendigkeit Offenlegungspflichten entscheidungsrelevanter Information vor dem Hintergrund des tatsächlichen Anlegernutzens zu bewerten. Hierbei wird deutlich, dass neben dem Inhalt insbesondere das Format und die Salienz der Information entscheidend wirken. Wir diskutieren unsere Ergebnisse vor dem Hintergrund bestehender Regulierung.

Essay (4): Fund manager narcissism

Unter Verwendung wortgetreu transkribierter Interviews zeigen wir, dass „Narzissmus“ im besonderen Maße das Portfoliomanagement von Fondsmanagern beeinflusst. Wir finden, dass narzisstische Fondsmanager mit einer um 41% höheren Wahrscheinlichkeit von ihrem im Verkaufsprospekt beworbenen Anlagestil abweichen. Darüber hinaus weisen die von narzisstischen Fondsmanagern verwalteten Fonds ein deutlich höheres Anlagerisiko auf, welches sich nicht in höheren realisierten Renditen widerspiegelt. Jedoch beobachten wir, dass, unabhängig von der Wertentwicklung des Fonds, keinerlei Reaktion der Anlegerseite auf narzisstische Tendenzen des Fondsmanagers vorgenommen wird. Unsere Ergebnisse deuten darauf hin, dass Anleger sich der investitionsrelevanten Konsequenzen dieses Persönlichkeitsmerkmals nicht bewusst sind.

I. Double Dutch finally fixed? A large-scale investigation into the readability of mandatory financial product information

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Own contribution: Ideation, concept, proof of concept, literature gathering and literature review, data preparation, methodology and identification strategy, statistics and analyses, results documentation, documentation of implications, editing

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Double Dutch finally fixed? A large-scale investigation into the readability of mandatory financial product information

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Abstract— With the introduction of short-form disclosure documents, financial regulation in the EU emphasizes the use of plain language to facilitate comprehensibility. We evaluate whether these documents and the accompanying plain language guidelines improve the readability of mandatory product information addressed to mutual fund investors. Applying advanced text mining algorithms, we benchmark the readability of product information by means of objective and readily replicable methods. While mutual fund information on average does not come in plain language, we find that readability improved significantly following the introduction of *Key Investor Information Documents* (KIIDs). Improvements are driven by simpler syntax and writing style. By contrast, we find that the use of jargon remains pervasive and report non-compliance with mandatory design requirements. We discuss our results and propose potential disclosure improvements.

Keywords: Mandatory information disclosure, investor protection, readability, regulation, retail finance, information model

JEL-Classification: D08, D18 G11, G28

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1. Introduction

“Don’t write up. Don’t write down. Write to.”

–Robert Gunning, pioneer of textual readability analysis

In this study, we investigate into the readability of mandatory product information addressed to retail investors. The regulatory goal behind imposing the disclosure of financial product information is to help investors arrive at informed decisions in situations which are likely characterized by a substantial information asymmetry between product providers and investors. To achieve this objective, financial regulation has traditionally mandated that an overwhelming quantity of information be provided to investors in order to support their financial decision making (e.g., Ben-Shahar and Schneider 2014, Choi and Pritchard 2003). Clearly, however, mandatory disclosure may not serve its intended purpose if investors are not able to process the wealth of information they are provided with (e.g., Oehler et al. 2014, Chater et al. 2010, De Pascalis 2014). Prior research documents multiple instances of ‘information overload’ in retail finance, i.e. a situation in which too much information is provided to consumers and, as a result, *reduces* their ability to arrive at well-informed decisions (e.g., Eppler and Mengis 2004, Agnew and Szykman 2005, Oehler and Wendt 2017, Malhotra 1984). Indeed, Huhmann and Bhattacharyya (2005) show that investment companies regularly provide excessively detailed information which goes well beyond what is required by law and some even conjecture that mandatory information disclosure is abused to obfuscate investors rather than inform them (e.g., Warren 2008).¹

In light of the questionable merits of traditional financial product information disclosure, regulatory authorities have shifted their focus away from pure information provision.² Recent disclosure requirements pay heed to long-standing evidence with respect to how humans process information as documented articulately in Kozup et al. (2008, p. 38): “[...] *in order for [...] information to have a positive impact on the consumer decision-making process, it must be easily accessible and presented in a clear and understandable format*”. Specifically, the EU has mandated *Key Investor*

¹ On a lighter note, Allan Sloan (2011), the former senior editor at Fortune magazine, provides a witty distinction of disclosure and transparency stating that “(...) *disclosure is when you bury information in widely separated places in a 400-word document filled with small type. Transparency is when you tell people what they need to know in simple terms in readable type on the cover of a document or within the first few pages. (...) Disclosure is a legal obligation. Transparency is an ethical obligation.*”

² See section 2 for details on the regulatory background of mutual fund product information in the EU.

Information Documents (KIIDs) for mutual funds in an effort to improve the readability of mutual fund product information. As of 2012, KIIDs have superseded Simplified Prospectuses (SPs) and are supposed to provide a comprehensible description of a fund's essential product features. In this study, we examine if these documents live up to their purpose. At this, we focus on investor information disclosed by actively managed equity mutual funds, since holdings in this asset class represent by far the largest fraction of aggregate household investments: in the EU, for example, total assets under management in mutual funds have reached an all-time high of as much as 17.2 trillion EUR by the end of 2019, with the large majority being actively managed (EFAMA 2020).³ Moreover, information disclosure requirements are pervasive for fund companies and the market is a prime candidate for unintended consequences of mandatory disclosure such as information overload: investors face a dizzying number of product options—e.g., as much as 62,511 mutual funds were domiciled in the EU by 2019—and each product carries a host of decision-relevant characteristics.

The introduction of KIIDs marks a paradigm shift in information disclosure in that these documents are legally required to be written *in plain language*.⁴ In order to specify this requirement, the Committee of European Securities Regulators (CESR) has issued the “CESR Guide to clear Language and Layout for the Key Investor Information Document” which provides fund companies with guidance and best practices on how to write in plain language (CESR 2010).⁵ Given that KIIDs are the blueprint for the upcoming *Key Information Documents for Packaged Retail and Insurance-Based Investment Products* (PRIIPs) which extend the concept of harmonized information provision to virtually all consumer finance products, a comprehensive evaluation of these documents is a matter of particular importance.

³ Mutual funds suitable for retail investors in the EU comprise Undertakings for Collective Investments in Transferable Securities (UCITS) and Alternative Investment Funds (AIF). UCITS are organisms whose sole purpose is to invest funds raised from the public for collective account in accordance with the principle of risk diversification in securities and / or liquid financial assets. Shareholder of UCITS shares can request to withdraw their assets of these organisms at any time. Contrary, AIFs cover all funds that do not qualify as UCITS funds. Typical examples for this asset class are hedge funds, private equity funds and real estate funds.

⁴ Commission Regulation (EU) No. 583/2010 – Section II / Article 5: “A key investor information document shall be: a) presented and laid out in a way that is easy to read, using characters of readable size; b) clearly expressed and written in language that communicates in a way that facilitates the investor's understanding of the information being communicated, in particular where: (i) the language used is clear, succinct and comprehensible [...]”

⁵ Note that the CESR was superseded by the European Securities and Markets Authority (ESMA).

To assess the readability of KIIDs, we apply state-of-the-art textual analysis methods. To this end, we retrieve original full-length product information documents pertaining to a large-scale sample of 9,363 funds domiciled in eleven different countries and issued by 205 different mutual fund companies. For each of these documents, we compute an individual Flesh Reading Ease (FRE) score using a fully automated text mining routine which builds on the natural language toolkit (NLTK) package in Python.

Our results suggest that key mutual fund investor information on average does not come in plain language. Compared to mandatory patient information leaflets or national newspapers, product information for mutual funds remains significantly more challenging to read and understand for the average retail investor. At the same time, however, several of our findings document that the introduction of KIIDs and the accompanying CESR's guidelines have improved the comprehensibility of mutual fund product information. On average, KIIDs are significantly easier to read than the preceding SPs. While the use of jargon has not improved much, we find that the CESR guidelines regarding syntax and style indeed lead to enhanced readability of mandatory mutual fund product information. Additional metadata analysis reveals that only roughly half of the product information documents under review comply with CESR design requirements (i.e. font type and size). Finally, we find fund companies domiciled in countries whose official language is the same as the document language comply more accurately with the plain language regulations specified for KIIDs. This ties in with the notion that composing a plain text is particularly challenging if done in a foreign language.

We make three contributions to prior research on KIIDs. First, we add to the ongoing debate about the usefulness of mandatory short-form-disclosure. In an early response to the finding that information representation matters for retail investors, the US Securities and Exchange Commission (SEC) introduced the *SEC Plain English Rule*⁶ in 1998 which Loughran and McDonald (2014b) indeed found to be useful. In a related study, Godwin and Ramsey (2016) evaluate the effectiveness of short-form disclosures in five other economies and find that the Canadian fact sheet launched in 2007, which puts special emphasis on intelligibility, ranks highest in a student online experiment. By contrast, the Australian fact sheet which has remained largely unregulated in terms of

⁶ The SEC Plain English Rule, along with detailed user instructions and best practices on how to provide information clearly and concisely, is documented in a handbook ('*A Plain English Handbook - How to create clear SEC disclosure documents*').

comprehensibility, comes in last. Moreover, they find that the complexity of language ranks as the most relevant determinant of investor attention to product information. Recently, Gilbert and Scott (2017) analyze investors' perception of product information in New Zealand pre- and after the introduction of a short-form disclosure document and report mixed results with respect to its usefulness. While they observe an improvement in finance-related terminology, they find that general language has become more complex and harder to understand in the short-form disclosure. In earlier research, Kozup et al. (2008) show that summary data affects investor assessment of different mutual funds. By contrast, Beshears et al. (2011) find that summary prospectuses lead to a welfare gain in that they reduce the time being spent on an investment decision, but do not alter investment choices.

Second, we analyze comprehensibility and legal compliance of KIIDs by applying objective and thus readily reproducible methods of advanced text mining. This methodology differs from approaches taken in most prior research in the field. Habschick et al. (2012) review a micro-sample of 160 short-form disclosures in Germany (among them 41 mutual fund KIIDs) and conclude that only roughly half of the fact sheets under review complied with the regulatory requirements on completeness of contents, intelligibility, and comparability. Oehler et al. (2014) ask students to compare the usefulness of real-world KIIDs with (mock-) fact sheets designed by the authors themselves and show a preference for the latter. In a related study, Walther (2015) conducts an online experiment in which 137 subjects make hypothetical investment decisions using KIIDs and fund prospectuses and rate their respective usefulness for the task. By contrast, our methodological approach allows for a significantly higher generalizability of results. Moreover, by focusing exclusively on KIIDs of mutual funds, i.e. the most important investment vehicle for retail investors in terms of asset volume, we ensure that our findings are not confounded by variation in intelligibility and regulatory compliance across different asset classes.

Third, we demonstrate the applicability of readability formulas in the context of financial product information. In fact, the use of readability formulas in order to assess complexity in financial communication has been advocated by, e.g., former SEC chairman, Christopher Cox (SEC 2007).

2. Mutual fund product information: regulatory background

Mandatory disclosure of mutual fund product information in the EU dates back to the EU directive 85/611/EEC (UCITS I) effective as of 1985 which marked the first step towards a single European financial market. Specifically, investment companies were mandated to disclose a sales prospectus as well as (semi-)annual financial reports for all open-ended funds distributed to individual investors in the EU.⁷ However, because of inconsistent national law as to the marketing of mutual funds, the level of harmonization proved insufficient for the standard setter's ultimate goal of establishing cross-border authorization and supervision.

As of 2001, directive 2001/107/EC (UCITS III) required management companies to publish a Simplified Prospectus (SP)—intended to summarize the usually lengthy sales prospectus—and make this document available to their investors prior to the purchase of a mutual fund. However, the SP neither lived up to its purpose: *“The Simplified Prospectus has failed as a consumer communication tool because the rules have led to long documents [...], written in technical or legalistic language [...] poorly structured and designed”* (CESR 2010, p. 4).

Hence, a new short-form document, the Key Investor Information document (KIID), has replaced the SP in all EU member states in a *“[...] radical attempt [...] to produce a document that is readily understandable by the average retail investor”* (CESR 2010, p. 4). As of 2012, KIIDs have been a mandatory part of pre-contractual product information for retail mutual funds distributed in the EU.⁸ Again, KIIDs are supposed to provide investors with information on the key features of a UCITS in order to correctly assess scope and risks of the product. However, as a response to the shortcomings observed under the SP regime, KIIDs are limited to a maximum of two pages, have a predefined structure and content and, most importantly, should be easy to read and understand for an average retail investor.⁹ Specifically, EU Regulation 583/2010 requires

⁷ A prospectus must include the information necessary for investors to be able to make an informed judgement of the investment proposed to them. (EU directive 85/611/EEC – Article 28 (1)).

⁸ The mandatory pre-contractual disclosure of a summary of a mutual fund's key characteristics in a *Key Investor Information Document* is part of the UCITS IV directive, effective as of June 2012 (Directive 2009/65/EC).

⁹ Specifically, EU Regulation 583/2010 mandates that KIIDs include the following information: product type and functionality, inherent risks, projected redemption and returns under different capital market scenarios, investment cost. Layout requirements include specifications as regards the sequence of contents as well as a simplified representation of risk, return, and cost of the product. As an exception to the general page limit, KIIDs pertaining to complex structured UCITS may consume up to three pages.

KIIDs be “(...) written in language that communicates in a way that facilitates the investor’s understanding of the information being communicated.” (Section II, Article 5, 1(b)). In order to provide fund companies with guidance on how to prepare KIIDs, the CESR (2010) has published guidelines on clear language and layout of the document. We list these guidelines in **Table I-1** and examine whether they are adhered to in the subsequent sections of this study. Notably, highlighting the importance of plain language as well as standardized format and content marks a paradigm shift in the disclosure strategy of European regulatory authorities.

Table I-1—CESR guidelines

Variable	CESR Guideline
Readability	“ <i>[The KIID] must appear important and easily readable.</i> ” (Part 3 – Designing a KIID)
Sentence length	“ <i>[...] aim to break up any that are over 25 words.</i> ” (Part 2 – Short sentences)
Complex words	(No specific guideline provided)
Jargon	“ <i>[Try] to avoid jargon altogether.</i> ” (Part 2 - Dealing with jargon)
Writing style	
Passive style	“ <i>A formal, passive and impersonal style can lead to redundant words and phrases as well as being unengaging to the reader.</i> ” (Part 2 – Other barriers to language)
Impersonal style	
Superfluous words	
Design	
Typeface	“ <i>Use a typeface that is easy to read, such as Arial (or similar sans serif) or Times New Roman</i> ” (Part 3 – Typeface)
Type size	“ <i>Aim for at least 11pt for serif fonts and 10pt for sans serif fonts</i> ” (Part 3 – Type size)

Notes: This table summarizes the main CESR guidelines. **Appendix I-1** provides detailed variable descriptions.

3. Data and methodology

3.1. Sampling and summary statistics

We collect product information documents for all funds marketed to retail investors in Germany from FWW Fundservices GmbH, who maintain a unique database of product disclosure documents for financial products. To control for potential time effects, we retrieve four different documents from the database: two SPs (earliest and most recent version available) and two KIIDs (first and most recent version available) for each fund in our sample. We access all documents in November 2018. The earliest document (SP)

in our sample was disclosed in 2004, whereas the most recent document (KIID) dates as of October 2018. For a given fund to be admitted to the sample, we require all four documents be available.¹⁰ Our final sample consists of 9,363 funds for which we obtain 37,452 product information documents in PDF format. Sampled funds are domiciled in eleven different countries and issued by 205 different mutual fund companies and asset managers.

To obtain textual characteristics from each document, we need to translate PDF files into machine-readable TXT files. We use the Python PDF2TXT module to extract plain text from the PDF files and supplement this module by a self-coded script, which enables us to obtain textual characteristics on various syntax measures (e.g., sentences, words, syllables) from the product information files in order to automate information processing. At this, we apply state-of-the-art textual analysis methods included in Python's Natural Language Toolkit (NLTK) and adopted to the investigation of text written in German. Finally, we merge the textual information with a host of fund characteristics we obtain from Morningstar Direct in order to explore differences with regards to the readability and format of product information depending on fund characteristics. Following the conventional procedure, we convert all variables at the share class level to fund-level aggregates weighted with their respective contribution to the fund's total net assets (e.g., Doshi et al. 2015).

Table I-2—Summary statistics - mutual funds

	Mean	SD	Min	Median	Max
Fund age (years)	12.45	6.40	6.00	12.00	84.00
Fund size (in € mn.)	721.38	1,170.45	2.21	227.26	7,450.64
Avg. annual gross return '12-'18 (in %)	4.98	4.78	-24.43	4.43	35.84
Avg. annual return std. dev. '12-'18 (in %)	9.24	5.54	0.50	9.90	38.92
Turnover ratio (in %)	70.93	110.92	-68.74	35.35	719.45
Morningstar rating (1-5 stars)	3.03	1.02	1.00	3.00	5.00
Ongoing charge (in %)	1.59	0.59	0.20	1.69	2.92

Notes: This table reports descriptive statistics of our sample of N=9,363 mutual funds. We provide a detailed description of the variables in **Appendix I-1**.

¹⁰ This limits the total of mutual funds covered in our sample from an initial 12,304 funds to a final 9,363 funds.

Table I-2 reports summary statistics of our fund sample. The average fund has been run 12.5 years since inception, holds 721 million EUR in assets, yields an annual gross return of 4.98%, turns over 71% of its assets in a given year, features a three-star Morningstar rating and charges their investors 1.59% annually.¹¹

Table I-3—Summary statistics – SPs and KIIDs

	Mean	Sd	Min	Median	Max
Panel A: Simplified Prospectus (earliest available version)					
Disclosure date	10/2007	694 days	02/2004	03/2007	10/2012
# sentences	454	591	42	130	3,318
# words	11,251	14,389	950	3,432	87,391
Unique words (in %)	26.7	13.6	4.3	28.4	48.0
Complex words (in %)	37.2	3.5	22.5	37.7	45.9
Panel B: Simplified Prospectus (most recent version)					
Disclosure date	03/2011	288 days	06/2005	05/2011	12/2012
# sentences	563	669	50	165	2,909
# words	14,551	17,029	1,202	4,594	67,641
Unique words (in %)	24.7	13.2	4.9	26.4	45.3
Complex words (in %)	38.1	2.4	23.0	38.1	45.3
Panel C: Key Investor Information Document (first version)					
Disclosure date	09/2012	120 days	05/2011	04/2012	10/2018
# sentences	53	8	37	52	74
# words	951	149	632	942	1,338
Unique words (in %)	48.1	3.4	41.4	48.3	56.6
Complex words (in %)	36.2	2.1	22.5	36.6	44.0
Panel D: Newest Key Investor Information Document (latest version)					
Disclosure date	03/2018	190 days	04/2012	02/2018	10/2018
# sentences	60	8	40	60	81
# words	1,073	165	189	1,066	1,469
Unique words (in %)	46.7	3.8	40.8	46.6	88.7
Complex words (in %)	36.8	3.0	20.9	36.9	81.2

Notes: This table reports descriptive statistics of our sample of N=9,363 mandatory disclosure statements for mutual funds registered for sale in Germany. Panel A (B) reports text statistics for mutual funds' Simplified Prospectus (SP) in the earliest (most recent) version available. Panel C (D) reports statistics for product information disclosure in the first (most recent) available Key Investor Information Documents (KIID) as of October 2018. Unique words represent the share of unique words (vocabulary) on total words. Complex words are defined as consisting of three or more syllables (Gunning 1952). We provide a detailed description of the variables in **Appendix I-1**.

Table I-3 reports summary statistics on the sampled SPs and KIIDs. Our sample comprises SPs from 2004 to 2012 (Panels A and B), i.e. the entire period in which these documents were required, and KIIDs from their introduction in 2012 through to 2018

¹¹ We use Morningstar's 'ongoing charge' data point to proxy fund fees. Ongoing charge encompasses the fund's (i) professional fees, (ii) management fees, (iii) audit fees, and (iv) custody fees and hence serves as an accurate proxy for the cost of fund ownership (Morningstar 2020).

(Panels C and D), which marks the end of our observation period. While SPs feature an average number of roughly 500 sentences and 13,000 words, respectively (see mean values of Panel A and B), the short-form disclosure KIIDs, unsurprisingly, make do on only about 56 sentences (1000 words) on average (see mean values of Panel C and D)¹². However, the share of unique words in a given document is almost twice as high for KIIDs as compared to SPs, suggesting that the page limit of KIIDs forced management companies to eliminate redundancies in their product information. Interestingly, we do not observe a measurable impact of the shift from SP to KIID with respect to the usage of complex words.¹³

3.2. *Measuring textual readability*

To assess the comprehensibility of a given fund's product information documents, we apply well-established measures of textual readability. DuBay (2004) argues that traditional readability formulas are the best predictors of text difficulty as measured by comprehension tests.¹⁴ Moreover, he shows that readability formulas are highly positively correlated with the reader's comprehension of a given text, which qualifies them as valid proxies for comprehensibility. The vast majority of extant research relies on two different survey methods to test the validity of readability formulas. Subjects are provided with text passages of different difficulty as measured by a given readability formula and either answer a questionnaire eliciting the extent to which they have understood the text or fill in words that are omitted from the text. Using the number of correct answers to the questionnaire or the number of correct words in the cloze test, validity is then measured as the correlation of subjects' comprehension of the respective text with its readability score provided by the formula under review.¹⁵ Average sentence length and word

¹² Reported numbers on sentences (words) refer to the document mean, i.e. an average SP in our sample contains approximately 13,000 words $(11,251 \text{ (Panel A)} + 14,551 \text{ (Panel B)}) / 2 = 12,901$.

¹³ "Complex" words, i.e. words which are hard to read, consist of more than two syllables (Gunning 1952).

¹⁴ Note that some authors argue that current readability formulas are poorly specified in financial applications. Instead, Loughran and McDonald (2014), for example, propose document file size to capture document readability.

¹⁵ "[Readability formula] predictions correlate very well with the results of the actual readability measurements of expert judgments, comprehension tests, and the cloze procedures" - Kondru (p. 9, 2006). For example, Flesch (1948) finds a correlation of 0.71 between the FRE and text comprehension. Moreover, DuBay (2004) documents readability formulas to capture between 50 and 84 percent of variance in text difficulty. Note, however, that the adequacy of readability measures based on lexical characteristics as proxies for text comprehensibility is discussed controversially in the literature. While Best (2006) argues that "[they] measure much more than is directly contained in the formulas due to the many interactions between linguistic entities", others question the validity of readability formulas (e.g., Hartley 2016, Connaster 1999, Duffy 1985, Manzo 1970).

complexity vary greatly across different languages and readability measures are designed to capture the comprehensibility of a given text in a specific language. While there is a range of different readability measures available for the English language, only a handful of measures have been developed for the German language. In our main analyses, we use the German version of the Flesch Reading Ease (FRE) as introduced by Amstad (1978), i.e. the most prominently applied German measure¹⁶, which is formalized as follows:

$$FRE_{i,d} = 180 - ASL_{i,d} - (58.5 * ASW_{i,d}) \quad (1)$$

where readability measured by the FRE score pertaining to document d of fund i is a function of the average sentence length (ASL) and the average syllables per word (ASW). ASL denotes the average number of words in a sentence of document d and ASW counts the average number of syllables used in a given word of document d .

We calculate the FRE for each document in our sample using a self-coded text analytics program which builds on Python's natural language toolkit (NLTK) package. Specifically, we analyze the lexical characteristics of each processed text document by tokenizing sentences, counting the number of words in each sentence and, if applicable, deconstructing all words into their respective syllables. The FRE takes values between 0 and 100, where a higher score indicates better readability. Amstad (1978) classifies FRE scores as follows: Texts scoring 60 to 70 (higher than 70) are referred to as easy (very easy) to read, average readability is defined by a score between 40 and 60, FRE scores below 40 indicate hard-to-read documents, and texts featuring scores below 30 rate as difficult, i.e. requiring at least university education in order to fully grasp their content.

Moreover, we include a number of additional determinants of textual readability suggested in the CESR guidelines on the design of KIIDs but not captured via the FRE measure. Specifically, we analyze whether important style components (active voice, personal style and superfluous words), the use of jargon (financial terminology) and textual design (font type and font size) comply with the CESR guidelines summarized in **Table I-1**. To this end, we apply a bag-of-words technique (e.g., Loughran and McDonald

¹⁶ Alternative, less frequently applied readability measures designed for the German language include the *Wiener Sachtext-Formel* proposed by Bamberger and Vanecek (1984); the German version of the *Simple Measure of Gobbledygook* (gSMOG) following Bamberger and Vanecek (1984); the *Kölner Verständlichkeitsindex* following Jussen (1983) and the *Lesbarkeitsindex* from Björnsson (1968).

2015) using several established dictionaries and conduct a metadata analysis of the PDF files under review.

To investigate into the effectiveness of KIIDs and the accompanying CESR guidelines on plain language, we test for statistical significance of differences in readability and writing style measured for SPs and KIIDs, respectively. At this, we focus on changes between the *most recent* SP and the earliest, i.e. *first-ever* KIID for a given fund in our sample, since the date of the regulatory intervention can be pinned down to lie in the time period between the issuance of the two documents. Yet, to uncover potential time trends, we also include the earliest SP as well as the most recent KIID, i.e. analyze a total of four documents per fund.

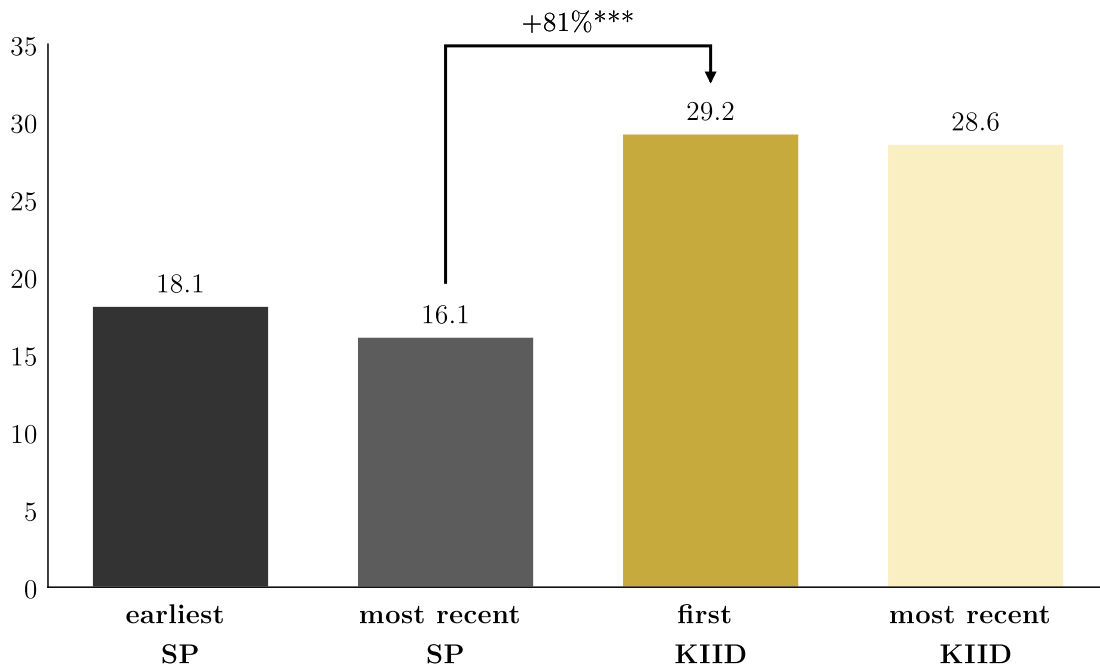
4. Results

4.1. Has the introduction of KIIDs improved readability?

Figure I-1 plots average FRE scores pertaining to the four documents under investigation. As can be inferred, all documents score below 30, indicating very low levels of readability. According to the Flesch interpretation scheme adapted by Amstad (1978), mutual fund product information provided in both SPs and KIIDs is very difficult to read for its addressees and requires at least university education. These values square well with the results reported in a study by Henselmann et al. (2009), which, to the best of our knowledge, has thus far been the only investigation into the readability of financial information in German language. For a micro-sample of 19 IPO prospectuses, they obtain FRE scores ranging from 20 to 35.

Figure I-1—Readability measures

Avg. Flesch Reading Ease (FRE)



Notes: This figure illustrates the Flesch Reading Ease (FRE) readability score as measured by their (German) Flesch-Reading Ease (following Amstad 1978) for the four panels ([earliest/most recent] SP and [first/most recent] KIID) under investigation.

To put these scores into perspective, we compare them with extant readability analyses of patient information leaflets, i.e. a related instance of mandatory information disclosure to consumers which has been researched quite extensively.¹⁷ Pires et al. (2015) survey a total of 22 studies on the readability of medicine package leaflets published between 2008 and 2013. Overall, those studies manifest a low level of readability of the package leaflets and the need to simplify the texts (e.g., Pinero-Lopez et al. 2011, Roskos et al. 2008, Weiss and Smith-Simone 2010). Product information is found to be too complex, with some package leaflets requiring university education.¹⁸ This is in stark contrast to the five years of education recommended by the Food and Drug Administration (FDA). Yet, featuring an average FRE score of 29, the comprehensibility

¹⁷ The European Commission’s guide “Guideline on the Readability of the Label and the package Leaflet of Medicinal Products for Human Use”, becoming effective as of June, 12th, 2009, dedicates its first chapter to the specification of levers to improve leaflet readability (“Chapter 1 Readability of the package leaflet and the labelling”). Among others, type size and font, layout, headings, syntax (e.g., short sentences) and style are mentioned as major levers to improve readability. (EC 2009)

¹⁸ Note that Pires et al. (2015) perform a systematic review of readability studies relying on English, Portuguese, Italian, French, or Spanish drug leaflets, thus applying slightly different readability formulas than applicable to German.

of mutual fund product information is well below that of German patient information leaflets, which feature average readability (FRE score of 47.6) reported by Merges and Fathi (2011). Hence, while dealing with an arguably equally complex topic, mandatory product information for drugs appears to be substantially more readable. Interestingly however, Pinero-Lopez et al. (2016) show that the readability of patient information leaflets has not improved ever since the EC introduced its guideline on the readability of package leaflets, a finding which is corroborated by Segura-Bedmar and Martinez (2017).

Moreover, Kercher (2010) analyzes the readability of national newspapers in Germany around the federal elections in 2009. He finds that the news outlets under review vary greatly in readability (Bild Zeitung: 61.3; Süddeutsche Zeitung: 52.7; Spiegel: 54.0), however, none of them rates as hard-to-read. In a related study, Kercher and Brettschneider (2011) analyze the comprehensibility of speeches delivered by German politicians. E.g., the FRE score computed for the 2007 Christmas speech of former federal president Köhler was as high as 65 and thus qualified as easy to understand, while an online podcast issued by chancellor Merkel still featured a FRE score of 47, i.e. average readability. Thus, financial product information in Germany also seems to be significantly harder to understand than newspapers or political speeches.

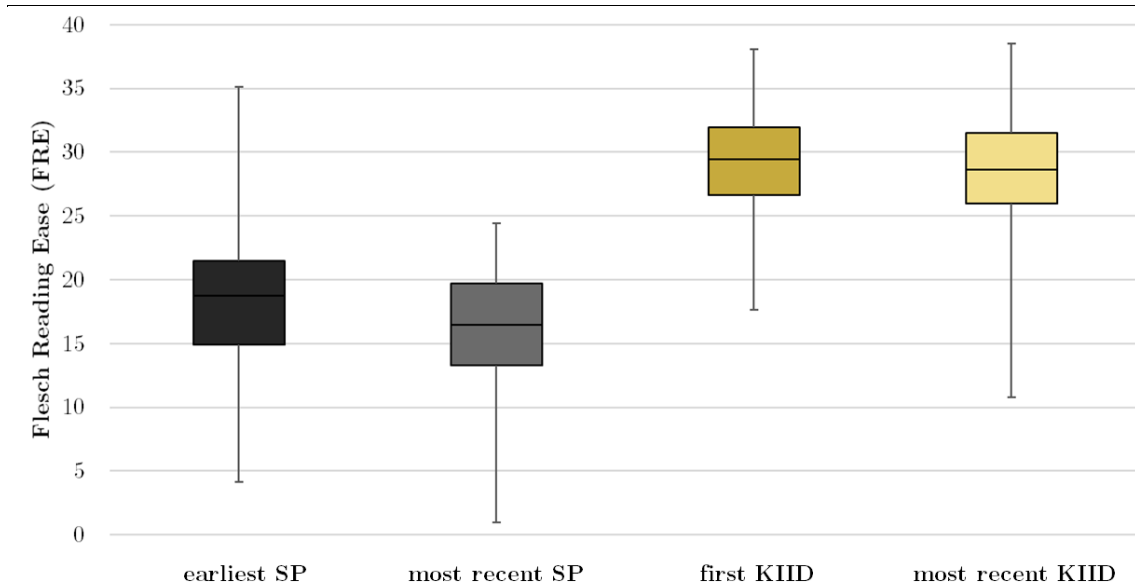
As can be inferred from **Figure I-1**, we document a statistically significant and economically relevant increase in readability along with the introduction of KIIDs in 2012. The improvement is not only large in magnitude, but has also been persistent ever since SPs have been replaced by KIIDs. Specifically, the average FRE score increases by 13.1 points, i.e. a relative improvement in readability of a given funds' KIID of as much as 81% when compared to the FRE score of that funds' most recent SP.¹⁹

Figure I-2 plots the distribution of readability scores for the sampled SPs and KIIDs and implies moderate variation within the respective document types. While product information provided in SPs is very difficult to read in virtually all cases, at least some of the KIIDs are in the range of 30 and above, indicating hard-to-read, but not difficult, text. Taken together, these empirical results point to a significant improvement in comprehensibility of mandatory mutual fund product information, as proxied by the

¹⁹ Average FRE of earliest KIIDs: 29.2 and average FRE of most recent SPs: 16.1: $\frac{29.2 - 16.1}{16.1} = 81.37\%$

FRE score, in recent years. Yet, readability of financial product disclosures lags behind that of mandatory consumer disclosures in other domains.

Figure I-2—Readability box plots



Notes: This figure shows box plots of the product information documents readability as measured by their (German) Flesch Reading Ease (following Amstad 1978). We provide a detailed description of the applied variables in **Appendix I-1**.

Better readability as measured by FRE may result from either (i) avoiding complex words and/or (ii) using shorter sentences.^{20,21} In addition to these two characteristics, several other factors have been shown to affect text difficulty (CESR 2010) but do not enter the FRE formula. To account for a potential influence of these additional characteristics, we supplement our analysis by examining (iii) writing style, (iv) use of financial jargon, and (v) text design.

4.2. Factors affecting readability

4.2.1. Complex words

Figure I-3 illustrates the share of complex words in the sampled texts (LHS) as well as their average word complexity captured by the number of syllables (RHS). We do not find a significant change in the usage of complex words: for both SPs and KIIDs, we obtain a share of complex words between 36 and 38 percent. Moreover, the decrease in

²⁰ Complex words are defined as featuring more than three syllables in the CESR guidelines.

²¹ The CESR guidelines call for avoiding sentences featuring more than 25 words.

the average number of syllables per word from 2.35 in case of SPs down to 2.2 for the sampled KIIDs is economically small and only borderline significant, hence confirming the pattern.²² This evidence suggests that the vocabulary used to describe the key characteristics of a mutual fund has not changed much.

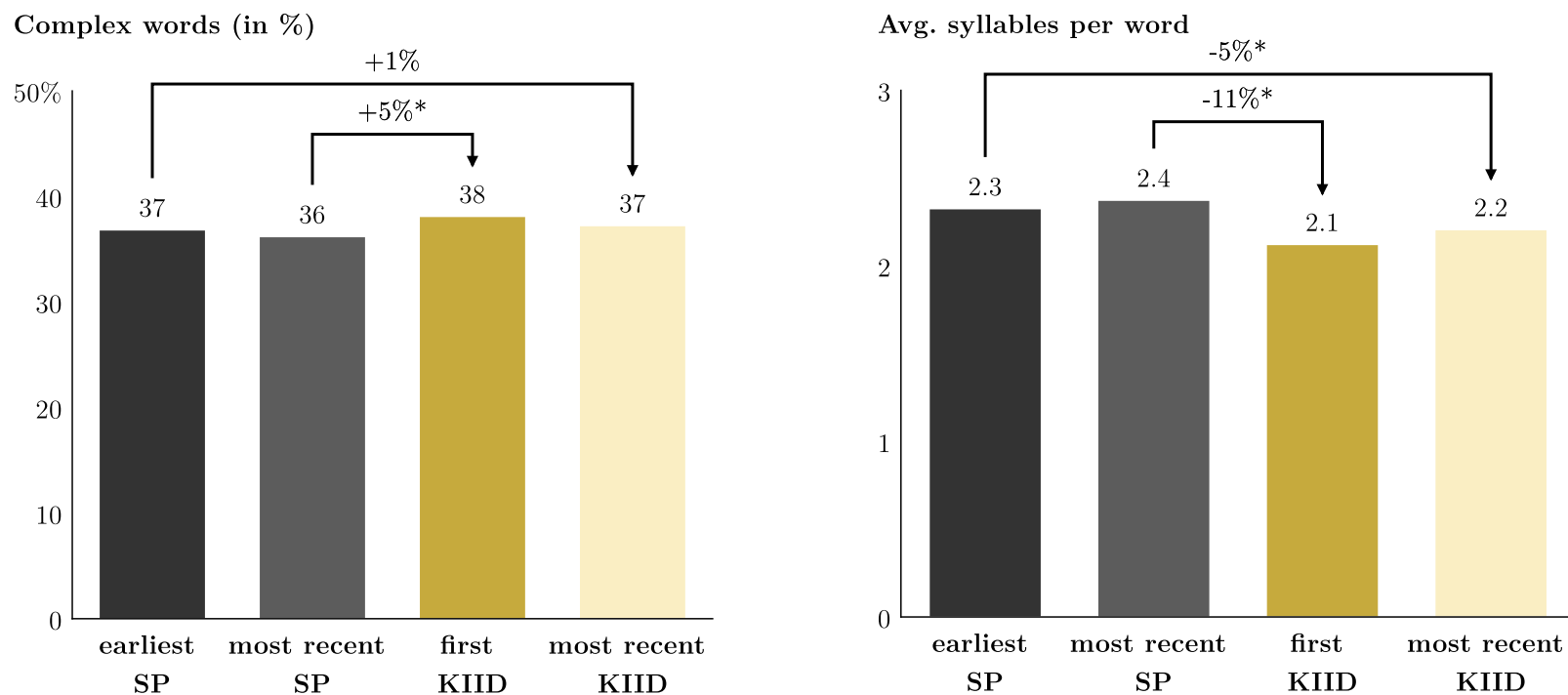
4.2.2. Sentence structure

Next, **Figure I-4** plots the percentage of long sentences in the documents under review (LHS) as well as their average sentence length (LHS). We find that KIIDs have a significantly lower share of long sentences than SPs; in fact, the use of hard-to-understand syntax has almost halved ever since SPs have been replaced by KIIDs. Moreover, KIIDs contain an average 18 words per sentence while the average SP in our sample comes to as much as 25 words, i.e. features about 50% longer sentences. Note that our results on sentence length of KIIDs tie in with prior evidence in the medical domain. Investigating patient information leaflets, Fuchs et al. (2006) report an average sentence length of 15.7 words, a number which is corroborated by Merges and Fathi (2011), who find an average sentence length of 15 to 17 words for the sampled leaflets. Despite the improvements in readability brought by the introduction of KIIDs, however, the average sentence in the mutual fund product information under review still features almost three times as many words as the average text passage in national German newspapers, i.e. making this information substantially more difficult to digest.²³

²² To put our results pertaining to word complexity into perspective: Kercher (2010), in his study on the text structure of national newspapers in Germany, e.g., documents an average word length ranging from 1.83 syllables (Bild Zeitung) to 1.91 syllables (Süddeutsche Zeitung).

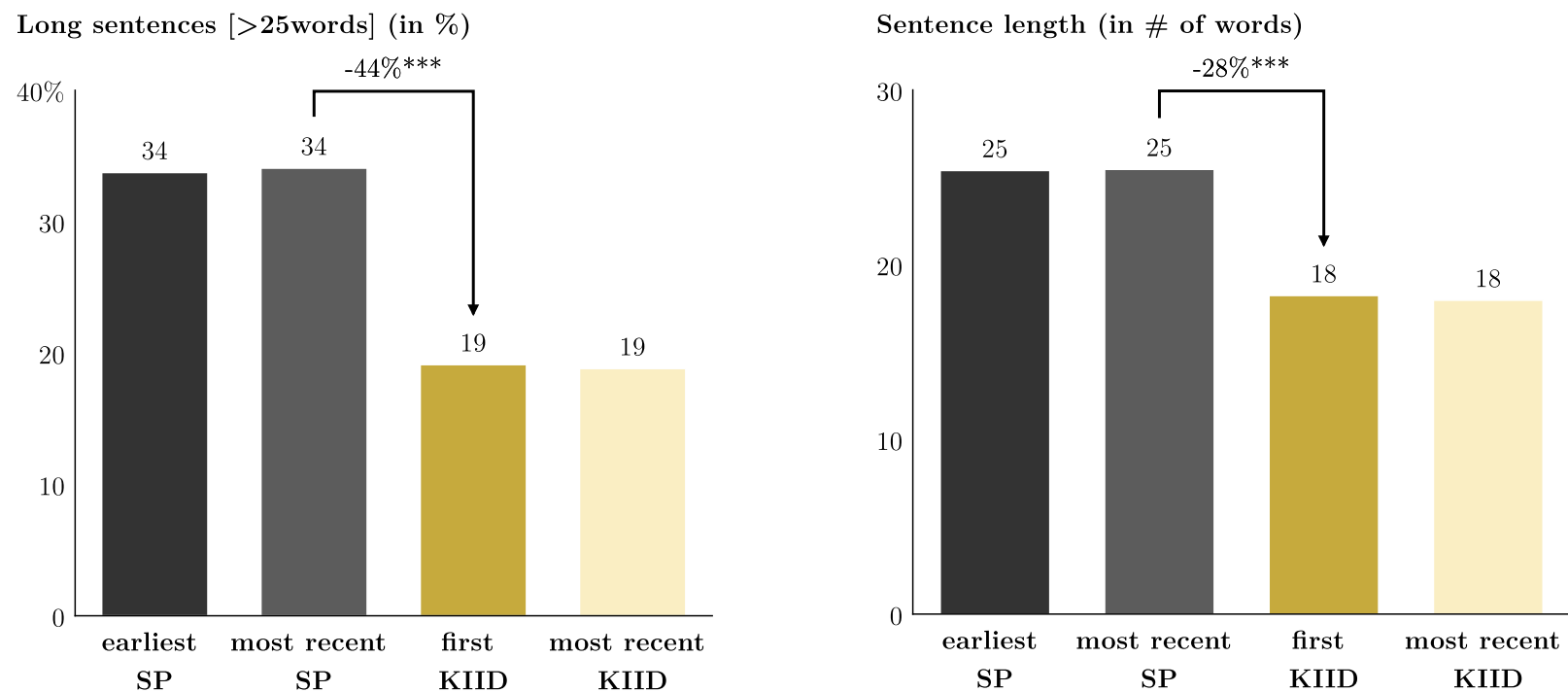
²³ Kercher (2010) documents an average sentence length of 5.6 words (Bild Zeitung) to 7.1 words (Süddeutsche Zeitung).

Figure I-3—Complex words and syllables per word



Notes: This figure shows the usage of complex words and the average syllables per word for the four product information documents under investigation. Complex words are defined as those word containing three or more syllables (e.g., Loughran and McDonald (2012)). Bar comparison lines describe the relative difference in complex words (avg. syllables per word) between the earliest and most recent document of a fund in our sample (outer comparison) as well as between the change in relevant product information document from SP to KIID (inner comparison). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

Figure I-4—Long sentences and average sentence length



Notes: This figure shows the usage of long sentences and the average sentence length (measured in number of words) the four product information documents under investigation. Long sentences are defined as those sentences consisting of more than 25 words according to the section “Short Sentences” of the CESR’s guide to clear language and layout for the Key Investor Information document. Bar comparison lines describe the relative difference in long sentences (sentence length) for the change in relevant product information document type from SP to KIID. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

4.2.3. Writing style

In our first supplementary analysis beyond the FRE-determinants, we analyze the writing style of the different documents in our sample. Writing style is relevant, since “[...] *formal, passive and impersonal style [... can] be unengaging to the reader*” (CESR 2010, p.7). Thus, we first infer the active tone of either document type by computing the number of verbs in passive form relative to the total number of sentences. Second, we construct a variable capturing the number of personal pronouns in a given text relative to the total number of words in order to approximate the personal style of the documents under review. Third and finally, we count the number of superfluous words as defined in the German version of the Technical Writers’ Companion.¹

Figure I-5 reports our results pertaining to the occurrence of the relevant style components in SPs and KIIDs, respectively. KIIDs are different from SPs in that they feature a more active tone, use a higher share of personal pronouns and a lower share of superfluous words than SPs. Note that these differences in writing style are highly statistically significant along all dimensions under review, i.e. suggesting that fund companies live up to the style requirements set down in the CESR guidelines.

4.2.4. Financial jargon

Moreover, the use of jargon, i.e. special words and phrases which are exclusively or primarily used by a particular group of people (Cambridge Dictionary 2020), compromises textual readability considerably. In fact, jargon is pervasive in the mutual fund industry and therefore—beyond word complexity and writing style—many text passages have been shown to be difficult to understand for retail investors simply because they are not fluent in ‘fund jargon’ (e.g., De Pascalis 2014). Consequently, the CESR guidelines call for management companies to avoid jargon whenever possible.

In the vein of Loughran and McDonald (2015), we capture the extent to which mandatory mutual fund product information includes jargon by applying a dictionary approach referred to as the ‘bag-of-words method’. Specifically, we quantify the overlap of words used in the documents under review with two widespread glossaries, which aim at explaining financial jargon to German retail investors, i.e. the *ING Börsenlexikon* (2020) and the *Frankfurter Allgemeine Zeitung (FAZ) Börsenglossar* (2020). To this end,

¹ https://www.indoition.com/de/technical-writing-companion-de/de_schwarze_liste_fuellwoerter.html

we define all entries in the two glossaries to represent financial jargon and count each word's unique occurrence in the text under review as well as the total number of jargon words per document. We draw on the *ING Börsenlexikon* because ING is one of the largest retail banks in Germany. Likewise, we select the *FAZ Börsenglossar* because the FAZ is Germany's third-largest national newspaper and features the most reputable business news (IVW 2020).

Figure I-6 plots the corresponding results. Counterintuitively, we document a strong and significant increase in the percentage of financial jargon used in KIIDs as compared to SPs. This increase holds for both the total number of jargon words used, which is up by 25% (55%) when using the ING glossary (FAZ glossary) and the share of unique jargon words in a given document, which is up by 20% (22%). Moreover, when we compare the first KIIDs to the most recent ones, we observe that the use of jargon has further increased in recent years. The increase is robust to the financial glossary we employ and, of course, runs counter to the improvements in comprehensibility documented in sections 4.2.2. and 4.2.3.

4.2.5. Text design

Finally, the CESR guidelines pay special attention to certain design elements which make for a document that appeals to the reader and thus increase the likelihood of being read.² Hence, we investigate into whether or not the mandatory mutual fund product information documents heed the CESR advice as to font size and typeface. The CESR recommends easy-to-read fonts such as Arial or Times New Roman and a font size of at least 11 point for serif (e.g., Times New Roman) and 10 point for sans serif fonts (e.g., Arial).³ To readout the typeface and font size used in the sampled documents, we compute a text algorithm based on the Python module *PDFMiner* which enables us to automatically analyze the PDF metadata of each document under review.

Figure I-7 plots the distribution of the primary font size used in the sampled documents which turns out to be approximately normal with a mean font size of 10 point.⁴ However, the fat tail at the lower end of the distribution indicates that a sizeable number

² See *Part 3: Designing a KIID* in the CESR guidelines.

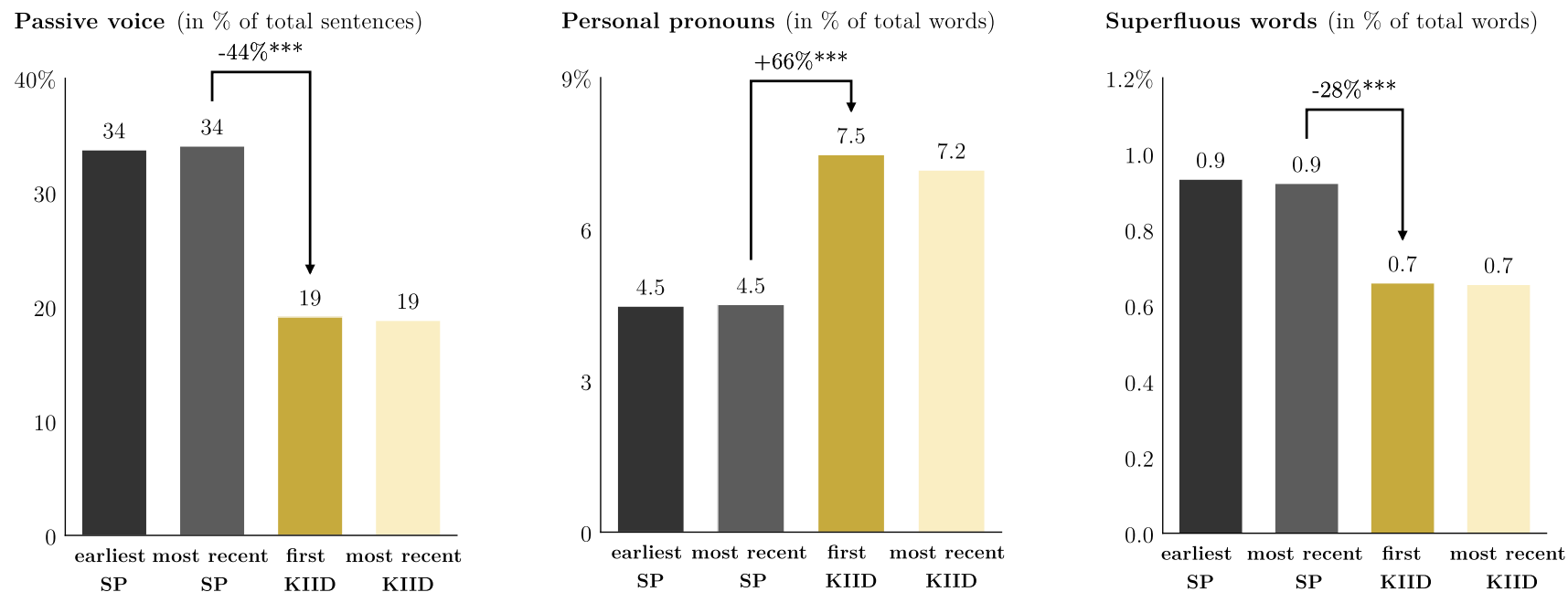
³ Note that the CESR guidelines are slightly more restrictive than those pertaining to the readability of patient information leaflets specifying "(...) a type size of 9 point (...) as a minimum." (European Commission 2009, p.7).

⁴ We define the primary font size of a document as the font size used for at least 85% of the words in that document. We drop observations in which multiple font sizes occur in the text body (excluding headings and legal disclaimers).

of SPs and KIIDs under review do not heed the CESR design guidelines. Similarly, **Figure I-8** illustrates the share of documents written in the recommended typeface (i.e. Arial or Times New Roman) as well as the share of documents which meet the minimum font size recommendation. To spell out the differences, **Appendix I-2** provides examples of a KIID in conformity with the CESR design guidelines (LHS; typeface: Arial, font size: 12 point) as well as a KIID which does not meet the respective recommendations (RHS; typeface: Times New Roman, font size: 8 point). The left-hand side of **Figure I-8** shows that only about half of all sampled documents use either Arial or Times New Roman. Moreover, our results pertaining to font size show a virtually linear downward-sloping trend. Whereas about 85% of SPs applied a font size of 10 point or greater (depending on typeface), only 53% of the most recent KIIDs meet the recommendations regarding minimum font size. The substantial decline could owe to the strict page limits of KIIDs which in turn might lead to fund companies cramming these documents full with information.⁵ Notably, this approach is counterproductive in that a reduction in font size of product information has been shown to discourage consumers from reading it (e.g., Adams and Edworthy 1995, Bernardini et al. 2001, Luna et al. 2019).

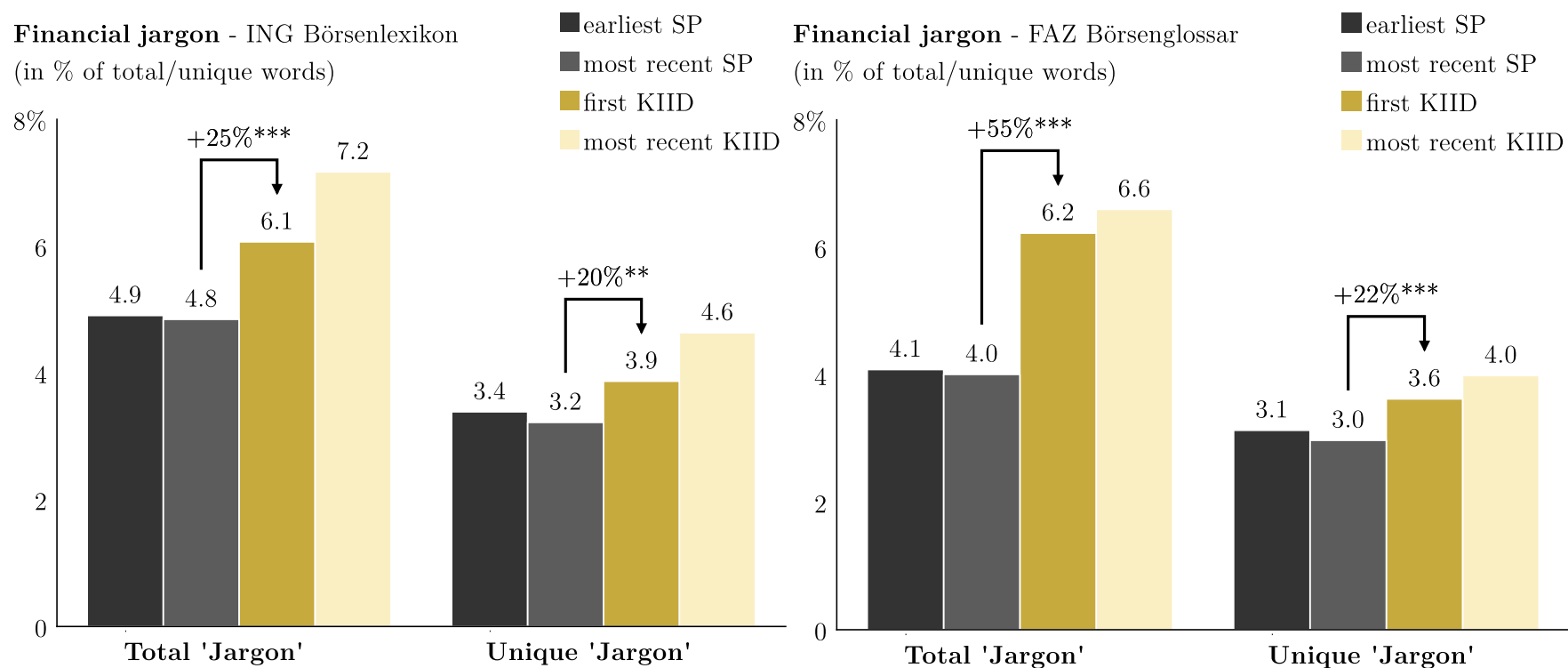
⁵ In unreported analyses, we document that the configuration of typeface and font size seems to be a decision at the *fund company* level and is only marginally influenced by the degree of complexity of a given *fund product*.

Figure I-5—Writing style – passive voice, personal pronouns and superfluous words



Notes: This figure illustrates the “writing style” used in the four product information documents under investigation. Passive voice captures verbs used in the “passive” form. Personal pronouns proxy for the ‘personality’ writing style and comprise all relevant pronouns (e.g., “I”, “You”, “We”, “Our”, “Your”, etc.). Superfluous words build on the Technical Writers’ Companion “Schwarze Liste: Füllwörter” (https://www.indoition.com/de/technical-writing-companion-de/de_schwarze_liste_fuellwoerter.html). Bar comparison lines describe the relative difference in passive voice (personal pronouns; superfluous words) for the change in relevant product information document type from SP to KIID. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

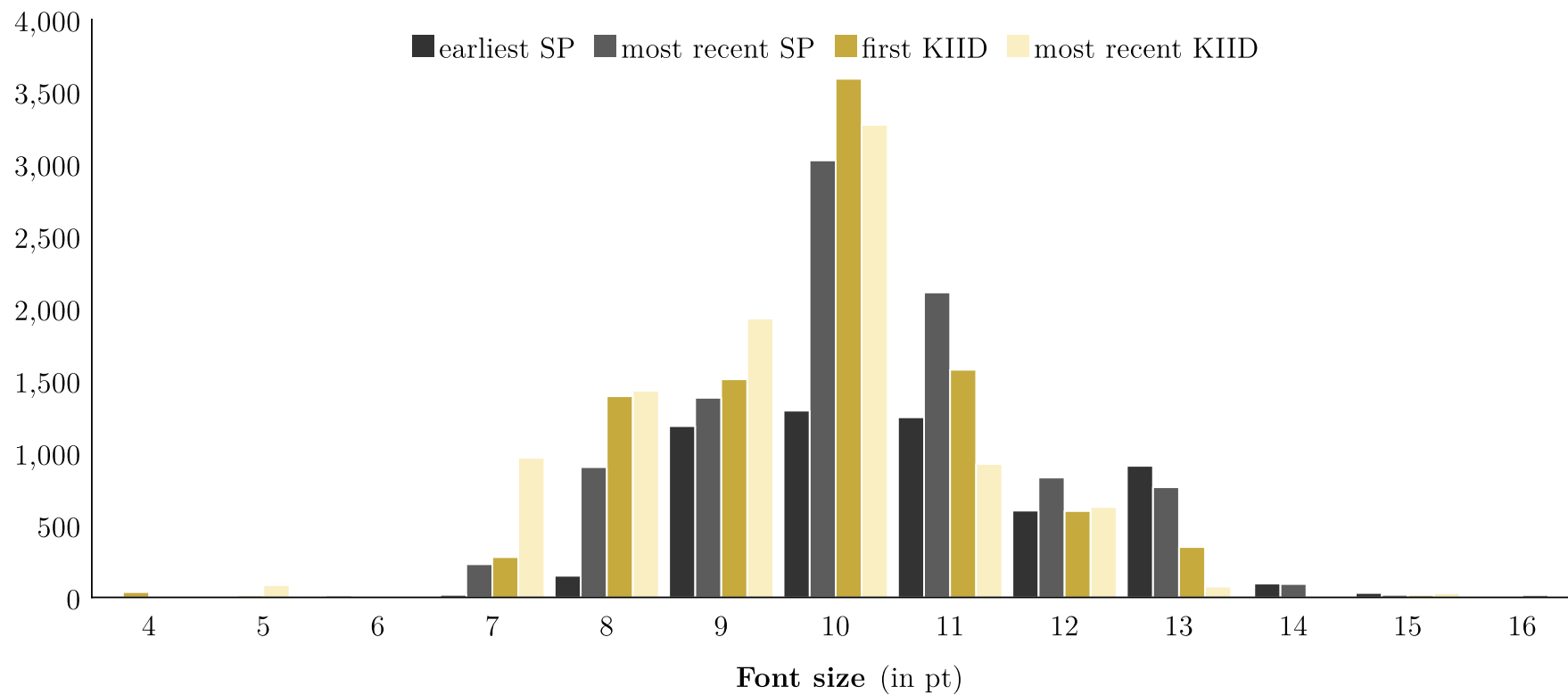
Figure I-6—Financial ‘jargon’ usage



Notes: This figure shows the usage of financial jargon as captured by two widespread German finance/stock exchange glossaries (left: ING Börsenlexikon / right: Frankfurter Allgemeine Zeitung [FAZ] Börsenglossar). Total ‘Jargon’ is defined as the relative share of financial jargon in a document contained in the respective glossary divided by the total number of words in this document (Total ‘Jargon’/Total Words). Unique ‘Jargon’ refers to the vocabulary’s unique overlap with the respective glossary (Unique ‘Jargon’ /Unique Words). Bar comparison lines describe the percentage difference in financial jargon usage for the change in relevant product information document type from SP to KIID. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

Figure I-7—Font size distribution

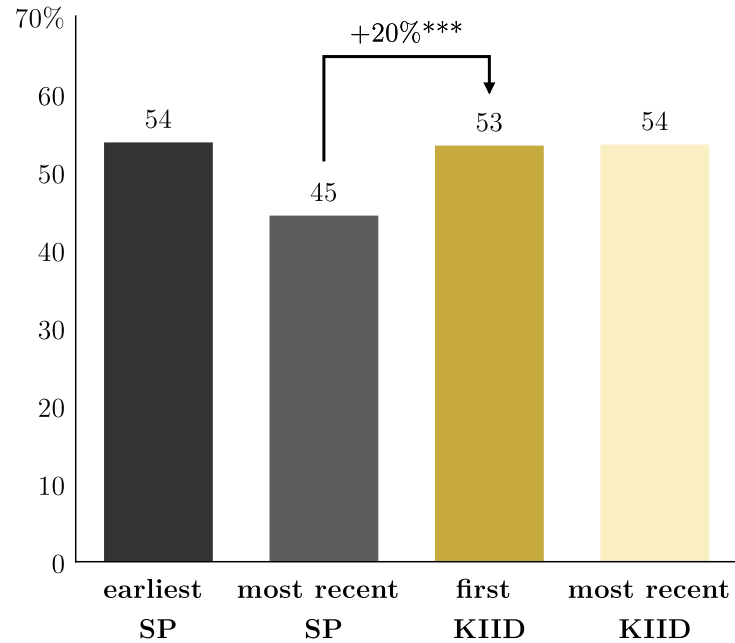
of documents



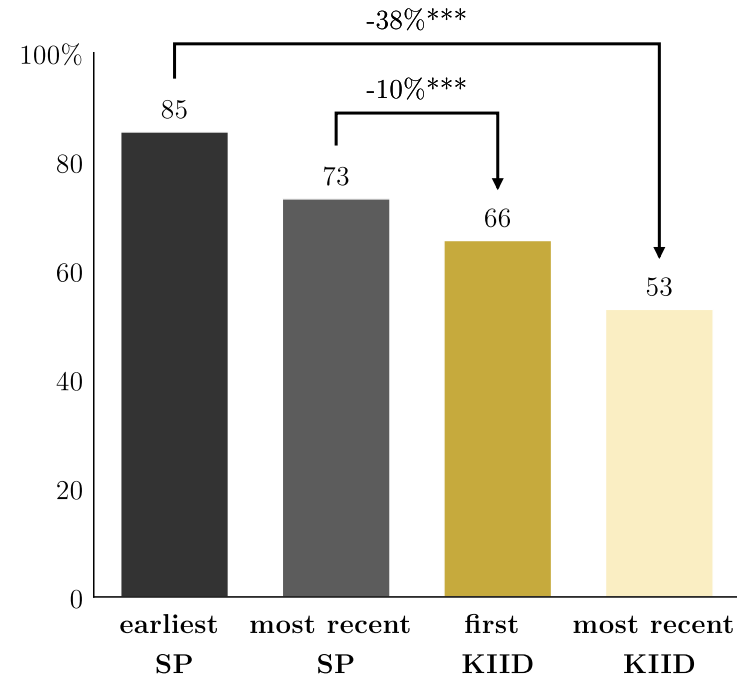
Notes: This figure plots the distribution of font sizes applied to any of our product information documents under investigation.

Figure I-8—Font typeface and font size compliance

Share of documents written in recommended font typeface



Share of documents compliant to min. font size requirement



Notes: This figure illustrates the percentage share of product information documents written in accordance with the CESR’s guideline regarding typeface (font) and type size as specified in “Part 3: Designing a KIID”. Bar comparison lines exhibit the relative difference of documents written in accordance with those requirements for change in product information document type from SP to KIID (inner comparison). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

4.3. Further analyses

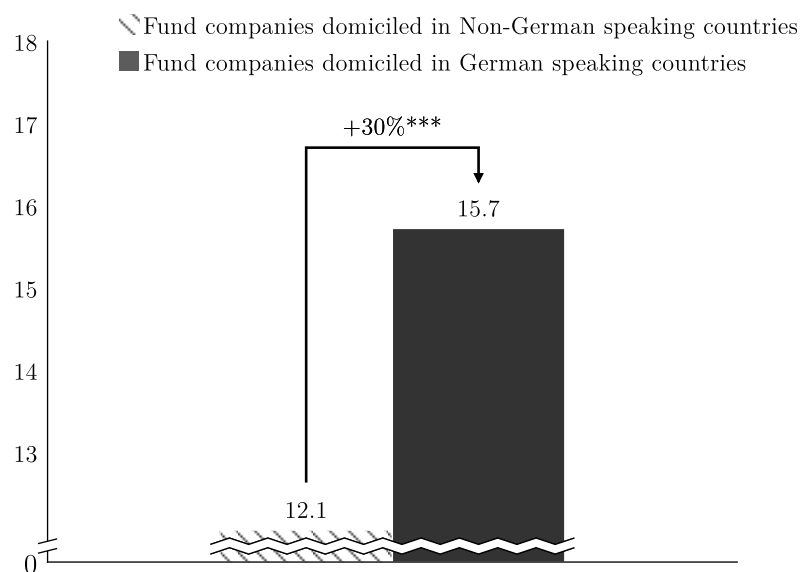
4.3.1. Fund-specific differences in document readability

It is conceivable that the readability of mutual fund product information also relates to fund characteristics other than the textual characteristics of the mandatory disclosure documents. Specifically, note that the CESR guidelines make the implicit assumption that investment companies are capable of preparing easy to read product information. Yet, this need not necessarily be the case. Even if fund managers comply with the new regulations related to content and structure of KIIDs, they might not be familiar with the ‘art of plain language writing’ (e.g., Aboulian 2011). Following this rationale, we would expect fund companies domiciled in countries where German is among the official languages—i.e. Germany, Austria, Liechtenstein, and Switzerland—to cope more easily with the plain language regulations specified for KIIDs. This is because writing in a foreign language is generally associated with specific difficulties (e.g., Reichelt et al. 2012) and composing a text in plain language is particularly challenging for non-natives (European Commission 2016).

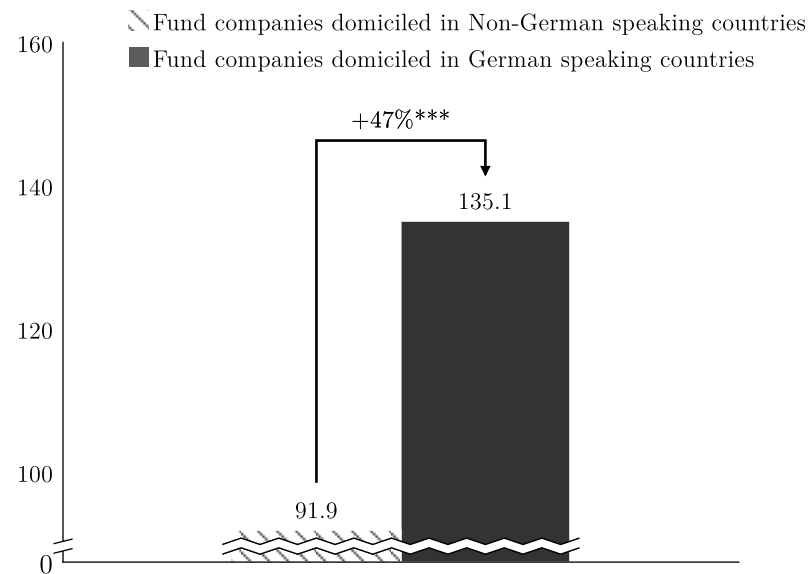
Figure I-9 depicts the absolute improvement (LHS) and relative improvement (RHS) in the readability of the sampled product information documents by comparing the *most recent* (last) SP of a given fund with its first-ever KIID. Solid bars illustrate FRE scores of funds issued by investment companies domiciled in countries where German is among the official languages, whereas hashed bars represent funds domiciled in the remainder of domicile countries. Indeed, we observe a 47% difference in document readability between the two groups: while the average improvement in readability increases by 15.7 FRE points among countries in the former subsample, it only improves by 12.1 FRE points for funds domiciled in the latter group of countries.

Figure I-9—German vs. non-German speaking domiciled fund companies

Abs. FRE score improvement (most recent SP to first KIID)
(in FRE score)



Rel. FRE score improvement (most recent SP to first KIID)
(in %)



Notes: This figure shows the absolute (left) and relative (right) improvement in product information documents readability from the latest SP to the first KIID of a fund in our sample for funds of investment management companies that are (not) domiciled in a primarily German speaking country (Germany, Austria, Liechtenstein, Switzerland). Readability is measured by the (German) Flesch Reading Ease (following Amstad 1978). Bar comparison lines indicate relative difference in document readability between funds domiciled in German vs. non-German speaking countries. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

To analyze yet other sources of variation in the comprehensibility of the documents under review, we also regress the improvement in readability on a number of fund characteristics potentially associated with fund companies' efforts to meet the intelligibility standards, formally:

$$\begin{aligned}
& \textit{Improvement FRE}_i \\
&= \alpha + \beta_1 \textit{German speaking}_i + \beta_2 \textit{Affiliated}_i + \beta_3 \textit{ETF}_i \\
&+ \beta_4 \textit{Equity fund}_i + \beta_5 \textit{Fund age}_i + \beta_6 \textit{Ln(Fund size)}_i \\
&+ \beta_7 \textit{Ongoing charge}_i + \beta_8 \textit{Turnover ratio}_i \\
&+ \beta_9 \textit{Yearly fund return}_i + \beta_{10} \textit{Yearly return sddd. dev.}_i \\
&+ \beta_{11} \textit{Morningstar rating}_i + \delta' \mathbf{c}_{i,t} + \varepsilon_{i,t}
\end{aligned} \tag{2}$$

where the dependent variable denotes the absolute or relative improvement in readability of document i measured by comparing the FRE score of the last SP of a given fund in our sample to that of its first KIID. *German speaking* indicates whether a fund's management company is domiciled in a country where German is among the official languages. Additionally, we include a set of fund level controls described in **Appendix I-1**.

Table I-4 reports the corresponding coefficient estimates. Even after controlling for a large set of fund characteristics, we find funds domiciled in German-speaking countries to improve their FRE score by an average 2.8 points more than their non-German speaking equivalents, thus corroborating the univariate results illustrated in **Figure I-9**. Note that this difference is not only statistical significant, but also economically meaningful: the difference corresponds to an incremental increase in readability of 40.3% subsequent to the introduction of KIIDs.

Second, three out of the five largest fund companies in Germany are in fact distributed by the asset management divisions of banks—referred to as ‘bank-affiliated funds’ in the literature—with Deka (central asset manager of all German savings banks), Union Investment (central asset manager of all German cooperative banks) and DWS (Deutsche Bank's asset manager) leading the way (e.g., Ferreira et al. 2018, Heyden et al. 2020).¹ Retail clients of banks with an affiliated investment management company are typically recommended a limited selection of funds issued by this particular provider (e.g., Florentsen et al. 2020, Heyden et al. 2020). Given the relevance of these funds in

¹ Following extant research (e.g., Ferreira et al. 2018), we label funds as ‘bank-affiliated’ if the fund's ultimate owner is a commercial bank, savings bank, or cooperative bank.

Germany, we examine if there are differences in the readability of the mandatory fund information of affiliated versus unaffiliated funds. As can be taken from the regression equation (2), we include an indicator variable $Affiliated_i$, denoting whether fund i is a bank-affiliated fund. Indeed, our empirical results imply that the KIIDs of affiliated funds are easier to understand for retail investors. More precisely, we find that the readability of affiliated funds improved by 1.6 points on the FRE score which translates into an incremental improvement of 12.5%.

Third and finally, there is some heterogeneity as to the product complexity of the sampled funds. Active portfolio management strategies, e.g., are arguably more difficult to explain to the investor than an investment which simply tracks a given benchmark index. This is likely to affect readability levels and, supporting this conjecture, **Appendix I-3** reports higher FRE scores for exchange-traded funds (ETF). Moreover, even for the multivariate setting in equation (2), we find that ETFs, which we classify as being less complex fund products, are associated with a particularly large improvement in readability following the introduction of KIIDs (0.49 FRE points; 21.1% incremental increase).

Table I-4—Readability improvement – multivariate analysis

	Improvement of readability [FRE] (most recent SP to first KIID)	
	Absolute (1)	Relative (2)
German speaking	2.844*** (0.160)	0.403*** (0.0230)
Affiliated	1.571*** (0.167)	0.125*** (0.0256)
ETF	0.486* (0.252)	0.211*** (0.0318)
Equity fund	-0.356* (0.205)	-0.129*** (0.0296)
Fund age	-0.0286*** (0.00818)	-0.00649*** (0.00112)
Ln(Fund size)	-0.382*** (0.0314)	-0.0311*** (0.00463)
Ongoing charge	1.013*** (0.119)	0.0799*** (0.0167)
Turnover ratio	-0.00365*** (0.000540)	-0.000828*** (0.0000761)
Avg. annual gross return '12-'18	0.0666*** (0.0168)	0.00926*** (0.00224)
Avg. annual return std. dev. '12-'18	-0.0983*** (0.0186)	-0.00433 (0.00265)
Morningstar rating	0.0511 (0.0376)	0.0117** (0.00504)
N obs.	9,363	9,363
R ² (overall)	0.113	0.092
Robust SE	YES	YES

Notes: This table reports coefficient estimates obtained from the regression model

$$\begin{aligned}
 & \text{Abs. or Rel. Improvement } FRE_i \\
 & = \alpha + \beta_1 \text{German speaking}_i + \beta_2 \text{Affiliated}_i + \beta_3 \text{ETF}_i + \beta_4 \text{Equity fund}_i \\
 & + \beta_5 \text{Fund age}_i + \beta_6 \text{Ln(Fund size)}_i + \beta_7 \text{Ongoing charge}_i + \beta_8 \text{Turnover ratio}_i \\
 & + \beta_9 \text{Avg. annual gross return}_i + \beta_{10} \text{Avg. annual return std. dev.}_i \\
 & + \beta_{11} \text{Morningstar rating}_i + \delta' c_{i,t} + \varepsilon_{i,t}
 \end{aligned}$$

where the dependent variable is documents i 's improvement in readability as measured by FRE from the latest SP to the first KIID in our sample. Specification (1) refers to absolute improvement, whereas (2) is linked to relative improvements in readability vs. the latest SP. German speaking is a binary variable and indicates whether a fund's management company is domiciled in a German speaking country. Affiliated is a binary variable and denotes 'bank-affiliated' mutual funds. ETF is a binary variable and indicates whether a fund qualifies as exchange traded fund (passive investment). We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

4.3.2. Alternative measures of readability

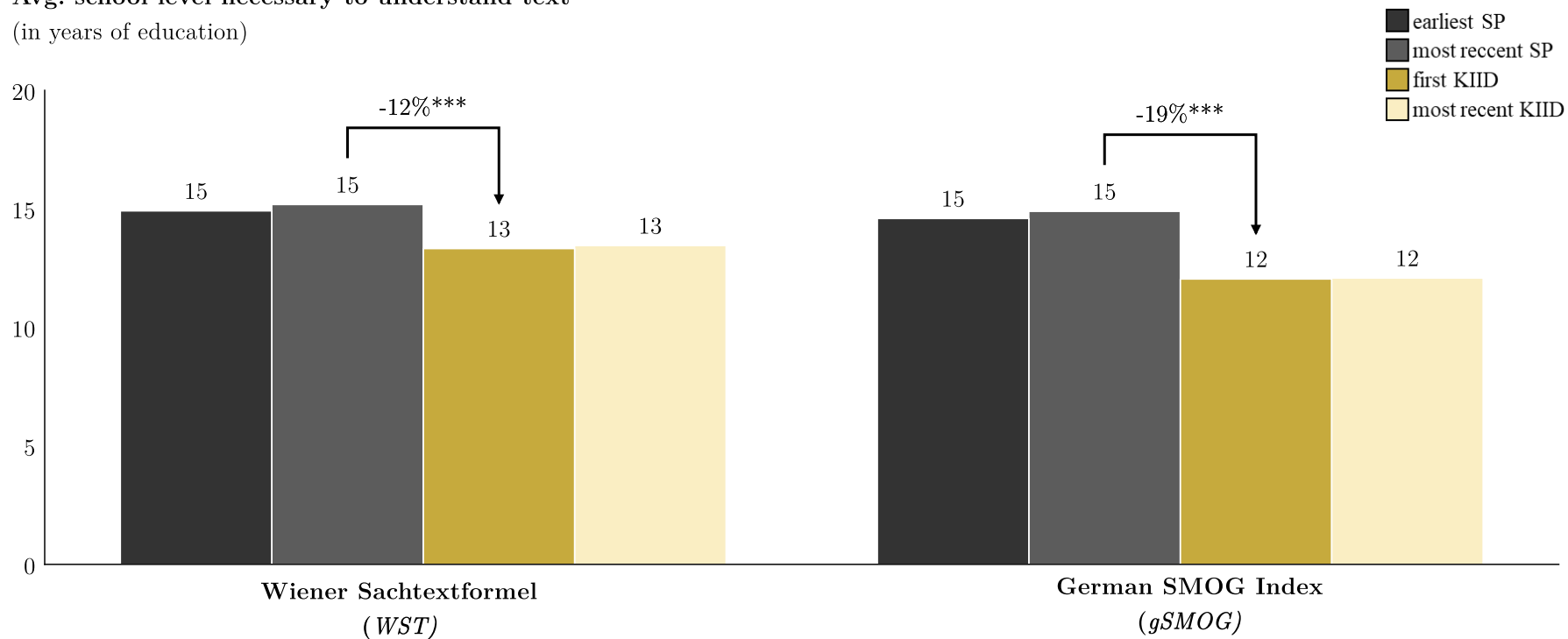
Lastly, we check whether our main findings are robust to the choice of the readability measure and replicate our analyses documented in sections 4.1 and 4.2 with alternative readability metrics available for texts in German language.

Figure I-10 reports the results of this supplementary analysis. Our alternative measures of readability include the Wiener Sachtextformel (WST) and the German version of the SMOG index (gSMOG). Note that these metrics quantify readability by means of years of education necessary to understand a given text (Bamberger and Vanecek 1984, McLaughlin 1969) and lower levels therefore indicate better readability. Corroborating our main finding obtained using the FRE, we document a statistically significant improvement in readability regardless of which alternative metric we employ. Using the WST, for instance, we find that the education necessary to understand the average KIID amounts to 13 years, down from 15 years for the average SP. Taken together, our main results prove robust to alternative proxies of readability.

Figure I-10—Robustness: alternative readability measures

Avg. school level necessary to understand text

(in years of education)



Notes: This figure illustrates the average grade level necessary to understand a text within the four panels ([earliest/most recent] SP and [first/most recent] KIID) for alternative measures of textual readability. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

5. Discussion and concluding remarks

In this paper, we investigate whether the introduction of Key Investor Information Documents (KIIDs) facilitates the readability of pre-contractual mutual fund product information addressed to retail investors. As of 2012, KIIDs—short form disclosure documents limited to two pages in length—have replaced the Simplified Prospectus (SP). SPs had been found to be too long, poorly designed and written in an overly technical language. Thus, the European Commission requires KIIDs be written concisely and non-technical. The introduction of KIIDs was accompanied by a guide on clear language and layout for the new disclosure document developed by the Committee of European Securities Regulators (CESR).

Applying a fully automated textual analysis approach on a large-scale sample of mutual fund product information, we are the first to benchmark and assess this policy change with objective and replicable methods. Specifically, this study (i) quantitatively benchmarks the readability of mutual fund product information, (ii) evaluates the effectiveness of the change in product information documents, and (iii) assesses whether KIIDs live up to the CESR guidelines.

We find that, while mutual fund product information documents are generally difficult to read, comprehensibility as captured by the Flesh Reading Ease (FRE) score has significantly improved ever since the introduction of KIIDs. The improvement in readability is primarily driven by shorter sentences, while we do not observe a reduction in word complexity *per se*. In addition, a more active and personal writing style and omitting superfluous words contributes to a better understandability of KIIDs versus SPs. However, fund companies tend to more frequently use financial jargon and significantly smaller font sizes in KIIDs, which compromise these efforts. While the CESR guidelines with respect to plain language have a positive effect on the overall presentation of information to retail investors, other parts of the guide (e.g., font size and financial jargon) do not seem to be broadly recognized in practice. Thus, we present mixed evidence with respect to the readability of mutual fund product information. While KIIDs provide investors with significantly more readable information and heed several of the recommendations made by the CESR, some of the respective guidelines are shown to be neglected. Compared to related evidence on the readability of package leaflets, e.g., we

document room for improvement not only pertaining to the overall readability of the product information under review, but also with respect to font type and size.

In light of the empirical evidence documented in this study, we suggest that the European standard setter provides stakeholders in charge of preparing financial product information with more detailed guidelines—potentially even accompanied by trainings—on how to write in plain language, e.g., including examples and best practices. Moreover, we reiterate a claim originally made by former SEC president Christopher Cox and propose that regulatory authorities take advantage of automated textual analysis when checking for the compliance of product information documents (Cox 2007). In fact, given the novel directive for Packaged Retail Investment and Insurance-Based Products (PRIIPs) which extends the universe of investment products coming under the ambit of KIID requirements quite dramatically, efficiency gains will likely become more important for the fulfillment of regulatory tasks.¹ In the US, the States of Florida and Massachusetts have already incorporated the FRE score as a readability metric in the authorization process of insurance policies, requiring the associated product information documents to score no lower than 50 and 45, respectively.² To borrow from Robert Gunning, a pioneer in textual readability analysis, fund companies preparing product information for their investors should try and heed a simple rule of written communication: “*Don’t write up. Don’t write down. Write to.*” (Gunning 1952, p. 10).

¹ PRIIPs regulations set out new methodologies and transparency requirements for investment products across the EU as of Jan. 1, 2018. In contrast to the UCITS IV directive, the PRIIPs regulation also covers non-UCITS retail schemes forwards, foreign exchange transactions (including futures and options), over the counter and exchange traded derivatives (such as caps, collars and swaps) and structured products and deposits. However, the European Commission has granted a 5-year grandfathering period for the KIID before deciding on its future under the new PRIIP regulation.

² Florida Statutes Title XXXVII. Insurance § 627.4145. Readable language in insurance policies; 2006 Massachusetts Code - Chapter 175 — Section 2B. Readability of policy form; definition; approval; actions based on language.

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7. Appendix

Appendix I-1—Variable description

Variable name	Description
<i>Textual characteristics</i>	
Simplified Prospectus (SP)	The simplified prospectus (German: “Vereinfachter Verkaufsprospekt”) is a legal document filed with securities regulators and disclosed to investors prior to the purchase of securities. It should provide investors important information about the mutual fund. In Germany the simplified prospectus was mandatory from 2004 to 2012 and replaced by the Key Investor Information Document (German: “Produktinformationsblatt”)
Key Investor Information Document (KIID)	Becoming effective with the directive of the European Union UCITS IV, the Key Investor Information Document (KIID), a standardized product information fact sheet with a maximum length two pages, replaces the SP in an attempt to provide investors with better structured and more readable product information.
Disclosure Date	Date on which a product information document <i>i</i> has been disclosed.
# Words	Total number of words making up a specific fund product information document <i>i</i> . The variable is truncated at the 2.5% level.
# Sentences	Total number of sentences contained in a specific fund product information document <i>i</i> . The variable is truncated at the 2.5% level.
Personal Pronouns	Percentage share of personal pronouns on total words contained in a specific fund product information document <i>i</i> . Personal pronouns include “Ich”, “Du”, “Wir”, “Er”, “Sie”, “Es”, “Ihr”, “Meiner”, “Deiner”, “Seiner”, “Ihrer”, “Euer”, “Ihrer”, “Mir”, “Ihm”, “Uns”, “Euch”, “Ihnen”, “Dich”, “Ihn”. The variable is truncated at the 2.5% level.
Complex Words	Percentage share of words consisting of three or more syllables (e.g., “Di-vi-den-de”) on total words contained in a specific product information document <i>i</i> . The variable is truncated at the 2.5% level.
Financial Jargon	Percentage share of words in a specific fund product information document <i>i</i> that are also included in a financial glossary / stock exchange lexicon on total words contained in the product information document. We apply the “ING – Börsen Lexikon” as well as the “FAZ – Börsen Glossar”. The variable is truncated at the 2.5% level.
Passive Voice	Percentage share of verbs on total words in a specific fund product information document <i>i</i> that are used in their ‘passive’ form (e.g., “was issued”, “is being prepared”). The variable is truncated at the 2.5% level.
Superfluous Words (in %)	Percentage share of “superfluous” words, i.e. words that do not alter the meaning of a sentences or phrase and therefore could be omitted, on total words contained in a specific fund product information document <i>i</i> . Superfluous words build on the Technical Writers’ 2016 “Schwarze Liste: Füllwörter”. Those words do not transport a meaning or any content, but rather serve as expletives. The variable is truncated at the 2.5% level.
Unique words (in %)	Percentage share of unique words (or vocabulary) represents the share of unique words on total words on total words contained in a specific fund product information document <i>i</i> . The variable is truncated at the 2.5% level.

Fund characteristics

German speaking	Indicator variable equals one if a fund's investment management company is domiciled in a primarily German speaking country (Germany, Austria, Liechtenstein, Switzerland), zero otherwise.
Affiliated	Indicator variable equals one if a fund's investment management company is affiliated to a commercial bank, zero otherwise. We follow Ferreira et al. 2018 in creating the variable.
ETF	Indicator variable equals one if a fund qualifies as entirely passively managed or exchange traded funds (ETF), zero otherwise. We screen the fund's legal names for by screening fund names for the following words/phrases: "ETF", "Exchange traded", "index", "tracker" and "passive".
Equity fund	Indicator variable equals one if a fund is primarily invested in equities, zero otherwise. We use the Morningstar Directs' fund classification.
Fund Age (years)	The fund age in number of years computed from the date of a fund's inception.
Fund size (in € mn.)	Total net assets under management of a fund as of December 2018. We use the logarithm of the variable in regression analysis. The variable is truncated at the 2.5% level.
Yearly Fund Return '12-'18 (in %)	Denotes the average yearly raw return of a fund in the period from 2012 to 2018. The variable is truncated at the 2.5% level.
Yearly Return Std. Dev. '12-'18 (in %)	Denotes the average yearly raw return standard deviation in the period from 2012 to 2018. The variable is truncated at the 2.5% level.
Turnover Ratio '12-'18 (in %)	A fund's average yearly turnover ratio, i.e. the percentage share of net assets of a fund invested / disinvested in a given year, in the period from 2012 to 2018. The variable is truncated at the 2.5% level.
Morningstar Rating (1-5 stars)	Morningstar rates mutual funds and ETFs from 1 to 5 stars based on how well they have performed (after adjusting for risk and accounting for sales charges) in comparison to similar funds and ETFs. Within each Morningstar Category, the top 10% of funds and ETFs receive 5 stars and the bottom 10% receive 1 star. The variable denotes the Morningstar rating as of December 2018.
Ongoing Charge (in %)	Represents the average yearly costs as percentage of total net assets an investor can reasonably expect to pay from one year to the next, under normal circumstances. It encompasses the fund's professional fees, management fees, audit fees and custody fees, but neglects incurred performance fees. The variable is truncated at the 2.5% level.

Notes: This table defines the variables used in the empirical analysis.

Appendix I-2—Font size: compliant vs. non-compliant KIID

AHEAD

Wesentliche Anlegerinformationen

Gegenstand dieses Dokuments sind wesentliche Informationen für den Anleger über diesen Fonds. Es handelt sich nicht um Werbematerial. Diese Informationen sind gesetzlich vorgeschrieben, um Ihnen die Wesensart dieses Fonds und die Risiken einer Anlage in ihn zu erläutern. Wir raten Ihnen zur Lektüre dieses Dokuments, so dass Sie eine fundierte Anlageentscheidung treffen können.

**Q-Selection Switzerland
ein Teilfonds des B & P Vision
ISIN: LI0022299676
Verwaltungsgesellschaft: Ahead Wealth Solutions AG**

Ziele und Anlagepolitik

- Ziel des quantitativ gemanagten Fonds ist es, einen nachhaltigen Wertzuwachs gegenüber dem Vergleichsmaßstab SPI zu erzielen.
- Um dies zu erreichen, investiert der Fonds in Aktien und andere Beteiligungswertpapiere und -wertrechte von Unternehmen mit Sitz in der Schweiz, die an einer Börse oder an einem anderen geeigneten, dem Publikum offenstehenden Markt gehandelt werden. Diese haben anspruchsvollen Auswahlkriterien zu genügen und werden aufgrund einer gründlichen, disziplinierten und quantitativen Analyse ausgewählt. In diesem Rahmen obliegt die Auswahl der einzelnen Investments dem Vermögensverwalter.
- In diesem Rahmen obliegt die Auswahl der einzelnen Wertpapiere dem Fondsmanager.
- Die Erträge des Fonds werden nicht ausgeschüttet sondern verbleiben im Fonds („Thesaurierung“).
- Die Anleger können grundsätzlich wöchentlich die Rücknahme der Anteile verlangen. Die Verwaltungsgesellschaft kann jedoch die Rücknahme aussetzen, wenn aussergewöhnliche Umstände dies unter Berücksichtigung der Anlegerinteressen erforderlich erscheinen lassen.

Risiko- und Ertragsprofil

Typischerweise geringe Rendite
Geringeres Risiko

Typischerweise höhere Rendite
Höheres Risiko

← 1 2 3 4 5 6 7 →

- Dieser Risikoindikator beruht auf historischen Daten, eine Vorhersage künftiger Entwicklungen ist damit nicht möglich.
- Der Fonds ist in der Kategorie 5 eingestuft, weil sein Anteilspreis typischerweise verhältnismässig stark schwankt und deshalb sowohl Verlustrisiken wie Gewinnchancen relativ hoch sind.
- Die Einstufung des Fonds kann sich künftig ändern und stellt keine Garantie dar. Auch ein Fonds, der in Kategorie 1 eingestuft wird, stellt keine völlig risikolose Anlage dar.
- Folgende Risiken haben auf die Einstufung keinen unmittelbaren Einfluss, können aber trotzdem für den Fonds von wesentlicher Bedeutung sein:
 - Markt- und Emittentenrisiko:** Aufgrund der überwiegenden Investition des Vermögens des Fonds in Beteiligungspapiere und -rechte besteht bei diesem Anlagentyp ein Markt- und Emittentenrisiko, welches sich negativ auf das Vermögen des Fonds auswirken kann.
 - Liquiditätsrisiken:** Der Fonds kann einen Teil seines Vermögens in Finanzinstrumente anlegen, die ihrer Wesensart zufolge hinreichend liquide sind, unter bestimmten Umständen aber ein relativ niedriges Liquiditätsniveau erreichen können. Es kann schwierig werden, kurzfristig einen Käufer für diese Papiere zu finden. Dadurch kann das Risiko einer Aussetzung der Anteilrücknahme steigen.
 - Ausfallrisiken:** Der Fonds kann Geschäfte mit einem oder mehreren Vertragspartner(n) abschliessen. Wenn ein Vertragspartner insolvent wird, kann er offene Forderungen des Fonds nicht mehr oder nur noch teilweise begleichen.
 - Operationelle Risiken und Verwahrisiken:** Der Fonds kann Opfer von Betrug oder anderen kriminellen Handlungen werden. Er kann auch Verluste durch Missverständnisse oder Fehler von Mitarbeitern der Verwaltungsgesellschaft oder einer Verwahrestelle oder externer Dritter erleiden oder durch äussere Ereignisse wie z. B. Brände, negativ beeinflusst werden.
 - Risiken aus dem Einsatz von Finanztechniken:** Der Fonds kann Finanztechniken wie z.B. Derivatkontrakte einsetzen, um die Renditechancen des Fonds zu erhöhen. Diese erhöhten Chancen gehen mit erhöhten Verlustrisiken einher.

Wesentliche Anlegerinformationen

Gegenstand dieses Dokuments sind wesentliche Informationen für den Anleger über diesen Fonds. Es handelt sich nicht um Werbematerial. Diese Informationen sind gesetzlich vorgeschrieben, um Ihnen die Wesensart dieses Fonds und die Risiken einer Anlage zu erläutern. Wir raten Ihnen zur Lektüre dieses Dokuments, sodass Sie eine fundierte Anlageentscheidung treffen können.

Schoellerbank Kurzinvest
ISIN/Kurschillingsanleihebezeichnung: AT0000044806
ISIN/Thesaurierungsanleihebezeichnung: AT0000020408
Der Fonds wird von der Schoellerbank Invest AG verwaltet.
Die Schoellerbank Invest AG gehört zur UniCredit Gruppe.

Schoellerbank
Private Banking

Ziele und Anlagepolitik

Ziel des Geldmarktfonds ist es, einen Ertrag zu erwirtschaften, der über jenem vergleichbarer Spar- und Termingeräten liegt. Alle für den Schoellerbank Kurzinvest ausgewählten Vermögenswerte lauten ausschließlich auf Euro. Für den Investmentfonds werden überwiegend einblauige variabel verzinsliche Wertpapierinstrumente hoher Bonität und/oder Geldmarktfonds, spezifische Geldmarktfonds von Mitgliedstaaten der Europäischen Union mit einem Zinsänderungsrisiko von weniger als einem Jahr erörtern. Darüber hinaus können bis zu 10 % des Fondsvermögens einblauige finanzierte Wertpapiere hoher Bonität von Mitgliedstaaten der Europäischen Union mit einer Restlaufzeit von maximal 2 Jahren erworben werden. Andere Geldmarktinstrumente dürfen ebenfalls erworben werden. Wertpapiere mit längerer Laufzeit dürfen ebenso erworben werden, wenn das Zinsänderungsrisiko weniger als ein Jahr beträgt. Der Schoellerbank Kurzinvest kann abwärts zu den Wertpapieren bzw. Geldmarktinstrumenten auch Schecklagen oder kurzfristige Einlagen mit einer Laufzeit von höchstens 12 Monaten halten. Der Investmentfonds investiert bereits oder beabsichtigt mehr als 20 % in, seines Fondsvermögens in Wertpapiere der Republik Österreich, der Bundesrepublik Deutschland und/oder der Republik Frankreich zu investieren. Der Schoellerbank Kurzinvest ist für Rückstellungen gemäß § 14 Abs. 7 Einkommenssteuergesetz geeignet.

Im Fonds werden keine derivativen Finanzinstrumente direkt eingesetzt.

Der Fonds ist ein Geldmarktfonds im Sinne der FMA Geldmarkterordnung und erfüllt damit die europäischen Richtlinien für Geldmarktfonds (CSRF's Guidelines on a common definition of European money market funds).

Der Fonds entspricht der Richtlinie 2009/65/EU.

Sie können, vorbehaltlich einer Aussetzung der Rücknahme aufgrund aussergewöhnlicher Umstände, jederzeit die Rücknahme der Anteile zum jeweils geltenden Rücknahmepreis, der dem Wert eines Anteils abgerundet auf die nächsten fünf Cent entspricht, bei der Depotbank verlangen.

Die Erträge des Fonds werden am 15.11. des folgenden Rechnungsjahres bei der Anteilsgattung AT0000044806 (A) ausgeschüttet, bei der Anteilsgattung AT0000020408 (I) verbleiben diese im Fonds und erhöhen den Wert der Anteile.

Empfehlung: Dieser Fonds ist unter Umständen für Anleger nicht geeignet, die ihr Geld innerhalb eines Zeitraumes von 1 Jahr aus dem Fonds wieder zurückziehen wollen.

Hinweis: Marktbedingte geringe oder sogar negative Renditen von Geldmarktinstrumenten bzw. Anleihen können den Nettowert des Investmentfonds negativ beeinflussen bzw. nicht ausreichend sein, um die laufenden Kosten zu decken.

Risiko- und Ertragsprofil

← Typischerweise geringere Ertragschance
Niedriges Risiko

Typischerweise höhere Ertragschance
Höheres Risiko →

← 1 2 3 4 5 6 7 →

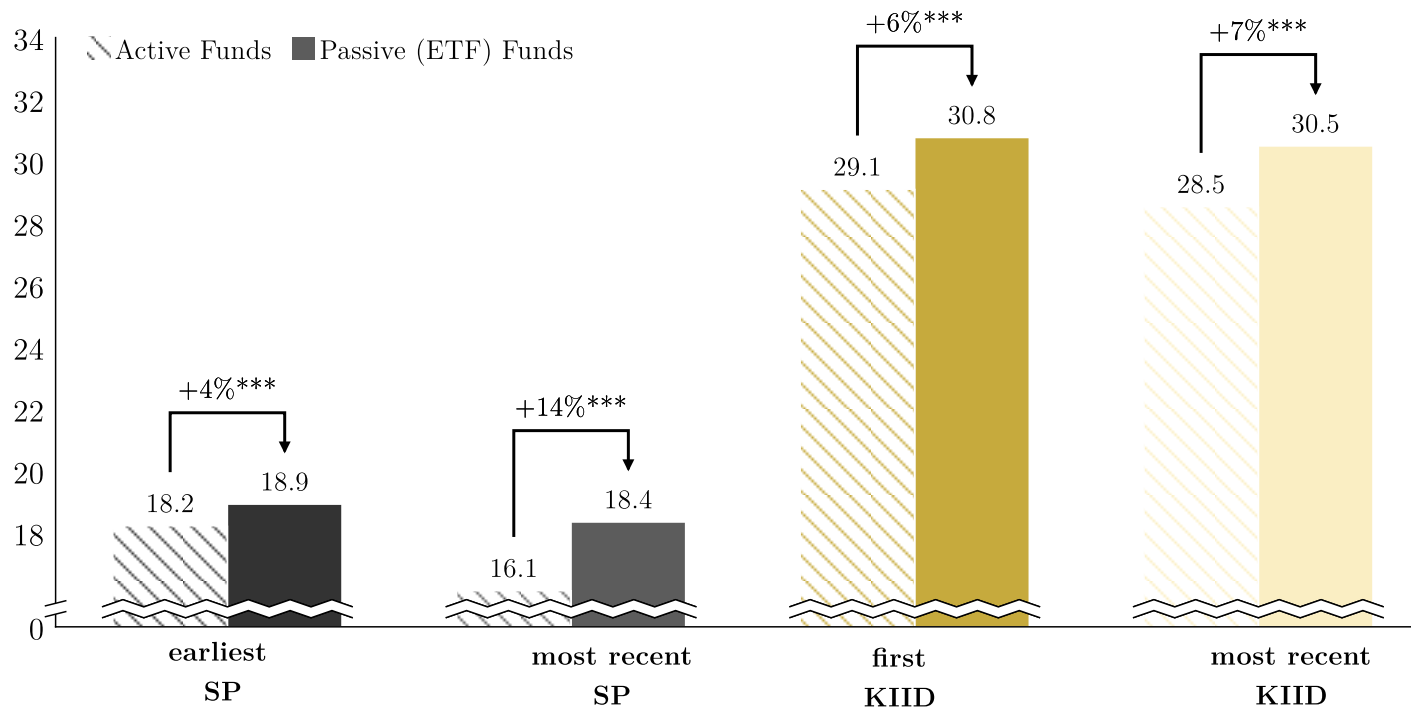
- Aufgrund der gemessenen Kurschwankungen in der Vergangenheit erfolgte eine Einstufung in Kategorie 1.
- Das Risiko-Ertragsprofil bezieht sich auf die Vergangenheit und kann nicht als verlässlicher Hinweis auf das künftige Risiko-Ertrags-Profil herangezogen werden.
- Die Risikoeinstufung kann sich im Laufe der Zeit ändern.
- RISIKEN, die von der Risikoeinstufung nicht erfasst werden und trotzdem für den Fonds von Bedeutung sind:
 - Kreditrisiko:** Der Fonds legt Teile seines Vermögens in Anleihen und/oder Geldmarktinstrumenten an. Deren Aussteller können insolvent werden, wodurch die Anleihen und/oder Geldmarktinstrumente ihren Wert ganz oder zum Größteil verlieren.
 - Liquiditätsrisiko:** Das Liquiditätsrisiko ist das Risiko, dass eine Position nicht rechtzeitig zu einem angemessenen Preis liquidiert werden kann.
 - Ausfallrisiko:** Der Fonds schließt Geschäfte mit Vertragspartnern ab. Wenn ein Vertragspartner insolvent wird, kann er offene Forderungen des Fonds nicht mehr oder nur noch teilweise begleichen.
 - Operationales Risiko:** Das operationale Risiko bedeutet die Gefahr von Verlusten als Folge unzulänglicher oder fehlerhafter interner Prozesse, Menschen und Systeme oder von externen Ereignissen und beinhaltet das Reputationsrisiko.
- Auch ein Fonds, der in Kategorie 1 eingestuft wird, stellt keine risikolose Anlage dar.

Schoellerbank Kurzinvest | Wesentliche Anlegerinformationen | Januar 2018 | 1

Notes: This figure provide examples for the first page of two KIIDs in our sample. Documents vary in font size: We provide a detailed description of the applied variables in Appendix I-1.

Appendix I-3—Readability: passive (ETF) vs. active mutual funds

Average Flesch Reading Ease Score (FRE)



Notes: This figure shows the differences in product information documents readability as measured by their (German) Flesch-Reading Ease (following Amstad 1978) for passively vs. actively managed funds. We consider funds as being passive if they classify as Exchange Traded Funds (ETF) according to Morningstar Direct's fund database. Hatched bars represent actively managed funds. Comparison lines indicate relative difference in document readability between active and passive funds. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. We provide a detailed description of the applied variables in **Appendix I-1**.

II. Leveling the playing field? The effect of disclosing fund manager activeness to individual investors

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Own contribution: Concept, proof of concept, literature gathering and literature review, data preparation, methodology and identification strategy, statistics and analyses, results documentation, documentation of implications, editing

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- 26th Annual Meeting of the German Finance Association (DGF) – Doctoral Seminar, Essen, Germany, 2019.

This paper is currently under review at *Management Science*.

Leveling the playing field?

The effect of disclosing fund manager activeness to individual investors

Dominik Scheld^a Oscar Stolper^b Andreas Walter^c

Abstract—As of April 2018, several of the largest US mutual fund firms have been constrained to disclose a measure of fund manager activeness to retail investors. We evaluate the effectiveness of this intervention. Investor reaction is strong but points to a media attention effect rather than rational trading on the newly available information. By contrast, even for those funds with a large overlap of holdings with their benchmark, no measurable effort to increase management activeness is observed subsequent to the imposed disclosure. We discuss our results and propose potential disclosure improvements.

Keywords: Mutual fund manager activeness, investor protection, disclosure effectiveness, regulation, retail finance

JEL-Classification: D12, D18, G18, G41

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1. Introduction

How do policy makers help consumers make sound investment decisions? Regulations which require the disclosure of information are among the most ubiquitous interventions in investor protection and authorities all over the world mandate that suppliers of financial products and services provide investors with an abundance of information.¹ However, although a generally approved policy measure, there is a paucity of evidence documenting the effectiveness of information disclosure for consumer financial decision-making. Indeed, the benefits of disclosure requirements are not a foregone conclusion: owing to behavioral biases and cognitive limitations of investors, the intended effects of information disclosure might not take full effect and in some cases even backfire (e.g., Beshears et al. 2009; Loewenstein et al. 2014).

In this study, we extend the scarce literature on the utility of investor information disclosure by evaluating an intervention of the New York Attorney General's Investor Protection Bureau (NYOAG) into the market for mutual funds. In early 2018, the NYOAG investigated more than 2,000 actively managed funds distributed to US retail investors and, in an accompanying report, called on fund companies to make information available about fund managers' activeness. Moreover, the report urges retail investors to study fund fees and managers' degree of activeness in order to arrive at informed allocation decisions. Following the investigation, the NYOAG imposed the disclosure of *Active Share* (AS), a measure of fund manager activeness proposed by Cremers and Petajisto (2009), on several of the largest US mutual fund firms. As of April 2018, these companies have published the respective metric for their actively managed equity mutual funds on their corporate web sites.²

Unlike passive funds, actively managed funds sell the potential to beat their benchmark (usually a market index) and investors who select this type of fund are typically looking for an opportunity to outperform the market. Moreover, actively

¹ Standard economic theory promotes information disclosure as a powerful tool. If properly designed, it does not interfere with the autonomy of individual decision-making (cf., e.g., Sunstein 1999). However, given that the information provided in mandatory disclosures (e.g., product risk warnings, financial disclosures, or nutrition fact labels) typically is not provided on free markets, information disclosure is able to address unwanted market failure in situations characterized by asymmetric information and a risk of misaligned incentives (cf., e.g., Akerlof 1970).

² *Active Share* (AS) summarizes the extent to which a fund's portfolio holdings differ from its benchmark index. The higher the AS, the greater the deviation from the benchmark, i.e. the more active the fund manager. See section 3.1 for further details about the AS metric and alternative measures of fund manager activeness.

managed funds usually charge significantly higher fees than passive funds: the average expense ratio of passive funds was 0.15% in 2017 while it amounted to 0.72% for active funds (Morningstar 2018). This cost difference may be justified by the fund manager's effort to manage the portfolio in a way which creates an opportunity to generate excess returns by deviating from the fund's benchmark. Therefore, information about the fund manager's past commitment in pursuing her goal to beat the benchmark should be highly relevant for investors' decisions about whom to entrust with the delegated portfolio management. Indeed, screening manager activeness seems worthwhile. Several studies have identified funds with relatively high fees which, at the same time, feature a relatively low degree of fund manager activeness, ultimately causing significant underperformance (Cremers and Petajisto 2009, Petajisto 2013, Cremers et al. 2016). These studies conclude that investors in such funds—dubbed as 'closet indexers'—pay for a service, i.e. active portfolio management, which, essentially, they do not receive.³

The NYOAG intervention constitutes an exogenous shock to the business operations of the affected fund companies and we apply a difference-in-differences regression approach to identify the intervention's causal impact on (i) retail investors' response to the sudden availability of information on fund manager activeness and (ii) fund firms' reaction to the imposed disclosure.⁴

Specifically, we capture the demand-side response by analyzing flows into (and out of) each of the sampled funds around the announcement of the disclosure. Since AS information has been available to institutional investors long before the intervention (cf. NYAOG 2018), we separate retail share classes from their institutional counterparts for all funds affected by the intervention. In doing so, we are able to unambiguously measure the flow response of the investor group targeted by the NYOAG by constructing individual within-fund control groups which allow us to control for all observed and unobserved fund and fund family characteristics potentially explaining investor demand. To gauge the supply-side reaction, we compare pre- and post-intervention AS levels of the sampled funds and a matched control group of actively managed mutual funds issued by fund companies unaffected by the NYOAG intervention. Because AS does not differ

³ Our assignment of funds to AS categories follows Cremers and Petajisto (2009). Funds featuring an AS below 60% rate as 'closet indexers', funds with an AS between 60% and 80% are classified as 'moderately active stock pickers' and funds with an AS in excess of 80% are referred to as 'stock pickers'.

⁴ Section 2 describes the intervention in detail.

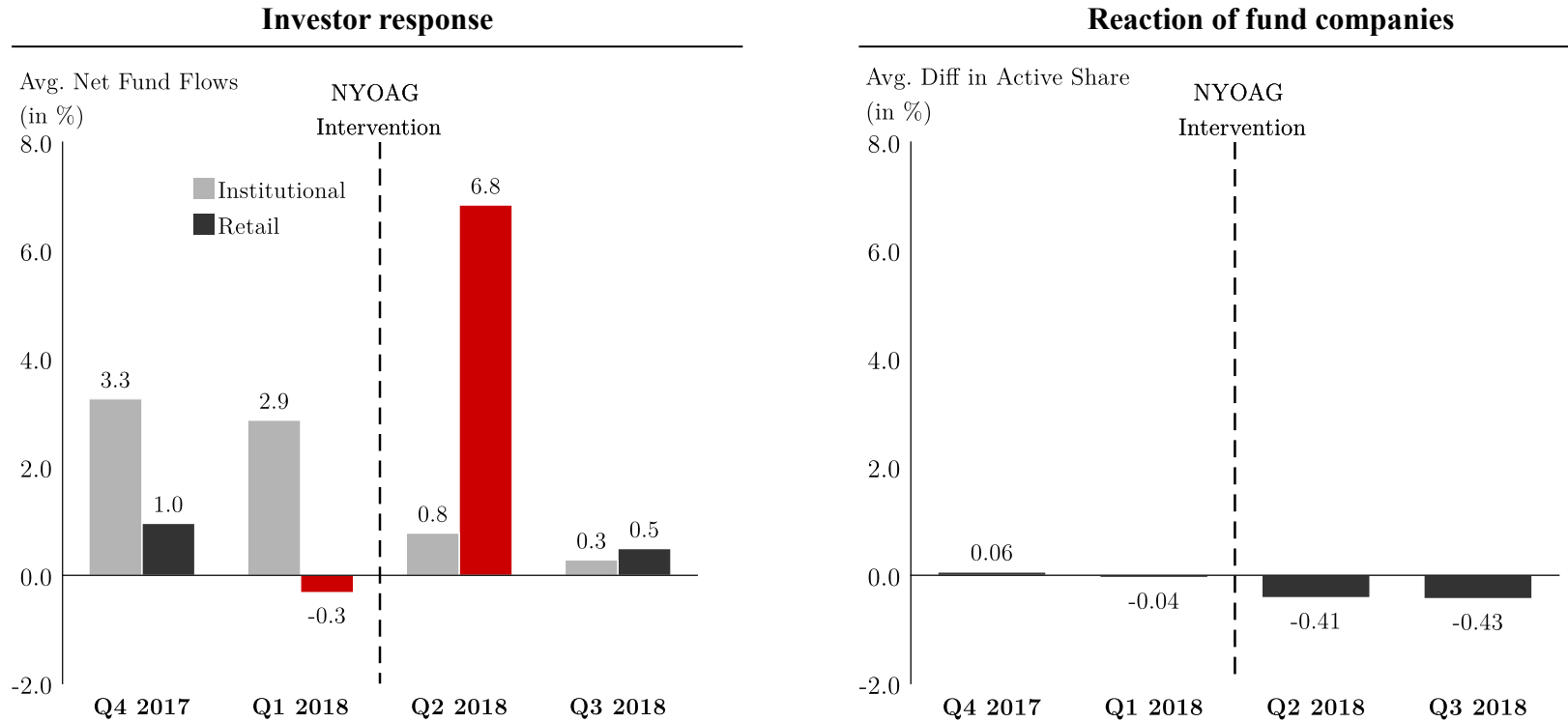
across the share classes of a given fund, we construct a balanced control sample applying a 1:1 nearest-neighbor matching approach in order to allow for a difference-in-differences analysis of fund companies' reaction to the intervention.

Figure II-1 illustrates our main results. Retail investors strongly respond to the intervention. As can be inferred from the left-hand graph, net fund flows into retail share classes of funds affected by the intervention increase by as much as 6.8 percentage points (pp.) in the quarter that immediately follows the intervention. By contrast, the NYOAG intervention does not have any measurable flow effect among institutional investors. Moreover, the right-hand side of **Figure II-1** shows that, compared to managers of control-group funds, fund managers affected by the NYOAG disclosure intervention have not adjusted their degree of active portfolio management any differently after publicly disclosing related information to retail investors. In fact, additional analysis reveals that even among managers of funds rated closet indexers—i.e. arguably those funds with the highest pressure to act—we do not observe any measurable effort to increase management activeness as captured by the fund's post-intervention AS.

Further investigation into the demand-side response suggests that retail investors do not differentiate between active stock pickers and closet indexers when increasing their holdings in the treated funds. Finally, a supplementary analysis of daily fund flows shows that the bulk of excess flows into the affected funds occurred right after the announcement of the disclosure intervention, which received broad news coverage. This evidence suggests that the investor response can be ascribed to a media attention effect rather than to investors' trading on the newly available information about the degree of fund manager activeness. Given the largely positive connotation of the incidental press reporting, investors might have interpreted the affected fund companies' collaboration with investor protection authorities as a signal of their commitment to improve transparency, thereby enhancing the respective firms' reputation *per se*.

Taken together, our findings are hard to square with the notion that retail investors have understood and traded on the newly available information about fund manager activeness. Hence, we conclude that the intended effects of the intervention, i.e. (i) to establish AS as a relevant decision criteria for retail investors and (ii) to curb closet indexing, have largely failed to materialize.

Figure II-1—Investor response and reaction of fund companies



Notes: This figure illustrates our main results. The LHS graph plots the investor response as captured by net flows into the funds affected by the NYOAG intervention for each quarter during our sample period. Grey (black) bars represent fund flows pertaining to a funds’ institutional (retail) share classes. The RHS graph plots the reaction of the fund companies under review measured as the univariate difference in fund manager activeness (Active Share) between affected funds and control-group funds.

Our work contributes to several strands of literature. First, we inform the ongoing debate on the effectiveness of information disclosure for improved consumer financial decision-making. Notably, our results run counter to prior evidence obtained in comparable settings, where disclosure does not much affect the recipients of the information while it tends to trigger a significant industry response.¹ For example, while most research to date suggests little or no evidence of consumer reaction to calorie labeling (e.g., Harnack et al. 2008), Namba et al. (2013) show that fast-food restaurants located in municipalities subject to menu-labeling laws increased their healthier menu options. Similarly, there is relatively weak evidence of consumer response to energy-efficiency labeling, but much stronger evidence of manufacturer responsiveness (e.g., Newell et al. 1999, Waide 2001). Reasons why providers change their products in response to disclosure requirements which their customers largely ignore could be that they overstate the anticipated response (e.g., Gilovich et al. 2000) or have a guilty conscience about the information disclosed (Loewenstein et al. 2014). In such situations, the psychological factors at play even amplify the effectiveness of disclosure, although, from an economic standpoint, the expected consumer inattention should prevent the supply-side from taking action. However, this pattern does not seem to hold in the mutual fund market. Rather, our results suggest that fund companies anticipated the limited impact of disclosing information about their funds' degree of activeness on retail investors. We discuss a number of explanations for the limited efficiency of the disclosure intervention. We argue that the heterogeneity in the presentation of the information as well as the lack of a reference point to interpret it are key drivers.

Second, we extend the literature on the media attention effect. Barber and Odean (2007) find that investors are more likely to be net buyers of stocks mentioned in the news than of those not mentioned and Kaniel et al. (2007) confirm this finding for mutual fund investments. Da et al. (2011) document a positive link between Google search frequency of a given stock and subsequent stock prices. In a more recent study closely related to our work, Kaniel and Parham (2017) exploit a natural experiment to show that retail investors are subject to a media attention bias when investing in mutual funds. Specifically, the authors document a substantial discontinuity in flows into mutual funds mentioned in the

¹ Note that such an outcome yet again differs from the generally intended effects of disclosure, i.e. prompting changes in the behavior of disclosees, which in turn cause disclosers to clean up their act (cf., e.g., Fung et al. 2007).

popular Wall Street Journal ‘Category Kings’ ranking when compared to the flows of those funds which just missed making the list. The post-intervention trading behavior of retail investors in our study constitutes evidence supporting the findings of Kaniel and Parham (2017).

Lastly, we contribute to the few existing studies measuring fund manager activeness using AS. On the one hand, we add to the literature by investigating into the development of fund managers’ AS once it is being disclosed to retail investors. More importantly, however, we are the first to analyze if and how individual investors react to AS information *once they (can) learn about it*.² This is an important contribution to prior research which documents that AS is highly decision-relevant but at the same time acknowledges that this information is inaccessible to retail investors, i.e. making it impossible for them to act on the conclusions presented in the respective literature. Cremers and Petajisto (2009) introduce the AS metric and document that funds with the highest AS significantly outperform their benchmarks, both before and after fees. By contrast, funds in the lowest AS bracket, which are nevertheless marketed as actively managed vehicles, underperform their benchmarks. The findings of Petajisto (2013) support this evidence. Cremers et al. (2016), in their international survey on closet indexing practices, show that actively managed funds are more active, charge lower fees and earn higher abnormal returns in countries in which they face more competitive pressure from explicit indexers. Recently, Cremers and Curtis (2016) argue that persistent closet indexing carries a number of legal issues, including potential liability for prospectus misstatements³, excessive fees⁴ and fiduciary breach⁵. Aside from the NYOAG initiative, this latter finding has prompted several other regulatory investigations into fund manager activeness (e.g., ESMA 2016, BaFin 2017, FCA 2018) which have all used AS as the relevant criterion in order to assess a funds’ level of activeness.

² While, theoretically, retail investors might have been able to compute a given fund’s AS prior to the NYOAG intervention, we argue that this is an implausible scenario. First, data on the specific securities held in the fund portfolio are hard to come by for individual investors. Second, (historic) benchmark holdings are not available free of charge and it is highly unlikely that the average retail investor pays for obtaining them. Finally, prior research shows that, even if consumers can access the relevant data, they generally refrain from performing any calculations necessary to obtain actionable information (e.g., Cox and Payne 2005).

³ Cf. Securities Act, 11(a) and 12(a).

⁴ Cf. Investment Company Act, 36(b)

⁵ Cf. Employee Retirement Income Security Act (ERISA).

2. The NYOAG intervention

In order to learn about the informativeness of fund fees with respect to manager activeness, the New York Attorney General's Investor Protection Bureau (NYOAG) investigates more than 2,000 actively managed equity funds sold to US retail investors with respect to fees and AS disclosure practices in early 2018. Unsurprisingly, they find that fees charged for actively managed equity funds are significantly higher than those of passive index funds. Moreover, they document that fees vary widely and, importantly, that higher fees in an actively managed equity fund are not necessarily associated with a higher level of active portfolio management as measured by AS.⁶ In fact, the analysis reveals that some funds charge high fees, but deviate only marginally from their benchmark index. Clearly, the potential to outperform after fees is rather unlikely for these closet indexing funds. Finally, the investigation highlights that—even though mutual fund firms have long provided AS information to institutional investors—the vast majority of firms surveyed by the NYOAG did not disclose AS statistics to retail investors at the time of the NYOAG investigation. The report concludes that “(...) *the lack of equal access to one valuable piece of information—Active Share—is an information gap that hinders retail investors' ability to fully analyze the potential value proposition of an actively managed equity fund.*” (NYOAG 2018, p.11).

Based on these findings, the NYOAG called for the disclosure of AS by several of the largest US mutual fund firms. Starting April 2018, 13 companies including Alliance Bernstein, BlackRock, The Dreyfus Corporation, The Capital Group Companies (American Funds), Columbia Management Investment Advisors, Eaton Vance Management, Goldman Sachs Asset Management, JP Morgan Chase, Oppenheimer Funds, Nuveen, T. Rowe Price, USAA and Vanguard have published AS statistics for their actively managed equity mutual funds on their websites, which together cover more than 20 percent of the aggregate assets under management in this fund segment in the

⁶ Note that other measures of fund manager activeness have been proposed: *Portfolio Turnover* (Chevalier and Ellison 1999), *R²* (Amihud and Goyenko 2013), *Tracking Error Volatility* (Roll 1992), and *Return Gap* (Kacperczyk et al. 2008). Unlike these measures of fund manager activeness, however, AS draws on the holdings of a fund instead of its returns. In doing so, AS focuses on the *practice* of portfolio management, whereas return-based metrics focus on assessing the portfolio management *outcome*.

US.⁷ While the NYOAG remains silent about the criteria applied to select the affected fund firms, the data does not reveal a selection bias along arguably relevant dimensions.⁸ Moreover, the treated funds are neither exclusively headquartered in New York City (exceptions are, e.g., American Funds and Vanguard), nor do they represent the universe of largest US fund firms in its entirety (Charles Schwab, State Street, and Prudential Investments, e.g., are not affected).⁹

The NYOAG published their findings as well as details on the disclosure intervention on April 5th 2018 in a report entitled ‘Mutual Fund Fees and Active Share’ (NYOAG 2018) which is publicly accessible on the NYOAG website. The report received broad media attention in the weeks following the disclosure.¹⁰

The report’s agenda addresses both retail investors and fund firms. On the one hand, retail investors are strongly advised to learn about a fund’s fees and AS statistics in order to make an informed investment decision.¹¹ On the other hand, fund firms are imposed to make AS information available to retail investors and institutional investors alike.¹² Taken together, these requests imply that—while not explicitly stated in the report—(i) retail investors should seek to avoid closet indexing funds and (ii) fund managers should adjust their funds’ AS, if necessary, so as to spell out to retail investors what value added they receive in exchange for higher fees.

⁷ Note that the report mentions a total of 14 fund companies which were constrained to disclose AS information to retail investors. However, one of them, Fidelity Investments, is different in that it already published freely accessible AS statistics prior to the NYOAG investigation, which we are able to confirm using the ‘Wayback Machine’. Thus, we omit funds issued by Fidelity Investment from our treatment group in the main analyses. In a supplementary analysis, we show that our results are robust to including Fidelity Investments funds. Results are available upon request.

⁸ Cf. Appendix II-2.

⁹ Have the treated funds disclosed AS prior to the NYOAG intervention? The results of a supplementary analysis suggest otherwise: using the *Wayback Machine*, a digital archive of the world wide web allowing to access historic versions of websites (web.archive.org), we visit the webpages of the treated funds for several points in time prior to the intervention and do not find AS information on any of them.

¹⁰ Appendix II-3 documents the business press coverage of the report and section 5.1.2. analyzes the media attention to the event.

¹¹ The report includes several such calls, e.g. “(...) *mutual fund investors should pay particular attention to the fees charged by mutual funds, as fees can significantly affect total returns on a mutual fund investment.*” (p.13); “*Investors who choose to buy actively managed funds are choosing to pay more than they would for index funds, and therefore should seek to understand what additional value they may obtain in exchange for higher fees. Active Share helps investors (...) evaluate one or more actively managed fund investments*” (p.13); “*Investors should seek to understand the Active Share metric and request Active Share information from their brokers or mutual fund providers if it is not publicly available.*” (p.14).

¹² “*Mutual fund firms that do not provide all investors equal access to Active Share information for their mutual funds deny certain investors an important piece of information they can use to make decisions about investing in particular funds*” (NYOAG 2018, p.12).

In the US, financial regulation is a national matter with the Securities and Exchange Commission (SEC) in charge of legislation. Although the collective of state regulators (North American Securities Administrators Association, NASAA) can petition the SEC to adopt a rule, the NYOAG chose to deviate from this principle and independently imposed disclosure of AS on the affected fund firms, who “[r]esponding to the Attorney General’s pressure, (...) publish Active Share information quarterly.” (Mutual Funds Observer 2018). Consequently, the intervention into the portfolio management practices of the affected companies arguably could not be anticipated by these firms and thus can be considered an exogenous shock to their operations.

3. Data and methodology

3.1. Sample selection and measurement of manager activeness

From the NYOAG report, we obtain the names of the 13 fund firms which disclose AS information to retail investors on their websites starting April 2018. We retrieve data for all actively managed open-end equity mutual funds issued by these companies and marketed to US retail investors. We include funds which (i) feature at least one institutional and one retail investor share class, and (ii) manage aggregate assets of at least 10 million USD in both institutional and retail share classes. Based on these criteria, 271 funds, i.e. roughly two thirds of the total of 404 funds affected by the intervention, enter the sample. In case funds offer more than one share class to either retail or institutional investors, we follow Doshi et al. (2015) and convert variables at the share class level to retail and institutional aggregates weighted with their respective contribution to the fund’s total net assets.

Since the relevant fund firms, at any given point in time, provide AS statistics only for the most recent quarter, we compute fund-specific time series of historical AS data by comparing end-of-quarter holdings of each fund with the portfolio composition of its benchmark index following Cremers and Petajisto (2009); formally:

$$AS_{i,t} = \frac{1}{2} \sum_{i=1}^N |w_{i,k,t} - w_{k,BM,t}| \quad (1)$$

where N is the total number of stocks included in either the fund portfolio i or the benchmark index, $w_{i,k,t}$ denotes the weight of stock k in fund i in quarter t , and $w_{kBM,t}$ is

the weight of stock k in the benchmark portfolio in quarter t . The higher the AS, the more a given fund's holdings differ from its benchmark.

In order to circumvent benchmark inconsistencies, we apply a three-step procedure to identify the relevant fund benchmarks.¹³ First, we retrieve the holdings of the sampled funds' primary prospectus benchmark index for those funds which provide the respective data in the Morningstar Direct Portfolio Analysis Toolkit. Second, a minority of funds in our sample features a FTSE Russell index as their primary prospectus benchmark. Since we lack holdings data for those indices, we calculate AS time series for the respective funds using the readily available holdings of an ETF portfolio with sufficiently low tracking error to the FTSE Russell indices (e.g., the iShares Russell 1000 ETF in case the FTSE Russell 1000 Index is the fund's benchmark). Specifically, for an ETF portfolio to be considered as FTSE Russell fund benchmark proxy, we require the average tracking error of the replicating ETF's past five year return to be less than 0.1, i.e. ensuring an almost perfect benchmark replication. Finally, for the small remainder of sampled funds left unassigned after the second step, we compute AS by using a 'best fit index benchmark' from Morningstar's default indices (Morningstar Category Index, Best Fit Index, Morningstar Category Average, Morningstar Index, and ETF Index Proxy).¹⁴ In doing so, we follow Cremers and Petajisto (2009) and Petajisto (2013) and select the index generating the lowest AS as a given fund's best fit index benchmark.¹⁵

We merge our key variables with a host of fund characteristics which we obtain from Morningstar Direct. Since the NYOAG intervention is concerned with protecting retail investors, we omit funds exclusively distributed to institutional investors as well as funds of funds in our analysis. Our period under review starts on October 1st 2017, i.e. two quarters prior to the publication of the NYOAG report on April 5th 2018, which marks our intervention date, and ends on September 30th 2018, i.e. two quarters subsequent to

¹³ See, e.g., Sensoy (2009) for a discussion on the presence and implications of 'mismatched' benchmarks for US equity mutual funds.

¹⁴ In a final data cleansing step, we exclude all funds for which (i) the deviation of the calculated AS from the AS disclosed in December 2018 exceeds 3 pp., or (ii) we obtain inconsistent primary prospectus benchmark indices on the fund's website as opposed to its prospectus, fact sheet, or Morningstar, or (iii) a lack of data does not allow us to calculate the full AS time series.

¹⁵ Note that our universe of possible 'best fit index benchmarks', i.e. Morningstar's default indices, differs from Cremers and Petajisto (2009) and Petajisto (2013), who select one out of 19 predefined benchmark indices commonly used in the US such that the fund under review features the greatest overlap with the index portfolio. In unreported analyses, we show that our AS calculations do not hinge on benchmark choice. The corresponding results are available upon request.

the intervention. **Appendix II-1** provides descriptions of all variables included in the analysis.

3.2. *Summary statistics*

To illustrate how AS relates to fund fees, **Figure II-2** plots the sampled funds' AS against the gross expense ratio of their (aggregate) retail share class in the middle of our period under review. Supporting the findings documented in the NYOAG report, both AS and fund fees vary widely, ranging from below 20% all the way up to 100% and from virtually zero up to 3.0%, respectively. Moreover, the relationship between a given funds' AS and expense ratio is indeed largely inconclusive.

Table II-1 reports summary statistics of the sampled funds separated by retail versus institutional share classes. Total assets under management represented in our sample aggregate to almost 1.5 trillion USD, i.e. cover as much as 14.3% of the 10.5 trillion USD invested in actively managed equity mutual funds in the US in 2017 (ICI 2018). The average fund features an AS of 73.0% and thus qualifies as a 'moderately active stock picker'. This percentage is broadly comparable to prior evidence on management activeness among US equity mutual funds: Cremers and Pareek (2016) report an average AS of 77%, while Petajisto (2013) documents an average AS of 81%. At the same time, roughly 18% of funds feature an AS of less than 60% and thus rate as closet indexers. Again, this share squares well with previously documented numbers: Petajisto (2013) observes 16% closet indexers, and, in an earlier study, Cremers and Petajisto (2009) find that about 19% of funds under review practice closet indexing. Naturally, retail and institutional share classes of the funds under review feature mostly identical characteristics. Notably, institutional share classes of the sampled funds receive higher average net fund flows (0.8% versus -1.2%), are smaller (1.37 billion USD versus 1.93 billion USD), slightly cheaper (0.880% versus 1.184% annual GER), and yield higher quarterly returns (0.462% versus 0.398%) as compared their retail counterparts.

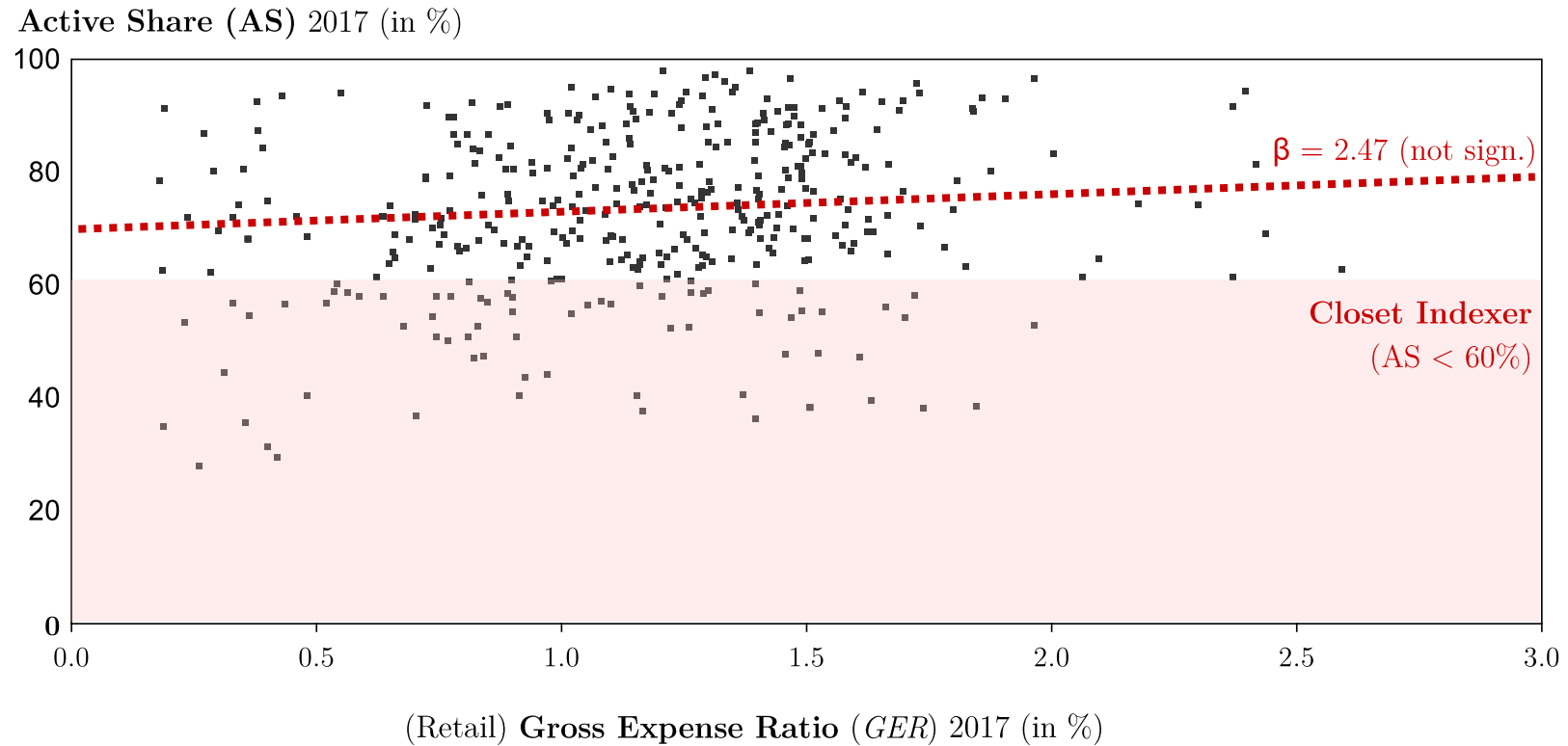
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Table II-1—Summary statistics

	Mean	Median	SD
Panel A: Dependent variables			
Net Fund Flows (% , quarterly)			
Retail SC	1.991	-2.273	18.54
Institutional SC	1.802	-0.236	17.62
All	1.897	-1.469	18.08
Active Share (% , quarterly)	73.02	73.11	13.81
Panel B: Key explanatory variables			
Intervention	0.5	0.5	0.5
Retail			
Retail SC	1	1	0
Institutional SC	0	0	0
All	0.5	0.5	0.5
Closet Indexer	0.181	0.000	0.385
Panel C: Control variables			
Fund Age (years)	23.60	21.92	13.30
Fund TNA (USD bn.)	5.301	1.281	12.83
Fund Family TNA (USD bn.)	229.8	140.0	288.5
Large Cap Fund	0.712	1	0.453
Mid Cap Fund	0.192	0	0.394
Small Cap Fund	0.096	0	0.295
Growth Fund	0.487	0	0.500
Value Fund	0.207	0	0.405
Blend Fund	0.306	0	0.461
# Managers	2.531	2	1.765
Manager Ownership (1=Yes)	0.830	1	0.376
Morningstar Rating (1–5)	3.262	3	0.966
Segment Flows (USD bn.)	-1.383	-0.541	1.980
Moderately Active	0.491	0	0.482
Stock Picker	0.328	0	0.321
Management Fee (% , annually)	0.680	0.675	0.173
Turnover Ratio (% , annually)	62.77	52.00	43.70
Return SD	12.51	12.12	4.212
Tracking Error (%)	6.808	6.413	3.575
TNA (USD bn.)			
Retail SC	3.334	0.480	8.182
Institutional SC	1.486	0.412	2.585
All	2.410	0.4505	6.135
Return (% , annually)			
Retail SC	2.880	3.174	3.035
Institutional SC	2.958	3.259	3.039
All	2.919	3.197	3.036
Gross Expense Ratio (% , annually)			
Retail SC	1.194	1.225	0.314
Institutional SC	0.873	0.872	0.258
All	1.033	1.002	0.329
Net Expense Ratio (% , annually)			
Retail SC	1.104	1.147	0.294
Institutional SC	0.799	0.801	0.224
All	0.952	0.915	0.303
Aggregate Total AuM (USD tn.)			
Retail SC		0.955	
Institutional SC		0.490	
All		1.445	
N funds			
Retail SC		271	
Institutional SC		271	
All		542	

Notes: This table reports descriptive statistics of (aggregated) retail and institutional share classes (SCs) for the mutual funds affected by the NYOAG intervention. Section 3.1 describes the sample selection. Share class information is obtained from Morningstar Direct. All fund characteristics are value-weighted by fund and share class category. **Appendix II-1** provides variable descriptions.

Figure II-2—Fund manager activeness and fund fees



Notes: This graph plots fund manager activeness as measured by Active Share (AS) against fund fees as captured by the (average) GER of the retail share class(es) of the sampled funds in the middle of the period under review (December 2017). Section 3.1 describes the fund sample selection. Following Cremers and Petajisto (2009), funds featuring an AS of less than 60% are rated closet indexers.

4. Identification strategy

4.1. Demand-side response

We apply a difference-in-differences regression approach to identify the causal impact of the NYOAG disclosure intervention. To measure investor response, we follow prior literature and analyze the flows into (and out of) each of the funds in our sample.¹ Importantly, funds' AS has been available to institutional investors already well before the intervention and therefore does not constitute any novel information to this part of the demand side (cf. NYAOG 2018). Thus, to unambiguously measure the flow response of the investor group targeted by the NYOAG—i.e. individual investors—we disentangle the demand-side by separating retail share classes from their institutional equivalents for all funds affected by the NYOAG intervention. In doing so, we are able to construct individual within-fund control groups which allow us to control for all observed and unobserved fund and fund family characteristics potentially explaining investor demand. We estimate several specifications of a generic difference-in-differences regression model to analyze investors' response using net fund flows ($FF_{i,t}$) as the dependent variable:

$$\begin{aligned}
 FF_{i,t} = & \alpha + \beta_1 Intervention_t + \beta_2 Retail\ SC_i + \beta_3 Closet\ Indexer_i \\
 & + \beta_4 Intervention_t \times Retail\ SC_i \\
 & + \beta_5 Intervention_t \times Closet\ Indexer_i \\
 & + \beta_6 Retail\ SC_i \times Closet\ Indexer_i \\
 & + \beta_7 Intervention_t \times Retail\ SC_i \times Closet\ Indexer_i \\
 & + \beta_8 Intervention_t \times Return_{i,t} \\
 & + \beta_9 Intervention_t \times Morningstar\ Rating_{i,t} + \delta' \mathbf{c}_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

where $Intervention_t$ is a binary variable distinguishing the pre-intervention period prior to April 2018 from the post-intervention period after April 2018, $Retail\ SC_i$ is a binary variable indicating whether a funds' share class is available to retail investors, and $Closet\ Indexer_i$ denotes whether fund i rates as a closet indexer prior to the intervention. To

¹ Following Sirri and Tufano (1998), we define net fund flows as the net growth in fund assets beyond reinvested dividends:

$$Net\ Fund\ Flows\ (FF)_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}}{TNA_{i,t-1}} - r_{i,t}$$

where $TNA_{i,t}$ denotes the dollar value of total net assets (TNA) of fund i in quarter t and $r_{i,t}$ denotes the return of fund i in quarter t as reported in Morningstar Direct. We differentiate between net fund flows of a funds' retail vs. institutional share classes. We apply the fund merger correction as proposed in Lou (2012) and winsorize the variable at the 1st and 99th percentile.

control for potential autocorrelation, we follow Bertrand et al. (2004) and collapse the time series data to a pre-intervention period ($t=0$; 2017Q4–2018Q1) and a post-intervention period ($t=1$; 2018Q2–2018Q3) in either regression model.²

Two interaction terms included in the model capture our effects of interest. The coefficient pertaining to $Intervention_t \times Retail\ SC_i$ estimates the difference in differences between the net fund flows of retail versus institutional share classes within a fund comparing them for the pre- and post-intervention periods. Additionally, the coefficient estimate for the triple interaction term $Intervention_t \times Retail\ SC_i \times Closet\ Indexer_i$ gauges the above-mentioned difference in net fund flow differences pertaining to a given funds' retail share class versus institutional share class, however focuses on the subsample of funds which rate as closet indexers prior to the NYOAG intervention.

Moreover, to account for potential performance-induced investor reactions which might coincide with the intervention, we interact $Intervention_t$ with the sampled funds' returns and Morningstar rating, respectively. Finally, the vector $c_{i,t}$ contains all fund-specific control variables listed in **Table II-1** and described in **Appendix II-1**.

4.2. Supply-side response

To gauge the reaction of the affected fund companies and their managers, we compare pre- and post-intervention levels of AS between the treatment group of funds and a matched control group of actively managed mutual funds issued by fund companies unaffected by the NYOAG intervention. Since AS does not differ across the share classes of a given fund, we follow prior literature in the field (e.g., Ernstberger et al. 2017, Kraft et al. 2017) and construct a balanced control sample applying a 1:1 nearest-neighbor matching approach in order to allow for a difference-in-differences analysis of the supply-side reaction to the NYOAG intervention. To this end, we match each affected fund with a control group fund based on its individual propensity score to be treated.³

The intervention targets the largest mutual fund providers in the US and we construct the control group accordingly. Specifically, we sample all actively managed

² Note that our results remain qualitatively unchanged if we use regular time series. The corresponding results are available upon request.

³ Apart from the fund's AS, the matching procedure incorporates several determinants previously shown to impact AS, i.e. fund size (Cremers and Petajisto 2009; Petajisto 2013) and investment focus (Jin et al. 2016) as well as a comprehensive set of additional fund characteristics (e.g., investment style, cost structure, fund family size). Appendix II-4 illustrates the pre- and post-matching bias between treatment group and matched control group and Appendix II-2 reports the corresponding summary statistics.

equity funds distributed in the US which either rank among the 100 largest mutual funds in the Morningstar Direct Mutual Fund Database or are issued by the Top 50 US Asset Managers as listed in the Mutual Fund Observer. We evaluate the impact of the NYOAG intervention on the supply-side by comparing the funds included in this control group with our treatment group of funds issued by the 13 companies which were constrained to publish AS information as of April 2018. Since the intervention focuses on retail investors, we draw on the retail share classes of treated and control-group funds, respectively.

Again, we estimate a generic difference-in-differences regression model comparing pre- and post-intervention levels of funds' AS between the treatment group of funds and a matched control group, formalized as:

$$\begin{aligned}
 AS_{i,t} = & \alpha + \beta_1 Intervention_t + \beta_2 Treated_i + \beta_3 Closet Indexer_i \\
 & + \beta_4 Intervention_t \times Treated_i \\
 & + \beta_5 Intervention_t \times Closet Indexer_i \\
 & + \beta_6 Treated_i \times Closet Indexer_i \\
 & + \beta_7 Intervention_t \times Treated_i \times Closet Indexer_i + \delta' c_{i,t} \\
 & + \varepsilon_{i,t}
 \end{aligned} \tag{3}$$

where $AS_{i,t}$ measures the AS of fund i in quarter t . Again, the interaction terms capture our effects of interest, estimating the difference in differences in AS between treated and control group funds for the pre- and post-intervention periods. Specifically, we focus on β_4 , i.e. the interaction term capturing the difference in differences between treatment and control group, and β_7 which gauges the three-way interaction effect between active funds and closet indexers affected by the intervention. Once again, we follow Bertrand et al. (2004) and collapse the time series to estimate the supply-side effect.

5. Results

5.1. Demand-side response

5.1.1. Main findings

First, we explore whether retail investors use the newly available AS information as intended by the NYOAG. A critical question to address in this context is if investors were in a position to learn about the disclosure intervention in the first place. In fact, the related news coverage suggests so: the NYOAG intervention received broad media attention in

some of the country's largest and most popular news outlets. We screened the US business press in the two weeks after the publication of the report and found many articles related to the intervention in high-volume nationwide news outlets such as the Financial Times and the Wall Street Journal as well as Bloomberg and Reuters. Thus, we argue that retail investors could indeed get wind of the intervention and the new fund information item provided to them on the fund companies' websites.

Do retail investors react to the sudden availability of AS information, and if so, how? **Table II-2** reports results obtained from estimating several specifications of the generic difference-in-differences regression model introduced in section 4.1 with quarterly net fund flows ($FF_{i,t}$) as the dependent variable and shows our main findings regarding the investor response to the AS disclosure commitment. As can be inferred from the first row, the overall time trend effect of the intervention among the affected funds is inconclusive. However, the relevant difference in differences—captured by the coefficient of the interaction term $Intervention_t \times Retail\ SC_i$ —turns out highly statistically significant and economical meaningful: a 5.79% difference in net fund flows of the retail versus institutional share classes is tantamount to extra investments by individual investors of as much as USD 55 billion in the post-intervention quarter.⁴ To put this into perspective: the NYOAG intervention effect on flows into retail share classes is almost three times the size of the well-documented flow-performance relationship (e.g., Gruber 1996, Carhart 1997) and twice the size of the flow effect associated with a one-standard deviation improvement in the fund's Morningstar Rating.⁵ Thus, the demand-side evidence indicates that retail investors strongly reacted to the NYOAG intervention in that they significantly increased their investments in funds issued by companies affected by the intervention. Moreover, while only slightly decreasing in magnitude, at 5.04%, this treatment effect remains highly statistically significant and, as can be inferred from specification (4), is robust to controlling for closet indexing.⁶

⁴ Total aggregate assets under management in the retail share classes of the 271 funds included in our sample amount to USD 955 billion.

⁵ The within-fund difference in the increase in quarterly fund flows among retail versus institutional share classes amounts to 0.320 standard deviations, while the flow-performance relationship causes an increase in flows of 0.101 standard deviations. Hence, the multiple amounts to $\frac{0.320}{0.101} = 3.17$. In the same vein, the NYOAG intervention effect on flows into retail share classes can be depicted as a multiple of a one-standard deviation improvement in the Morningstar rating: $\frac{0.320}{0.156} = 2.05$.

⁶ Our results are qualitatively robust to clustering standard errors at the fund family level as well as to controlling for firm fixed effects in the treatment group. The corresponding results are available upon request.

Table II-2—Investor response: main results

	Dependent variable: $FF_{i,t}$			
	(1)	(2)	(3)	(4)
Intervention _t	0.414 (1.045)	2.430 (3.481)	-0.819 (3.274)	-0.347 (3.150)
Retail SC _i			0.895 (1.688)	1.225 (1.701)
Intervention _t × Retail SC _i			5.787*** (2.095)	5.041** (2.027)
Closet Indexer _i				1.791 (3.408)
Intervention _t × Closet Indexer _i				-2.642 (5.509)
Retail SC _i × Closet Indexer _i				-2.182 (4.379)
Intervention _t × Retail SC _i × Closet Indexer _i				4.163 (7.763)
Return _{i,t-1}		0.603** (0.321)	0.595* (0.410)	0.605* (0.372)
Intervention _t × Return _{i,t-1}		-0.267 (0.499)	-0.274 (0.501)	-0.290 (0.506)
Morningstar Rating _{i,t}		2.890*** (0.783)	2.914*** (0.787)	2.897*** (0.780)
Intervention _t × Morningstar Rating _{i,t}		-0.603 (0.990)	-0.530 (0.980)	-0.514 (0.975)
N obs.	1,084	1,058	1,058	1,058
N funds	542	536	536	536
R ² (within)	0.0000	0.2850	0.0387	0.0393
R ² (overall)	0.0011	0.0015	0.0775	0.0919
Min Size Requirement (USD 10m)	YES	YES	YES	YES
Controls	NO	YES	YES	YES

Notes: This table reports coefficient estimates obtained from the regression model

$$\begin{aligned}
 FF_{i,t} = & \alpha + \beta_1 \text{Intervention}_t + \beta_2 \text{Retail SC}_i + \beta_3 \text{Closet Indexer}_i + \beta_4 \text{Intervention}_t * \text{Retail SC}_i \\
 & + \beta_5 \text{Intervention}_t * \text{Closet Indexer}_i + \beta_6 \text{Retail SC}_i * \text{Closet Indexer}_i + \beta_7 \text{Intervention}_t \\
 & * \text{Retail SC}_i * \text{Closet Indexer}_i + \beta_8 \text{Intervention}_t * \text{Return}_{i,t-1} + \beta_9 \text{Intervention}_t \\
 & * \text{Morningstar Rating}_{i,t-1} + \delta' \mathbf{c}_{i,t} + \varepsilon_{i,t}.
 \end{aligned}$$

as specified in section 4.1. $FF_{i,t}$ measures net fund flows pertaining to fund i in quarter t . Intervention_t is a binary variable distinguishing the pre-intervention period prior to April 2018 from the post-intervention period after April 2018, Retail SC_i is a binary variable separating retail from institutional share classes at the fund level, and Closet Indexer_i denotes whether fund i rates as a closet indexer prior to the intervention. The coefficient pertaining to $\text{Intervention}_t \times \text{Retail SC}_i$ estimates the difference in differences between the net fund flows of a funds' (aggregated) retail share classes versus the same funds (aggregated) institutional share classes when comparing them for the pre- and post-intervention periods. The triple interaction term $\text{Intervention}_t \times \text{Retail SC}_i \times \text{Closet Indexer}_i$ gauges the above-mentioned difference in differences for the subsample of retail share classes versus institutional share classes which rate as closet indexers prior to the NYOAG intervention. $\text{Return}_{i,t-1}$ captures the funds' lagged gross return. $\text{Morningstar Rating}_{i,t-1}$ is the lagged fund star rating provided by Morningstar. The vector $\mathbf{c}_{i,t}$ contains the fund-specific control variables listed in Table 1. Data is collapsed to a pre-treatment period (Q4 2017 – Q1 2018) and a post-treatment period (Q2 2017 – Q3 2018). Section 3.1 describes the fund sample selection. Table A1 provides variable descriptions. Robust standard errors (in parentheses) are clustered at the fund family level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Counterintuitively, however, investors do not appear to rationally discriminate between stock pickers and closet indexers when increasing their holdings in the treated funds: the coefficient estimate β_7 pertaining to the triple interaction term $Intervention_t \times Retail SC_i \times Closet Indexer_i$ turns out insignificant.⁷

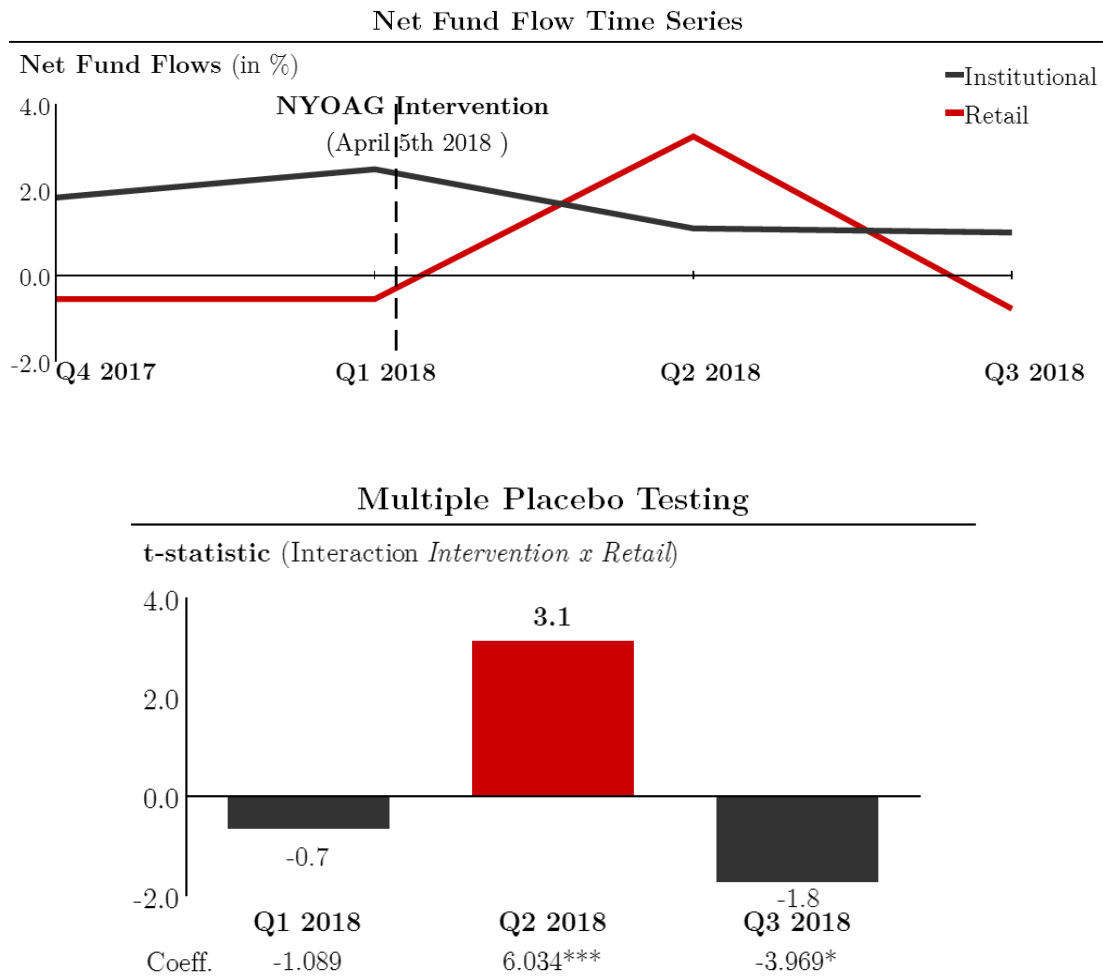
Note that our difference-in-difference design builds on the conjecture that, absent the NYOAG intervention, the development of fund flows in retail and institutional share classes would have represented parallel trends.

Panel A of **Figure II-3** plots the development of net fund flows into retail share classes (red line) and institutional share classes (black line) and documents a largely parallel trend in the pre-intervention quarters (Q4 2017 and Q1 2018). Immediately after the intervention, however, the graph suggests a sharp rise in retail inflows while institutional money decreases on net. To formally test if the assumption of parallel trends is valid, we follow recent research by Frydman and Wang (2020) and run a multiple placebo test with respect to the impact of the NYOAG intervention on fund flows. To this end, we split our time series into three pairs of adjacent quarters and run separate regressions for either pair. Panel B of **Figure II-3** plots t -statistics of the coefficient estimates pertaining to the interaction term $Intervention_t \times Retail SC_i (\beta_4)$, which captures our effect of interest. Indeed, the relevant coefficient turns out highly statistically significant only for the actual intervention quarter. Thus, assuming parallel trends in net fund flows of retail and institutional share classes of a given fund in the non-intervention quarters seems plausible.

Taken together, investors seem to react to the intervention, but apparently not in the way intended by the NYOAG: while we document abnormally high post-intervention flows into the retail share classes of affected funds, evidence suggests that households do not allocate their investments rationally. Of course, AS is not the only relevant parameter for the mutual fund investment decision. Nevertheless, at least some of our findings indicate that investors behave diametrically opposed to what the NYOAG report would have advised them to do. In what follows, we explore investor behavior around the precise announcement date of the NYOAG report in an attempt to disentangle the possible causes of the counterintuitive evidence collected so far.

⁷ Supplementary analysis shows that our results do not hinge on the AS cutoff separating truly actively managed funds from closet indexers. The corresponding results are available upon request.

Figure II-3—Investor response: times series of net fund flows and multiple placebo testing



Notes: This figure plots the time series of net fund flows (top graph) and results of a multiple placebo testing (bottom graph). In the upper graph, fund flows are separated between funds’ retail (red line) and institutional assets (black line). Following Frydman and Wang (2020), we apply a multiple placebo test on our regression model specified in equation (2) using each pair of adjacent quarters in our sample. Specifically, we assume the NYOAG intervention to happen at the end of the first quarter for each pair of quarters, e.g., December 31st 2017 for the first bar in the lower graph. Quarters on the horizontal axis denote the second quarter of each pair. Bars in the lower graph represent the time-series of t-statistics pertaining to the difference-in-differences estimator on the interaction term $Intervention_i \times Retail_i$. The red bar marks the quarter in which the actual intervention takes place. We report regression coefficients of the multiple placebo testing below the quarters. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

5.1.2. Media coverage of the NYOAG intervention and investor attention

Given that retail investors face a costly search problem, the mere appearance of a mutual fund company in the media might make them add the company and its funds to their limited set of salient investment opportunities (c.f. Merton 1987). Indeed, prior literature documents that investors are more likely to be net buyers of securities mentioned in the news (e.g., Barber and Odean 2007, Da et al. 2011, Sirri and Tufano 1998). Only recently,

Kaniel and Parham (2017) provide evidence of retail investors subject to a media attention bias when making mutual fund allocation decisions. Exploiting a natural experiment, the authors document a substantial discontinuity in quarterly capital flows into mutual funds mentioned in the popular Wall Street Journal ‘Category Kings’ ranking when compared to the flows of those funds which just missed making the list. Moreover, they conclude that the prominence of the publication and its visibility are key to driving the media effect. Hence, to proxy for a given fund company’s individual visibility, we count the number of intervention-related articles in the US business press which mention the respective company by name. To this end, we screen Dow Jones Factiva as well as Google News in the two weeks following the intervention. We obtain a number of articles which cover the AS disclosure intervention, most of which are published by well-known news outlets frequently accessed by retail investors such as the Financial Times (“*Closet tracker funds face tougher regulatory scrutiny*”), Wall Street Online (“*Top mutual funds to disclose new active-management metric*”), Bloomberg (“*Picking a Mutual Fund Just Got Easier, Thanks to N.Y. Regulator*”), and Reuters (“*Thirteen mutual fund firms to reveal more about active funds*”). We observe considerable variation in the number of articles in which a given fund firm appears by name. For example, Vanguard and BlackRock are mentioned in 78% and 84% of all articles covering the intervention, while Columbia Threadneedle Investments, a relatively smaller fund company, is mentioned in only 47% of articles. Hence, we use the number of press mentions of a given fund company as a proxy for the extent of media attention fund i received due to the intervention ($Media\ Attention_i$). $FF_{i,d}$ measures the daily net fund flows of fund i on day d . We separate fund flows into funds’ retail and institutional share classes. Data is collapsed to a pre-treatment period (starting 15 days prior to the NYOAG intervention on April 5, 2018) and a post-treatment period (until 15 days after the intervention). The number of press mentions of a given fund company within two weeks after the intervention proxies for the extent of media attention fund i received owing to the intervention ($Media\ Attention_i$). $Media\ Attention_i$ is standardized to assume a mean of zero and a standard deviation of one. The vector $c_{i,d}$ contains the fund-specific control variables listed in **Table II-1**. Fund company fixed effects are included in all specifications. Robust standard errors (in parenthesis) are clustered at the fund family level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table II-3—Investor response: media attention effect

	<i>Retail SC</i>		<i>Institutional SC</i>	
	(1) unconditional	(2) w/controls	(3) unconditional	(4) w/controls
Media Attention _i	0.0125* (0.0075)	0.0144** (0.0071)	-0.0097 (0.0124)	-0.0023 (0.0111)
N obs.	542	542	494	494
N funds	271	271	247	247
R ² (within)	0.0000	0.0168	0.0192	0.0192
R ² (overall)	0.0034	0.0795	0.0933	0.0933
Controls	NO	YES	NO	YES
Fund company FEs	YES	YES	YES	YES

Notes: This table reports coefficient estimates obtained from the regression model

$$FF_{i,d} = \alpha + \beta_1 \text{Media Attention}_i + \delta' \mathbf{c}_{i,d} + \varepsilon_{i,d}.$$

Table II-3 reports coefficient estimates pertaining to the media attention effect around the intervention. Again, we follow Bertrand et al. (2004) and collapse the data to a pre-treatment period (-15 to zero trading days before April 5th 2018) and a post-treatment period (zero to +15 trading days after April 5th 2018). Unlike for the institutional share classes of the funds affected by the NYOAG intervention, we find that media attention in the US business press indeed proves significant in predicting flows into their retail share classes. Specifically, a one standard deviation increase in *Media Attention* causes average inflows into the affected funds retail share classes in the order of 1.44 bp. of aggregate retail TNA. To spell this out: for the largest fund family in our sample (American Funds), this amounts to daily net inflows of as much as USD 47 million.⁸

In sum, the evidence provided in this section supports the notion that the investor response observed after the announcement of the AS disclosure intervention can be ascribed to an attention bias rather than to investors' trading on the newly available information about fund manager activeness. Retail investors appear to 'chase' funds of the companies mentioned in the news articles related to the NYOAG intervention. Moreover, given the positive connotation of most of the coverage, investors might have interpreted the willingness of the affected fund companies to collaborate with investor

⁸ Active equity funds managed by American Funds account for approximately USD 330 billion in assets under management prior to the NYOAG intervention.

protection authorities as a signal of their commitment to increase transparency.⁹ If so, being named in the report and the associated news coverage could have gone along with a reputational benefit for the treated fund companies.

5.2. Supply-side response

Next, we turn to the question of whether the affected funds adjusted their level of AS subsequent to the intervention.

Table II-4 reports the main results of our investigation into the NYOAG intervention effect on fund company behavior. We begin by analyzing the unconditional development of AS across all sampled funds before and after the intervention (specification (1)). At -0.116 pp., AS of actively managed equity funds slightly declines after April 2018. However, given a mean AS of 74% among the matched funds under review (cf. **Appendix II-2**), the overall time effect is economically negligible. Also, its statistical significance washes out once we include fund controls and use the matched sample (specification (2)). Note that our results remain qualitatively unaltered when we include fund fixed effects (specification (3)). In fact, incorporating fund fixed effects only marginally increases the within-model fit, while substantially worsening the overall-model fit. Since fund controls already explain about 42% of the overall variation in AS, we thus continue estimating our main specifications (4) and (5) without fund fixed effects. Specification (4) includes β_4 , i.e. our coefficient estimate of the difference-in-differences of AS for the treated funds versus control group funds before and after the intervention. We find that the intervention effect turns out statistically and economically irrelevant. Thus, compared to control group funds, those funds affected by the intervention have not adjusted their degree of active portfolio management any differently ever since they have disclosed AS information as of April 2018.¹⁰

Are our results confounded by the many moderate and active stock pickers which do not feel the urge to adjust their AS? To examine this possibility, we focus on the subsample of closet indexers, i.e. arguably those funds with the highest pressure to act. The full model (specification (5)) includes the relevant triple interaction term, but again,

⁹ We identify the sentiment of all press releases with respect to the NYOAG intervention and note that the majority of articles entails an either positive or neutral connotation. Appendix II-2 describes the methodology and reports the corresponding descriptives.

¹⁰ Our results are qualitatively robust to clustering standard errors at the fund family level as well as to controlling for fund fixed effects in the treatment group. The corresponding results are available upon request.

the corresponding coefficient estimate, β_7 (0.046), is miniscule and statistically indistinguishable from zero. Hence, we do not observe any meaningful effort to increase AS for managers of funds rated closet indexers at the time of the intervention, either. Moreover, the AS threshold level of 60% which—according to the definition of Cremers and Petajisto (2009)—separates truly actively managed funds from closet indexers might be (i) somewhat arbitrary and (ii) unknown to fund managers. Thus, we divide the universe of funds into quintiles depending on their AS prior to the intervention and replicate specifications (4) and (5) of our main analysis for each of the quintiles-based cut-offs. Yet, regardless of the respective quintile, we fail to find any measurable differences of AS adjustment among the treated versus control group funds.¹¹

Finally, the NYOAG report calls for retail investors to assess funds with respect to both manager activeness and cost. Thus, another plausible supply-side response would be to adjust fund fees instead of altering the level of active management. However, our analysis of the funds' expense ratios does not support this notion. Specifically, the coefficient estimate pertaining to the interaction term $Intervention_i \times Treated_i$ turns out economically and statistically insignificant when we replicate specification (5) using the funds' Gross Expense Ratio (*GER*) as the dependent variable. Additionally, a complementary screening of the development of fund fees subsequent to our sample period shows that the affected funds have not adjusted fees in 2019 either.¹²

Taken together, this evidence suggests that fund companies have not reacted to the intervention in the way intended by the NYOAG.

¹¹ The corresponding results are available upon request.

¹² The corresponding results are available upon request.

Table II-4—Reaction of affected fund companies

	Dependent variable: $AS_{i,t}$				
	(1)	(2)	(3)	(4)	(5)
Intervention _t	-0.116** (0.0505)	-0.176 (0.133)	-0.184 (0.154)	-0.146 (0.153)	-0.0591 (0.156)
Treated _i				-1.432 (0.938)	-1.564* (0.879)
Closet Indexer _i					-5.826*** (1.277)
Intervention _t × Treated _i				-0.054 (0.168)	-0.001 (0.175)
Intervention _t × Closet Indexer _i					0.131 (0.332)
Treated _i × Closet Indexer _i					0.409 (1.451)
Intervention _t × Treated _i × Closet Indexer _i					0.046 (0.474)
N obs.	2,868	1,260	1,260	1,260	1,260
N funds	1,434	630	630	630	630
R ² (within)	0.0036	0.1261	0.1261	0.1267	0.2119
R ² (overall)	0.0002	0.4210	0.4207	0.4225	0.5494
Matched Sample	NO	YES	YES	YES	YES
Controls	NO	YES	YES	YES	YES
Fund FE	NO	NO	YES	NO	NO

Notes: This table reports coefficient estimates obtained from the regression model

$$AS_{i,t} = \alpha + \beta_1 Intervention_t + \beta_2 Treated_i + \beta_3 Closet Indexer_i + \beta_4 Intervention_t * Treated_i + \beta_5 Intervention_t * Closet Indexer_i + \beta_6 Treated_i * Closet Indexer_i + \beta_7 Intervention_t * Treated_i * Closet Indexer_i + \delta' c_{i,t} + \varepsilon_{i,t}$$

as specified in section 4.2. $AS_{i,t}$ measures the Active Share of fund i in quarter t , $Intervention_t$ is a binary variable distinguishing the pre-intervention period prior to April 2018 from the post-intervention period after April 2018, $Treated_i$ is a binary variable indicating funds issued by fund companies which were imposed to disclose AS statistics by the NYOAG, and $Closet Indexer_i$ denotes whether fund i rates as a closet indexer prior to the intervention. The coefficient pertaining to $Intervention_t \times Treated_i$ estimates the difference in differences between the AS of treated funds versus control group funds when comparing them for the pre- and post-intervention periods. The triple interaction term $Intervention_t \times Treated_i \times Closet Indexer_i$ gauges the respective difference in differences for the subsample of treated funds versus control group funds which rate as closet indexers prior to the NYOAG intervention. The vector $c_{i,t}$ contains the fund-specific control variables listed in Table 1. All results are obtained from a balanced sample of treated funds and control-group funds matched using PSM (nearest neighbor 1:1 method) as described in section 4.2. Data is collapsed to a pre-treatment period (Q4 2017 – Q1 2018) and a post-treatment period (Q2 2017 – Q3 2018). Robust standard errors (in parenthesis) are clustered at the fund family level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

6. Further analyses

6.1. Investor reaction around the disclosure announcement date

In a first supplementary analysis, we explore in detail when exactly investors reacted to the NYOAG intervention and for that draw on *daily* fund flow data from Morningstar Direct. We calculate cumulative abnormal fund flows (CAFFs) to trace the flows into retail share classes of treated versus non-treated funds around the NYOAG report disclosure.¹³ Our event window spans the 60 trading days from six weeks prior to the publication of the NYOAG report on April 5th 2018 until six weeks after that date.

The bottom row of **Table II-5** reports CAFFs of treated funds compared to their nearest-neighbor counterfactuals for various event windows relative to the NYOAG report disclosure date. While we do not observe any significant difference in fund flows prior to the intervention, treated funds indeed attracted significantly higher fund inflows directly after the publication of the NYOAG report. In fact, CAFFs amount to over 1% during the first 30 trading days subsequent to the disclosure of the intervention, i.e. equivalent to a substantial USD 6.4 billion in additional inflows for the (matched) treated funds. Moreover, we find that the monotonous increase in CAFFs until $d=30$ diminishes thereafter.¹⁴ Thus, the bulk of abnormal inflows to the treated funds seems to have occurred soon after the announcement of the fund companies' commitment to disclose AS information. This finding corroborates the notion of a media attention effect explaining investors' response as documented in section 5.1.2.

6.2. Exposition of AS information

Second, we take a closer look at how the relevant AS information is presented to investors on the websites of the fund companies. Salience of information disclosure has been shown to significantly impact consumers' decision making (e.g., Loewenstein et al. 2014, Shaton

¹³ Specifically, we calculate CAFFs for treated fund i over matched control-group fund j following Cooper et al. (2005):

$$\text{Pre intervention: } CAFF_{i,d} = \prod_d^{d=0} FF(\textit{treated fund})_{i,d} - FF(\textit{control fund})_{j,d}$$

$$\text{Post intervention: } CAFF_{i,d} = \prod_d^{d=0} FF(\textit{treated fund})_{i,d} - FF(\textit{control fund})_{j,d}$$

where $FF(\textit{treated fund})_{i,d}$ is the daily net fund flow of treated fund i on trading day d and $FF(\textit{control fund})_{j,d}$ is the daily net fund flow of the nearest-neighbor untreated fund j on trading day d . Matching is based on the following set of covariates: AS, fund size (TNA), fund style (Large Cap, Growth), and past return.

¹⁴ The corresponding results are available upon request.

2017, Badoer et al. 2020). While we confirm that AS information has been disclosed by all affected fund companies as of April 2018, we observe considerable variation in the accessibility of the published AS statistics.

Specifically, only 28.7% of the treated funds provide AS statistics as part of the fund overview information. For the remaining funds, AS is either disclosed in the fund's details (e.g., portfolio composition), the fund's fact sheet or in a general AS report (including AS metrics for all funds distributed by the respective company) and hence more difficult to access for investors. Similarly, only 54% of treated funds feature an explanation of how to interpret the AS information. **Appendix II-5** provides examples of AS presentation modes.

Given the variation in the way AS is disclosed to retail investors, it is conceivable that (i) the counterintuitive investor response might be limited to funds for which AS statistics were difficult to retrieve and that (ii) the non-response on the supply-side predominantly stems from those funds which do not care to provide AS information in an accessible way. To explore this possibility, we augment our baseline analysis by including the binary variable *SaliencyHigh*, which separates highly salient AS disclosure modes from their relatively low-salient counterparts.¹⁵ As with our main analyses, we capture the effect of interest by interacting *Intervention* with *Saliency High*.

Panel A of **Table II-6** reports the coefficient estimates pertaining to the demand-side response and produces two additional results. First, we do not observe a significant effect of AS information salience on fund flows. Second, we fail to find evidence of investors eschewing closet indexers when AS information is easy to obtain.

Analogously, Panel B documents the supply-side response. First, we find that managers of funds issued by companies affected by the intervention have not adjusted their degree of active portfolio management any differently in case the AS information is presented more salient on their funds' website. Second, manager behavior with respect to the closet indexers among the affected funds proves insignificant once again. Third and finally, as can be inferred from the coefficient of the respective triple interaction term, fund manager behavior does not appear to be mediated by disclosure salience for the subsample of closet indexers.

¹⁵ Specifically, we define a given funds' AS information salience as *high* if its AS information may be retrieved with no more than one mouse click on the funds' front-page. Analogously, if accessing AS information requires longer clickstreams, the respective fund's salience is flagged as *low*.

Table II-5—Investor response: daily fund flows around announcement

	[-30;0]	[-25;0]	[-20;0]	[-15;0]	[-10;0]	[-5;0]	[0;5]	[0;10]	[0;15]	[0;20]	[0;25]	[0;30]	N
Mean CFF treated	-2.79	-3.93	-2.60	-3.79	-2.48	0.67	1.00	1.85	0.67	0.46	2.46	1.94	281
Mean CFF control	-2.31	-3.60	-2.30	-3.61	-2.48	0.72	1.17	2.20	1.07	0.98	3.29	2.99	281
CAFF (Difference)	0.48 (1.60)	0.32 (1.20)	0.30 (1.38)	0.18 (0.94)	-0.01 (-0.05)	0.05 (0.45)	0.17* (1.67)	0.35** (2.19)	0.39** (1.97)	0.52** (2.02)	0.82*** (2.55)	1.05*** (2.63)	562

Notes: This table reports average Cumulative Abnormal Fund Flows (CAFF) of treated funds over a matched sample of control funds for various periods prior to and subsequent to the NYOAG intervention on April 5, 2018 as specified in section 5.2. t-statistics (reported in parentheses) test against the null hypothesis of CAFFs in the respective time window being zero. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table II-6—AS disclosure salience

	Panel A: Demand-side response ($FF_{i,t}$)		Panel B: Supply-side response ($AS_{i,t}$)	
	(1)	(2)	(3)	(4)
Intervention _t	1.122 (1.446)	0.716 (1.430)	-0.378 (0.231)	-0.354* (0.192)
Salience High _i	-0.131 (1.511)	-1.216 (1.415)	-0.508 (1.818)	-1.317 (1.695)
Intervention _t × Salience High _i	-2.314 (1.918)	-2.352 (1.862)	0.169 (0.341)	0.291 (0.386)
Closet Indexer _i		-1.051 (2.634)		-7.888*** (1.100)
Intervention _t × Closet Indexer _i		2.350 (5.455)		0.197 (0.356)
Salience High _i × Closet Indexer _i		7.114 (5.060)		4.849*** (1.429)
Intervention _t × Closet Indexer _i × Salience High _i		-9.557 (6.734)		-0.671 (0.775)
N obs.	1,058	1,058	630	630
N funds	536	536	315	315
R ² (within)	0.0247	0.0308	0.1265	0.3132
R ² (overall)	0.2621	0.2649	0.4459	0.5878
Additional Controls	YES	YES	YES	YES

Notes: This table reports coefficient estimates obtained from the regression model specifications

$$FF_{i,t} / AS_{i,t} = \alpha + \beta_1 Intervention_t + \beta_2 Salience High_i + \beta_3 Closet Indexer_i + \beta_4 Intervention_t * Salience High_i + \beta_5 Intervention_t * Closet Indexer_i + \beta_6 Salience High_i * Closet Indexer_i + \beta_7 Intervention_t * Salience High_i * Closet Indexer_i + \delta' c_{i,t} + \varepsilon_{i,t},$$

$FF_{i,t}$ ($AS_{i,t}$) measures the net flows into (AS of) fund i in quarter t , $Intervention_t$ is a binary variable distinguishing the pre-intervention period prior to April 2018 from the post-intervention period after April 2018, $Closet_i$ denotes whether fund i rates as a closet indexer prior to the intervention. The variable of interest in this specifications is $Salience High$ indicating that fund i discloses AS salient on its website. The coefficient pertaining to $Intervention_t \times Salience High_i$ estimates the difference in differences between the AS of funds (difference in retail net fund flows) transparently disclosing the AS metric versus funds that chose a rather opaque disclosing method when comparing them for the pre- and post-intervention periods. The triple interaction term $Intervention_t \times Salience High_i \times Closet_i$ gauges the above-mentioned difference in differences for the subsample of ‘transparent disclosers’ versus funds with rather difficult to access AS information which rate as closet indexers prior to the NYOAG intervention. The vector $c_{i,t}$ contains the fund-specific control variables listed in Table 1. The sample is restricted to retail share classes of funds issued by fund families affected by the NYOAG intervention (treatment group). Table A1 provides variable descriptions. Data is collapsed to a pre-treatment period (Q4 2017 – Q1 2018) and a post-treatment period (Q2 2017 – Q3 2018). We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

7. Discussion and concluding remarks

7.1. Discussion of key results

In early 2018, the New York Attorney General’s Investor Protection Bureau (NYOAG) investigated more than 2,000 actively managed equity funds distributed to US retail investors and, in an accompanying report, called on fund companies to make AS information available to retail investors, too. Following the investigation, the NYOAG imposed the disclosure of AS on several of the largest US mutual fund firms and, as of April 2018, these companies have published AS statistics for their actively managed equity mutual funds on their websites. In this study, we evaluate the effectiveness of this disclosure intervention.

While we confirm that all affected fund companies comply with the disclosure commitment, we conclude that the intended effects have largely failed to materialize. Compared to managers of control-group funds, fund managers affected by the NYOAG intervention have not adjusted their degree of active portfolio management—as measured by *Active Share* (AS)—any differently after having been constrained to publicly disclose AS information. Even for managers of funds rated closet indexers—i.e. arguably those funds with the highest pressure to act—we do not observe any measurable effort to increase AS post-intervention. Moreover, fund managers’ non-response is not altered by whether or not the AS metric is presented in a visible fashion.

Why don’t fund managers adjust AS levels following the disclosure commitment? First, fund managers might not be able to adjust AS in the short run. On the one hand, they might face a lack of suitable investment opportunities outside the funds’ benchmark portfolio. On the other hand, while AS seems easy to manipulate on the face of it, unobservable company-specific policies might make it difficult for managers to react to the disclosure commitment in the way they would have wished to. However, this notion is hard to square with prior evidence: Cremers and Curtis (2016), e.g., provide examples of substantial short-term AS adjustments among managers of large mutual funds. They

argue that AS can be easily manipulated by simple portfolio selection and weighting, with almost no lead-time required.¹

Second, managers might fear it could be taken as a sign of their poor pre-intervention activeness if they scale up AS levels of their funds immediately after the NYOAG intervention. Instead, they might consider it tactically wise to adjust AS gradually over time rather than increasing it all at once. Yet, we do not observe any patterns of incremental AS adjustments during the six-month post-intervention period for which we have AS information available. While our data does not allow us to explore potential long-term effects of the NYOAG intervention, we interpret the lack of gradual adjustments until September 2018 as indicative of manager inertia rather a strategy regarding the funds' AS.

Third, managers might not adjust AS levels subsequent to the announcement of the intervention because they have already done so. To check for potential information leakage or anticipation effects of the imposed disclosure, we replicate our analysis of the supply-side response for the last quarter of the pre-intervention period (18Q1), i.e. three months prior to the official announcement. However, (unreported) results do not support any measurable pre-announcement AS adjustment activity and corroborate the notion that the intervention marked a shock to the affected fund firms' operations.²

Fourth, managers might not consider AS relevant for their operations (e.g., Frazzini et al. 2016). However, empirical evidence documents that AS drives fund performance and, as such, indeed constitutes a relevant piece of information for investors and fund managers alike (e.g., Cremers and Petajisto 2009, Petajisto 2013, Cremers and Pareek 2016). Moreover, fund companies have traditionally provided AS information to institutional investors and internally use AS for benchmarking, hence making it difficult for them to deny the metric's meaning.³

Fifth and finally, fund managers might anticipate that investors will not trade on the newly available AS information and thus might not feel the urge to adjust AS levels.

¹ Yet an alternative explanation for fund managers' non-response could be that fund managers willing but unable to adjust AS instead altered management fees in order to react to the NYOAG intervention. However, a related analysis (unreported; results available upon request) shows that management fees are virtually unchanged during and after our period under review.

² The corresponding results are available upon request.

³ E.g., fund companies set AS guidelines for their portfolio managers, employ AS to review their performance, and use AS as a metric to assess fund sub-advisors (NYOAG 2018).

While we lack the data necessary to test this hypothesis, the documented investor response indeed points to a lack of understanding with respect to how AS should be used for mutual fund investment decisions.

Unlike fund managers, investors strongly respond to the NYOAG intervention. Investments in the retail share classes of affected funds significantly increase as compared to that same funds' institutional shares. Counterintuitively, however, investors do not appear to make a difference between active stock pickers and closet indexers when increasing their holdings in the funds affected by the NYOAG intervention: regardless of whether the fund qualifies as truly actively managed or rather hugs its benchmark index, the respective fund inflows are statistically indistinguishable.

A supplementary investigation of daily fund flows shows that the bulk of excess flows into the affected funds occurred right after the announcement of the fund companies' commitment to disclose AS information. This suggests that the investor response can be ascribed to an attention bias rather than to investors' trading on the newly available information about fund manager activeness. In fact—given the mostly positive connotation of the related news coverage—investors might have interpreted fund companies' collaboration with investor protection authorities as a signal of their commitment to increase transparency. If so, being named in the report and the associated news would have enhanced the affected companies' reputation. Taken together, these findings are hard to square with the notion that retail investors understand the concept behind AS and trade on this newly available information.

7.2. Towards a comprehensible measure of fund manager activeness

Generally, consumers tend to process information in the format in which it is made available to them and typically are not prepared to convert data into actionable information first (Cox and Payne 2005). Therefore, *“for [financial] information to have a positive impact on the consumer decision-making process, it must be easily accessible and presented in a clear and understandable format.”* (Kozup et al., 2008, p.38) However, several issues might obstruct the comprehensibility of the AS disclosure under review.

First, investors are presented with a numerical value and—except for the rather technical descriptions of AS on fund companies websites—typically receive no guidance on how to interpret it. This runs counter to robust evidence indicating that the ability to

derive meaning from numerical information is key to processing it efficiently.⁴ Specifically, investors require external reference information as an interpretational aid to differentiate suitable from unsuitable funds based on their AS.⁵ At this, fixed baseline comparison has been shown to be a particularly important reference type (e.g., Hieke and Newman 2015). Hence, an extension of the AS measure—i.e. a fund’s Active Fee (AF), as introduced by Cremers and Curtis (2016)—might be a promising metric to effectively inform retail investors. AF combines a funds’ AS information with the fees charged on the actively managed part of the portfolio.⁶ Assuming that the ‘passive’ part of a fund’s holdings could be invested in the benchmark index at the respective expense ratio, AF tells investors how much they pay for the truly actively managed part of the fund portfolio, i.e. the part that deviates from the benchmark.⁷

Figure II-4 illustrates the AS-AF relationship. Univariately, we observe a significant inverse relation supporting the conjecture that funds with low levels of active portfolio management charge comparatively higher fees. Thus, one avenue to provide investors with easy-to-understand information about fund manager activeness might be to compare its AF to the average AF of peer funds (cf. Kozup and Hogarth 2008).

Second, investors are presented with a snapshot of the fund’s AS which need not be indicative of its long-term asset management strategy (Cremers and Curtis 2016).⁸ Thus, besides a missing reference point, retail investors also lack information on the development of a fund’s AS over time. Such historical AS information is valuable, however, since manager activeness could be subject to window-dressing practices

⁴ See Kwon and Lee (2009) for a review of related studies.

⁵ While not the scope of our study, it is conceivable that fund companies deliberately choose not to provide investors with a reference point to assess a given funds’ AS relative to an industry or product benchmark. This practice is referred to as ‘baseline omission’ in the literature (e.g., Xie and Johnson 2015).

⁶ A fund’s Active Fee is calculated as

$$Active\ Fee_{i,a} = \frac{Expense\ Ratio_{i,a} - (1 - Active\ Share_{i,a}) * Index\ Fund\ Fee_{i,a}}{Active\ Share_{i,a}}$$

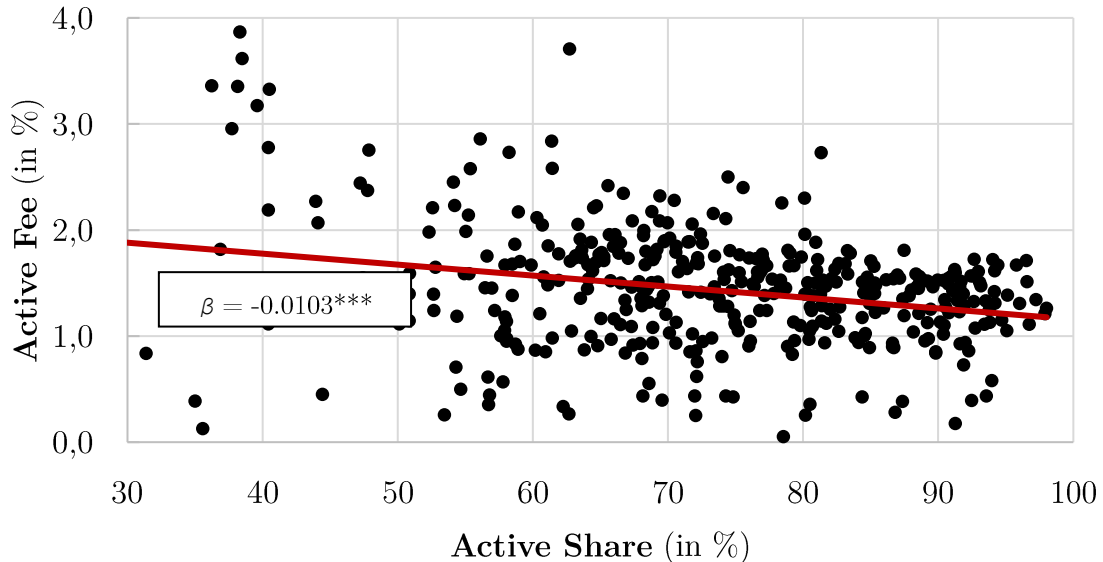
where $Expense\ Ratio_{i,a}$ represents the investors’ total expenses for fund i in year a , $Active\ Share_{i,a}$ is the AS of the fund in year a and $Index\ Fund\ Fee_{i,a}$ is the typical expense ratio charged by an index fund closely tracking fund i ’s benchmark.

⁷ In a supplementary analysis, we test whether affected fund companies adjusted Active Fee levels. Corroborating our main findings, however, we do not observe a measurable reduction in AF. If anything, we find that funds which already charge high fees relative to their degree of manager activeness further *increase* their Active Fee. The corresponding results are available upon request.

⁸ A small number of fund companies disclose AS in a separate AS report and occasionally provide AS information for the two most recent quarters.

(Cremers and Curtis 2016). In the vein of existing disclosure requirements regarding after-tax fund returns, policymakers could mandate fund companies to present individual investors with AS and AF statistics over one-, five-, and ten-year periods.⁹

Figure II-4—Active Fee and Active Share



Notes: This figure plots the sampled funds' Active Fee (AF) as specified in section 7.2. in relation to funds' manager activeness as measured by Active Share (AS) in the middle of the period under review (December 2017). AF is computed following Cremers and Curtis (2016). *** indicates statistical significance at the 1% level.

Third and finally, as documented in section 6.2, we observe large heterogeneity in the way AS is disclosed for the affected fund companies under review. Given the rather opaque presentation of AS statistics by some of the sampled fund companies, harmonization efforts should not be limited to content, but instead extend to the exposition of AS information.

Taken together, our evaluation of the NYOAG intervention documents a number of unintended consequences and reveals substantial limits to the effectiveness of this disclosure initiative. As has been advocated by the NYOAG, it is for the SEC to establish (i) the legislation required to effectively curb closet indexing and (ii) the mandatory

⁹ SEC Final Rule: "Disclosure of Mutual Fund After-Tax Returns" - 17 CFR Parts 230, 239, 270, and 274. (Younger funds: after-tax returns over entire fund life.)

disclosure standards to alert investors' to rogue firms.¹⁰ Indeed, action seems imperative: in a review of the legal aspects to closet indexing, Cremers and Curtis (2016) argue that persistent closet indexing entails delinquencies including prospectus misstatement under the Securities Act 11(a) and 12(a), excessive fees under the Investment Company Act 36(b), and fiduciary breach under the Employee Retirement Income Security Act.

¹⁰ The SEC provides an online guide which describes several relevant factors related to risk, return, and expenses that need to be considered by investors (<https://www.sec.gov/investor/pubs/sec-guide-to-mutual-funds.pdf>). As of now, however, the document lacks any guidance with respect to funds' degree of active management.

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9. Appendix

Appendix II-1—Variable descriptions

Variable name	Description
Panel A: dependent variables	
Active Share (AS) (%, quarterly)	<p>Proportion of mutual funds' holdings that differ from the benchmark index. Computed as</p> $AS_{i,t} = \frac{1}{2} \sum_{i=1}^N w_{i,k,t} - w_{k,BM,t} $ <p>where N is the total number of stocks included in either the fund portfolio <i>j</i> or the benchmark index, $w_{i,j,t}$ denotes the weight of stock <i>k</i> in fund <i>i</i> in quarter <i>t</i>, and $w_{i,BM,t}$ is the weight of stock <i>i</i> in the benchmark portfolio in quarter <i>t</i>. The higher the AS, the more a given fund's holdings differ from its benchmark. The variable is winsorized at the 1st and 99th percentile.</p>
(Quarterly / Daily) Net Fund Flows (FF)	<p>Quarterly / daily net fund flows are the net growth in fund assets beyond reinvested dividends:</p> $Net\ Fund\ Flows\ (FF)_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}}{TNA_{i,t-1}} - r_{i,t}$ <p>where $TNA_{i,t}$ denotes the dollar value of total net assets (TNA) of fund <i>i</i> in quarter <i>t</i> (on day <i>d</i>) and $r_{i,t}$ denotes the return of fund <i>i</i> in quarter <i>t</i> (on day <i>d</i>) as reported in Morningstar Direct. We apply the fund merger correction as proposed in Lou (2012). The variable is winsorized at the 1st and 99th percentile.</p>
Panel B: key explanatory variables	
Treated	Equals one if a fund company has been mentioned in the report "Mutual Fund Fees and Active Share" by the New York Attorney General Investor Protection Bureau (NYOAG report) on April, 5 th 2018, zero otherwise.
Intervention	Binary time variable distinguishing the pre-intervention period prior to April 2018 from the post-intervention period after April 2018. Equals one for the post-intervention period, zero otherwise.
Closet Indexer	Equals one if a funds' Active Share (AS) is below 60%, zero otherwise. Definition taken from Cremers & Petajisto (2009).
Retail SC	Equals one if a funds' share class is available to retail investors, zero otherwise.
Saliency High	Equals one if a (treated) fund company transparently discloses the AS metric on its website, (i.e. AS information can be obtained within one mouse-click from the funds' overview website), zero otherwise.
Panel C: control variables	
Fund Age (years)	Age in years since a funds' inception date. We use the logarithm of <i>Fund Age</i> in our main regressions.
Large Cap Fund	Equals one if a fund primarily invests in large cap stocks, zero otherwise.
Mid Cap Fund	Equals one if a fund primarily invests in mid cap stocks, zero otherwise.
Small Cap Fund	Equals one if a fund primarily invests in small cap stocks, zero otherwise.
Growth Fund	Equals one if a fund primarily invests in growth stocks, zero otherwise.
Value Fund	Equals one if a fund primarily invests in value stocks, zero otherwise.
Blend Fund	Equals one if a fund primarily invests in blend stocks, zero otherwise.
Institutional SC	Equals one if a fund is available for institutional investors only, zero otherwise.
# Managers	Number of managers responsible for managing a fund as reported by Morningstar.

Managerial Ownership	Equals one if at least one of the funds' managers is privately invested in the fund he/ she manages, zero otherwise.
Morningstar Rating (1 to 5 stars)	Morningstar rates mutual funds and ETFs from 1 to 5 stars based on how well they have performed (after adjusting for risk and accounting for sales charges) in comparison to similar funds and ETFs. Within each Morningstar Category, the top 10% of funds and ETFs receive 5 stars and the bottom 10% receive 1 star.
Segment Flows (USD bn.)	(Quarterly) net fund flows in (and out of) a specified Morningstar fund segment. The variable is winsorized at the 1st and 99th percentile.
Fund TNA (USD bn.)	Funds total net assets – aggregating both, institutional as well as retail share classes of a given fund. We use the natural logarithm of <i>Fund TNA</i> in our main regressions. The variable is winsorized at the 1st and 99th percentile.
Fund TNA – Retail (USD bn.)	Funds total net assets aggregated over retail share classes (available to retail – excluding any share classes labeled as “institutional” as reported on Morningstar Direct). We use the natural logarithm of <i>Fund TNA - Retail</i> in our main regressions.
Fund Family TNA (USD bn.)	Total net assets of fund family (company). Refers to the total net assets reported in Morningstar Direct for a fund family. Total net assets are restricted to actively managed equity mutual funds, excluding fund of funds. The variable is winsorized at the 1st and 99th percentile.
Moderately Active	Equals one if a funds' Active Share (AS) is below 80% but above 60%, zero otherwise. Definition taken from Cremers & Petajisto (2009).
Stock Picker	Equals one if a funds' Active Share (AS) is above 80%, zero otherwise. Definition taken from Cremers & Petajisto (2009).
Gross Expense Ratio (% , annually)	A fund's annual gross expense ratio in percent. The variable is winsorized at the 1 st and 99th percentile.
Net Expense Ratio (% , annually)	A fund's annual net expense ratio in percent. The variable is winsorized at the 1 st and 99th percentile.
Management Fee (% , annually)	Percentage that was deducted from an investment's average net assets to pay the investment's management.
Turnover Ratio (% , annually)	Percentage amount of a mutual fund's portfolio that has changed within a given year in percent. The variable is winsorized at the 1st and 99th percentile.
Return (% , annually)	A funds' (quarterly) raw return before any fees and cost in percent. The variable is winsorized at the 1st and 99th percentile.
Return SD (% , annually)	A funds' (quarterly) standard deviation of raw return in percent. The variable is winsorized at the 1st and 99th percentile.
Tracking Error (% , annually)	Standard deviation of the difference between the fund's and the benchmark index' return. The variable is winsorized at the 1st and 99 th percentile.
N Benchmark Holdings	Total number of (long) equity holdings in a funds' benchmark. The variable is winsorized at the 1st and 99th percentile.
Top10 Assets in BM (% , quarterly)	Sum of weights of the top 10 stocks in the funds' benchmark in percent. The variable is winsorized at the 1st and 99th percentile.

Appendix II-2—Summary statistics: matched sample

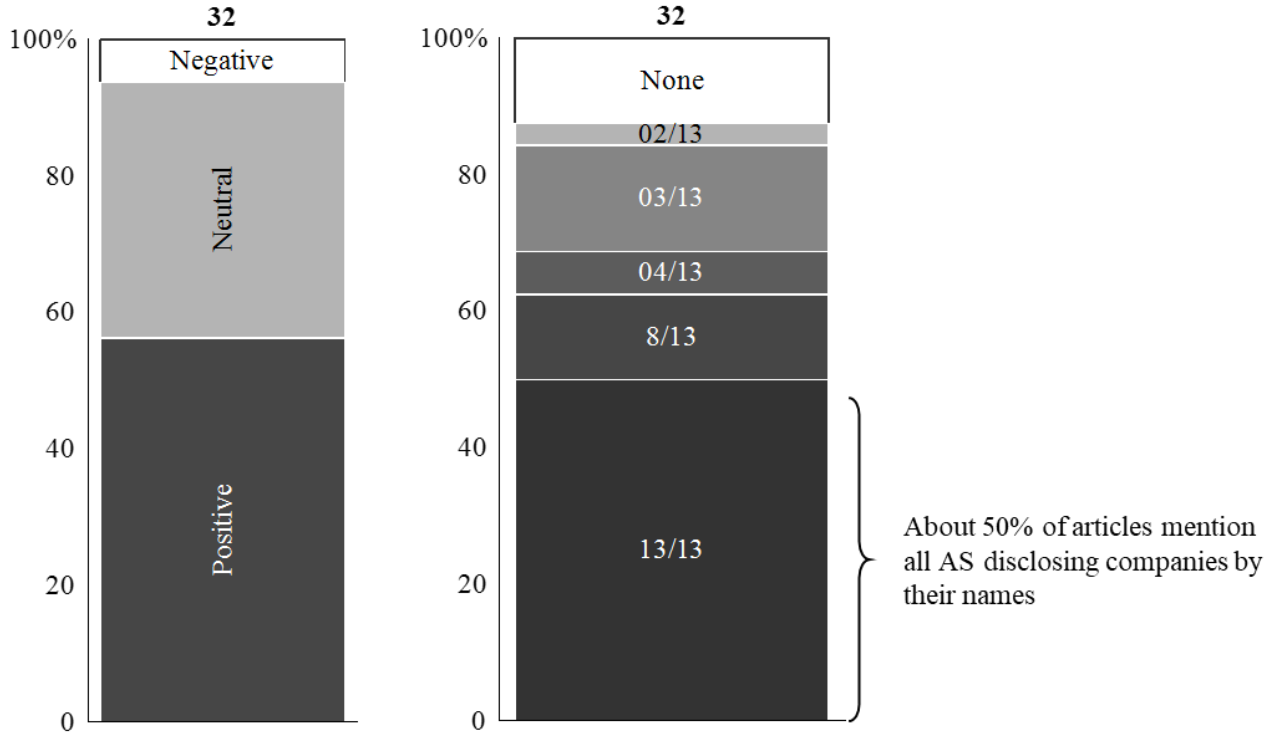
	Matched treatment group			Matched control group		
	Mean	P50	SD	Mean	P50	SD
Panel A: matching covariates						
Ln (Fund TNA)	25.445	25.195	0.710	25.421	25.461	0.685
Ln (Fund Family TNA)	19.465	19.786	2.196	19.317	19.621	2.349
Large Cap Fund (0=No; 1=Yes)	0.721	1	0.449	0.716	1	0.451
Value Fund (0=No; 1=Yes)	0.232	0	0.422	0.228	0	0.420
Gross Expense Ratio (% annually)	1.321	1.258	0.607	1.333	1.198	0.700
Active Share (%)	74.072	74.655	14.034	73.751	74.782	15.412
Panel B: non-matching covariates						
Net Fund Flows (% quarterly)	1.234	-1.994	10.877	0.296	-2.424	10.861
Intervention	0.5	0.5	0.5	0.5	0.5	0.5
Treated	1	1	0	0	0	0
Fund Age (years)	20.651	19.667	12.429	18.449	18.250	12.441
Mid Cap Fund (0=No; 1=Yes)	0.178	0	0.383	0.199	0	0.400
Small Cap Fund (0=No; 1=Yes)	0.102	0	0.302	0.085	0	0.279
Growth Fund (0=No; 1=Yes)	0.444	0	0.497	0.424	0	0.495
Blend Fund (0=No; 1=Yes)	0.324	0	0.468	0.348	0	0.477
# Managers	2.606	2	1.746	2.935	2	1.832
Manager Ownership (0=No; 1=Yes)	0.752	1	0.432	0.631	1	0.483
Morningstar Rating (1-5)	3.124	3	0.993	3.029	3	1.151
Closet Indexer (0=No; 1=Yes)	0.171	0	0.377	0.218	0	0.413
Moderately Active (0=No; 1=Yes)	0.394	0	0.489	0.396	0	0.490
Stock Picker (0=No; 1=Yes)	0.449	0	0.498	0.403	0	0.491
Net Expense Ratio (% annually)	1.133	1.159	0.293	1.137	1.135	0.296
Management Fee (% annually)	0.709	0.710	0.163	0.740	0.750	0.191
Turnover Ratio (% annually)	63.528	56.335	39.184	53.570	42.000	39.040
Return (% annually)	2.775	2.936	2.910	2.497	2.823	3.128
Return SD	12.598	12.190	4.165	13.391	12.918	3.867
Tracking Error (%)	6.636	6.307	3.299	7.126	6.996	3.467
N funds		315			315	
N obs.		630			630	
Panel C: matching characteristics						
	Post-matching			Pre-matching		
Mean covariate bias	1.5			39.2		
Median covariate bias	1.0			34.6		
Rubin's B	5.1			104.4*		
Rubin's R	0.93			2.21*		

Notes: This table reports summary statistics of our sample pre and after matching. Treatment and Control Group are matched using propensity score matching (nearest neighbor 1:1 method). Matching is based on a comprehensive set of covariates, which include Active Share (AS), fund style (Growth Fund), investment focus (Large Cap Fund), fund size (Fund TNA - Retail), the funds cost structure (Gross Expense Ratio) and fund family size (Fund Family TNA). Panel C reports PSM matching characteristics.

Appendix II-3—Business press coverage of NYOAG intervention

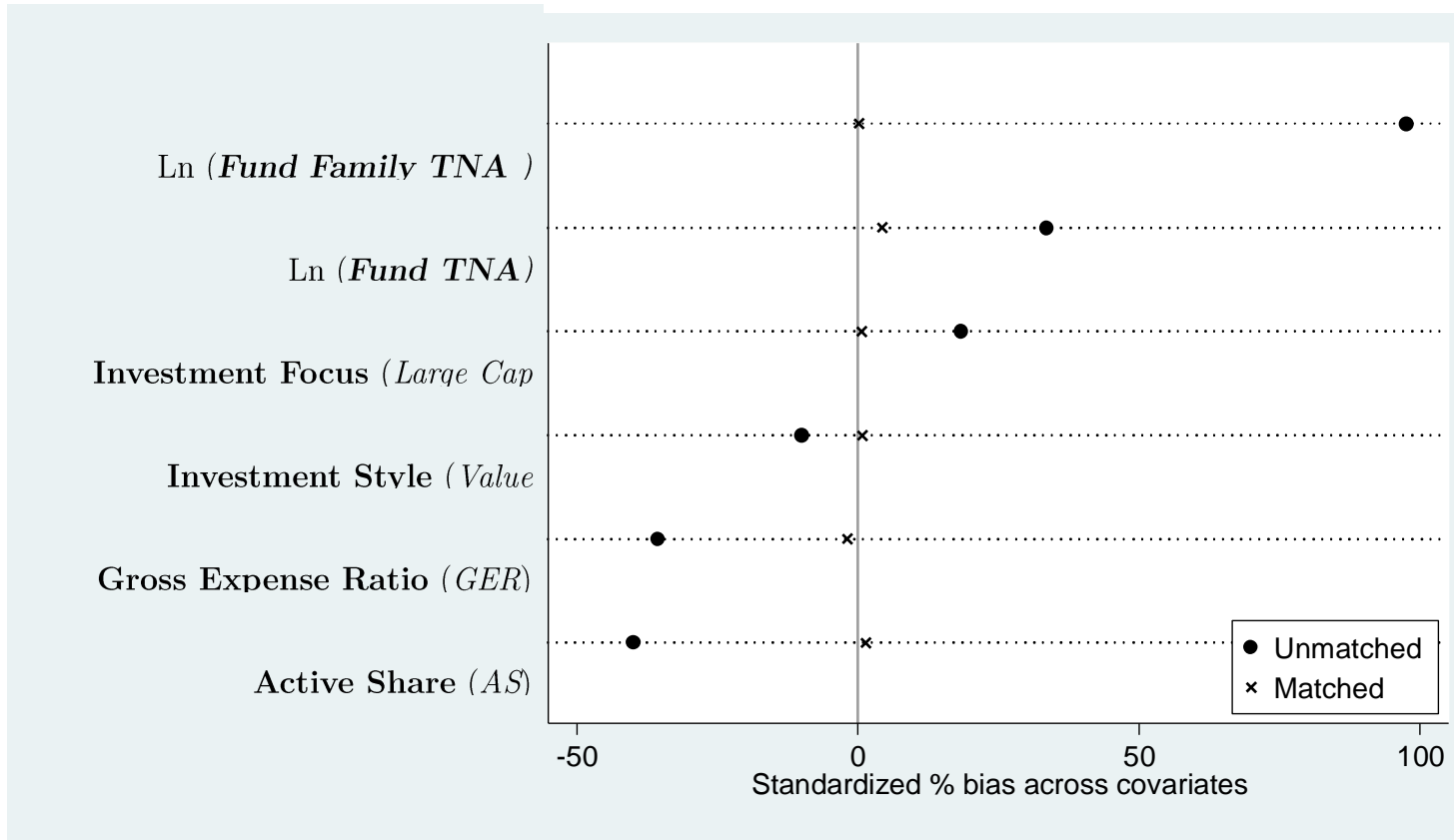
of Press Articles written in positive/neutral/negative Tonus

of Press Articles mentioning Fund Companies



Notes: This figure illustrates the business press coverage of the NYOAG intervention on April 5, 2018. The LHS graph displays the overall sentiment (connotation) of the press articles as captured by using Intencheck (<https://www.intencheck.com/>). The RHS graph plots the frequency distribution of articles stacked with respect to the number of affected fund firms mentioned in the respective article.

Appendix II-4—Propensity score matching



Notes: This figure illustrates the (standardized) mean covariate bias between affected funds and control-group funds prior to and after the propensity score matching. Circles indicate the pre-matching covariate bias, while crosses indicate the respective post-matching bias.

Appendix II-5—Salience of Active Share disclosure

Panel A: Active Share disclosed as part of the fund overview



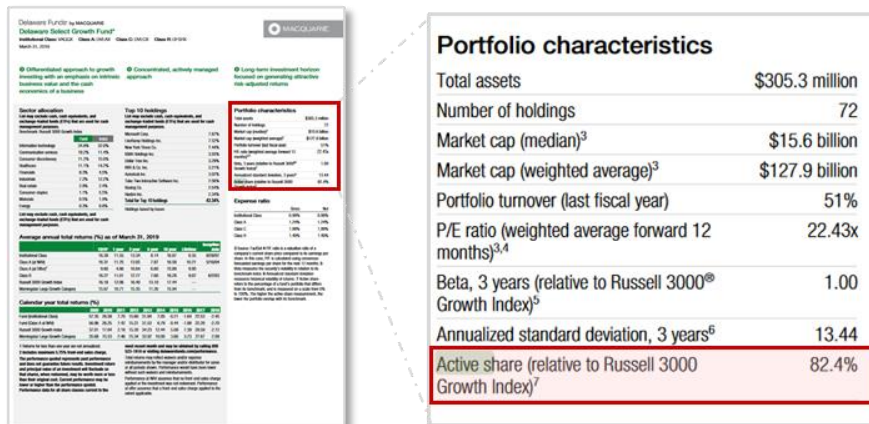
Panel B: Active Share disclosed in the fund risk measures (or holdings)

Risk Measures

As of 02/29/2020

Active Share ⓘ	0.60
Alpha ⓘ	0.19
Beta ⓘ	1.05

Panel C: Active Share disclosed in a funds’ fact sheet



Panel D: Active Share disclosed in a separate report

The screenshot shows a Goldman Sachs Active Share Report (GSAM) with the following data:

Fund	Active Share
Goldman Sachs Large Cap Growth Insights Fund	50%
Goldman Sachs Large Cap Value Insights Fund	88%
Goldman Sachs Small Cap Equity Insights Fund	86%
Goldman Sachs U.S. Equity Insights Fund	81%
Goldman Sachs International Equity Insights Fund	88%
Goldman Sachs Small Cap Value Insights Fund	87%
Goldman Sachs Small Cap Growth Insights Fund	82%
Goldman Sachs Emerging Markets Equity Insights Fund	50%
Goldman Sachs International Small Cap Insights Fund	88%

Notes: This figure provides examples of how Active Share is disclosed by the mutual fund companies.

III. '*skin-in-the-game*': Investors' reaction to fund managers' strategic signaling of mutual fund ownership

Authorship: This paper was written in single authorship.

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‘skin-in-the-game’: Investors’ reaction to fund managers’ strategic signaling of mutual fund ownership

*Dominik Scheld**

Abstract—Skin-in-the-game (*‘sitg’*), a fund manager’s private investment in her own funds, allows to align investors’ and managers’ interest. However, this information can be regarded as almost unattainable for retail investors under current disclosing practices. Using fund managers’ letter to the shareholders (LS), a different, yet more salient information channel of *‘sitg’* disclosure, on a large sample (~16,000 observations) of US mutual funds, we show that verbal signaling of fund manager investment alters fund flows. Specifically, we find that *‘sitg’* signaling translates into substantial fund inflows up to two weeks after the LS is sent out. Furthermore, we document that this effect is most pronounced after poor fund performance. In contrast, investors do not react on the actual amount invested by portfolio as currently required to be disclosed by the SEC. Our findings highlight the increasing need for regulators to focus on not only content, but also on the format of disclosure requirements.

Keywords: Investor reaction, fund flows, textual analysis, fund manager ownership, fund shareholder letters, disclosure effectiveness

JEL-Classification: G11, G23, G29, G32

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1. Introduction

“Don't tell me what you think, tell me what you have in your portfolio.”

Nassim Nicholas Taleb

Mutual funds constitute the most popular professionally managed investment vehicle in the US. Estimated 100 million individuals in 56 million households own shares in at least one of the large universe of mutual funds available for private investors. The total amount of assets managed reached about 19 trillion dollar at the year-end 2017.¹ Investing in an actively managed mutual fund is tantamount to delegating the management of a securities portfolio. Consequently, fund investors face ongoing uncertainty about the standard of care investment professionals exercise when managing their savings and whether they act in their best interest. Hence, understanding the incentives of the individuals responsible for managing those funds is of major importance to investors given the asymmetric information setup.

Responding to a series of governance scandals in the fund industry², the US Securities and Exchange Commission (SEC) requires all managers of mutual funds to disclose their personal investment in the funds they manage since March 2005. The disclosure requirement is meant to bring more transparency, reduce agency cost and align interests in the relationship between shareholders and managers of mutual funds. As the SEC argues, *“a portfolio manager's ownership in a fund provides a direct indication of his or her alignment with the interests of shareholders in that fund”* - SEC Rule S7-12-04.³ While fund manager ownership might be motivated by a variety of reasons⁴, it can in turn establish a useful incentive alignment mechanism: fund managers, who invest their private money in self-managed funds, should refrain from excessive risk taking and

¹ The Investment Company Institute - 2018 Investment Company Fact Book.

² Among them, late trading and market timing have revealed misaligned incentives in the fund industry in the early 2000s and carried penalties of more than \$ 4billion imposed on fund companies (Bullard 2005).

³ SEC Rule S7-12-04: Disclosure Regarding Portfolio Managers of Registered Management Investment Companies.

⁴ For example, fund manager ownership can be justified as a personal portfolio decisions, i.e. when the manager has superior information on the funds' future performance, or linked to fund family policies such as requiring minimum investments or (partly) compensating managers with shares of self-managed funds. However, referring to compensation contracts, Ma et al. (2019) do not find evidence for this to be the case in practice.

exercise caution on the shareholder money employed.⁵ According to Nassim Taleb, author, mathematical scientist and former options trader, having “*skin-in-the-game*” (*sitg*), i.e. being exposed to risk when taking a decision, is at the heart of an effective principal-agent setting. He argues, “[*h*ow much you truly believe in something can be manifested only through what you are willing to risk for it.”

Indeed, prior research largely documents that in the mutual fund setting manager ownership relates positively to fund performance (Ma and Tang 2019, Khorana et al. 2007, Evans 2008) with the incentive alignment mechanism between fund managers and shareholder being the main driver for the positive return relation (Ma and Tang 2019, Martin and Sonnenburg 2015).

Theoretically, retail investors should benefit from the mandated disclosure of manager ownership. However, the information on managers’ private investments is disclosed in a lengthy (>50 pages), word-heavy (>10,000 words) and most-probable unread document that is only provided upon request –the *Statement of Additional Information* (SAI). For the vast majority of private investors this document is, at best, a secondary source of information and therefore remains unread (SEC 2019).

Yet, interestingly, fund managers regularly use another medium to voluntarily disclose ‘*sitg*’ to their investors: the Letter to the Shareholder (LS).⁶ In the LS, the fund management directly speaks to the funds’ shareholders and discusses, among others, past performance, market outlook and sometimes stock picks (Hillert et al. 2016). Constituting the initial section of the semi-annual fund reporting, the LS is presumably read more often than other parts of the reporting and therefore can be regarded as the main communication tool for the fund management (Chu and Kim 2019).

Using advanced textual analysis building on a self-coded Python routine, we are able to automatically process a large sample (~16,000) of mutual funds’ shareholder letters. We analyze whether investors response to fund managers’ communication of ‘*sitg*’ in the LS controlling for a comprehensive set fund, manager and market characteristics. First,

⁵ Note that other incentive alignment mechanisms are also at play, e.g., performance-based compensation contracts, fund manager dismissal after poor performance or removal of the fund management company by the funds’ board of directors. Furthermore, we cannot rule out the case that fund manager ownership is a requirement from the fund management company and consequently does not display a personal portfolio choice. However, there is only little evidence suggesting so (cf. Khorana et al. 2007).

⁶ Examples of how ‘*sitg*’ is communicated are, e.g., “*I remain a significant investor in the fund alongside you*” or “*I am committed to invest a substantial part of my private wealth in the fund*” and addressing fund investors as “*fellow shareholders*”.

we show that communication of personal investment by fund managers triggers substantial retail investor net inflows in the month following the filing of the LS. In fact, this effect is substantially larger than the well-established performance-flow relationship in our setting and amounts to USD 20.6 million for the average fund in our sample. Thus, ‘*sitg*’ communication approximately doubles flows in the post filing month. Moreover, the effect is substantial in the first week after the filing and persistent throughout time, i.e. it does not revert until the next reporting period. By contrast, the actual dollar amount invested by the manager, which is only accessible via the funds’ SAI, does not alter retail investor flows. Second, we show that the investor’s response to ‘*sitg*’ communication is most pronounced when the fund has performed badly, the market is bullish, funds are solo managed as well as when the LS is short and ‘easy to read’. This suggests that ‘verbal commitment’ of the fund manager creates an opportunity to retain assets after bad performance (see, e.g., Coval and Stafford 2007) and to differentiate from competition in a booming market. Third, we find that investors are highly sensitive to changes in the signaling of fund managers’ commitment in the LS. We observe significant positive (negative) net flows if fund managers start (stop) to signal their ‘*sitg*’ of the funds they manage. Again, this finding is solely driven by the verbal commitment and unaffected by the actual dollar amount invested. Fourth and finally, we provide evidence that ‘*sitg*’ communication is only affecting retail investors’ decision. Institutional investor flows remain unaltered by whether (or not) fund managers signal aligned incentives in the LS.

Our study contributes to different strands in the literature. First, we build on the existing literature analyzing the impact of ‘*sitg*’ in the mutual fund domain. Khorana et al. (2007), Evans (2008) and Ma and Tang (2019), e.g., show that mutual funds in which the fund managers hold significant private investments yield higher risk-adjusted returns and conclude that – all else equal – ‘*sitg*’ is desirable for the individual investor.⁷ Using (non-public) accounts of fund managers’ private portfolios, Ibert (2018) supports these findings in concluding that fund managers possess superior information on their ability to generate abnormal returns and invest their money accordingly.⁸ The positive ownership-performance relation is shown to be most pronounced for single managed

⁷ To the best of our knowledge, there is only one paper not documenting a positive relation between SitG and future fund performance: using data on finish mutual funds, Kumlin and Puttonen (2009) find no such relation.

⁸ Recently, Gupta and Sachdeva (2019) find the performance enhancing ability of managerial co-investment also in the context of hedge funds.

funds (Hornstein and Hounsell 2016). Furthermore, '*sitg*' significantly decreases the probability of a fund to encounter the disposition effect (Fu and Wedge 2011) or to feature high annual asset turnover (Evans 2008). Focusing on private investments of the funds' board of directors', Cremers et al. (2009) and Chen et al. (2008) show that directors' '*sitg*' impacts fund operations. Specifically, they find that a lack of '*sitg*' among directors is an indicator of ineffective governance.

However, the aforementioned studies draw on the SAI in order to capture manager's (director's) personal holdings in their funds and remain silent about how retail investors are supposed to know about their fund managers' ownership. Unlike these studies, we analyze aggregate fund flows to learn if and to what extent retail investors incorporate voluntarily disclosed information using a piece of communication that is readily available to the average investor – the mutual funds' LS. Second, by doing so we built on the various existing studies analyzing the determinants of mutual fund flows (e.g., Sirri and Tufano 1998, Barber et al. 2005). Our contribution in this regard relates to the investigation of which role the signaling of incentive alignment as well as the salience thereof plays for retail investors. Third, we extend the increasing stream of literature applying textual analysis on written communication in accounting and finance to gauge supply- or demand-side effects (e.g., Tetlock et al. 2008, Li 2010, Loughran and McDonald 2014).⁹ Most of the existing studies in this context focus on corporate disclosures. By contrast, textual analysis related to mutual fund textual disclosure remains rather untapped. Recent research by Hillert et al. (2016), Du et al. (2019) and Chu and Kim (2019), which to our knowledge are the only existing studies to examine LSs so far, mark an exception. Supporting the importance of LS as fund managers' primary communication tool, they also document that LS influence investors' asset allocation: focusing on the LS writing style, they find that flows are significantly lower the more negatively and impersonal it is written (Hillert et al. 2016). With respect to return predictability, however, prior evidence is mixed. While Chu and Kim (2019) document pessimistic tone in the LS to be associated with superior future fund performance and Du et al. (2019) even conclude that hyperbole language in LS includes hidden information investors can use to differentiate luck from skill, Hillert et al. (2016) found no such

⁹ Loughran and McDonald (2016) review textual analysis in accounting and finance. More recently, they issued a working paper with special emphasis on finance related text analysis, which has been published since their initial literature review (Loughran and McDonald 2019).

relation. In the corporate context, several studies report that negative sentiment within the corporate annual filing or press releases is related to negative future performance (e.g., Li 2010, Davis et al. 2012). We extend this nascent field of research by exploring retail investor reaction to strategic fund manager signaling.

2. Data, variables and regression model

2.1. Data

In order to learn about fund managers signaling in the LS and their impact on investors, we need to link different sources. First, we sample our fund data from Morningstar Directs’ fund database. From Morningstar we obtain a host of fund characteristics, among them a history of all portfolio managers per fund, which allows us to link disclosure of ownership to a specific person, and net assets, which allow us to trace investor reaction.¹⁰ Following prior literature, we focus on actively managed equity mutual funds, thereby excluding money market funds, fund of funds and index funds.¹¹ Next, we collect LSs for each fund in our sample to identify which fund managers communicate ‘*sitg*’. For this purpose, we coded a Python-based routine to download all relevant fund (semi-)annual reports and SAIs from the SEC EDGAR online archive. As mentioned earlier, LS are not required by the SEC and therefore represent an optional communication tool for fund managers. In consequence, there is no clear-cut section for the LS in the funds’ (semi-)annual reporting. Therefore, we extract the LS (if applicable) using common phrases, such as “Dear Shareholder” (“Best regards”), that identify the beginning (end) of a shareholder letter and clearly separate it from other parts of the funds’ financial report (methodically following Hillert et al. 2016 and Chu and Kim 2019). In case we lack the identification of LS beginning (end), we flag the respective annual report and extract the corresponding LS manually. Additionally, we apply selective manual checks to ensure a high quality of this slicing exercise. We observe large heterogeneity in format and design. In our sample, the length of LS ranges from only 113 words to over 3000 words and from fairly complex language to more narrative texts presumably easy to understand by all

¹⁰ In addition, we retrieve a host of control variables common in the literature. Appendix II-1 provides descriptions of all variables.

¹¹ Morningstar labels money market and fund of funds. We exclude index funds checking for fund name indicators such as “ETF”, “Exchange-Traded” or “Index” following Pastor et al. (2015).

investors.¹² Finally, we merge actual fund manager investments to our dataset. To this end, we retrieve ownership levels from the funds’ SAI filings. The SEC requires all mutual funds to disclose managerial ownership in mutual fund since March 2005.¹³ Ownership levels are provided annually within the funds’ SAI accompanying the annual report. Beneficial holdings are not reported in exact amounts, but rather refer to one of seven dollar ranges specified by the SEC.¹⁴ Analogously to the funds’ LS, there is no standardized requirement on the display format in the SAI.¹⁵ Hence, automated collection is not applicable. Therefore, we hand-collect the dollar-denominated brackets of fund managers’ private investments disclosed in the SAI for each fund, fund manager and year in our sample at the respective fiscal year end. We link data between the three data sources (Morningstar, LS, SAI) applying a multi-step procedure using SEC share class IDs, which we extract from the funds’ LS (SAIs), in combination with SEC class ticker symbols provided by the SEC and entailed in the Morningstar fund database. We provide details on the matching in **Appendix III-2**.

Since the extraction and cleaning of LSs and data collection on fund manager ownership involves substantial manual efforts, we restrict our sample of actively managed equity funds in the style of Chen et al. (2004) and Pastor et al. (2015) concentrating on funds with more than USD 100 million total assets as of 2018.¹⁶ This procedure also allows us to focus on the potential incentive alignment mechanism of fund manager investments. By contrast, large managerial ownership in small funds could imply ‘control stake’ intentions, which would bias our findings. Furthermore, we store same funds’ retail and institutional fund characteristics, if applicable, in separate accounts in our database allowing us to distinguish non-professional from professional investors’ response in the following.¹⁷ Our observation period spans the years 2013 throughout 2018.

¹² We measure the length of a LS counting the total number of words as implemented via the Python Natural Language Toolkit (NLTK). Accordingly, we compute the textual comprehensibility using the Flesch-Reading Ease Score, a widespread formula to assess the readability of written text, using modules of the NLTK. Python code is available upon request.

¹³ SEC Rule S7-12-04, “Disclosure Regarding Portfolio Managers of Registered Management Investment Companies”.

¹⁴ \$0, \$1–\$10,000, \$10,001–\$50,000, \$50,001–\$100,000, \$100,001–\$500,000, \$500,001–\$1,000,000, and above \$1,000,000.

¹⁵ We find various different modes on how funds disclose potential beneficial ownership of their funds managers ranging from indicating dollar ranges in plain text over structured tables (aggregating the entire fund family and all fund managers) to graphical illustrations.

¹⁶ Chen et al. (2004) and Pastor et al. (2015) use a threshold of USD 15 million.

¹⁷ As we retrieve fund information on the share class level from Morningstar, we convert fund-level retail (institutional) aggregates weighted with their respective contribution to the fund’s total net assets (e.g., Doshi et al. 2015).

In order for a funds to qualify for our sample, we require a fund to (a) being an actively managed equity fund with a fundsize of more than USD 100 million, (b) include a LS in each annual report in our observation period, (c) disclose information on fund manager ownership in the fund’s SAI for all years the fund manager has been active in a given fund and (d) allow for a link between the three data sources. In sum, 1,334 actively managed mutual funds fulfill those requirements. To the best of our knowledge, this database represents the most comprehensive and recent collection of fund manager private investments, while being the first to link actual investments with investor communication.¹⁸

2.2. Key variables

2.2.1. Net fund flows

Of major interest to us is whether retail investors respond to fund managers’ strategical use of ‘*sitg*’ communication in the fund’s LS. Therefore, our key dependent variable is retail investors net fund flows, which we measure following Sirri and Tufano (1998):

$$Net\ fund\ flows\ (FF)_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}}{TNA_{i,t-1}} - r_{i,t} \quad (1)$$

where $TNA_{i,t}$ denotes the dollar value of total retail (institutional) net assets (TNA) of fund i in month t (on day d) and $r_{i,t}$ denotes the retail (institutional) return of fund i in month t (on day d) as reported in Morningstar Direct. We apply the fund merger correction as proposed in Lou (2012). We distinguish fund level assets and returns between retail and institutional share classes to be able to separate retail from professional investors’ response.

2.2.2. ‘*sitg*’ communication

As the LS is a non-mandatory narrative section within the (semi-)annual shareholder reports, it is largely unregulated and therefore fully at the fund managers’ discretion to verbally communicate ‘*sitg*’. Manually screening a comprehensive set (~150) of LSs, we identify a number of terms, phrases and expressions that unambiguously indicate fund managers’ attempt to signal ‘*sitg*’ to her shareholders. Typical examples of how this is done are: “*I remain a significant investor in the fund alongside you*“, “*I am committed to*

¹⁸ Our cross sectional sample compares in size to that of Khorana et al. (2007) with 1,406 funds, however instead of relying on one year only (2004 in their paper), we obtain data for six consecutive years.

invest a substantial part of my private wealth in the fund” and addressing fund investors as “fellow shareholders“. We screen each LS for the potential inclusion of such ‘sitg’ signaling using a Python-based text-mining algorithm. To this end, we make use of the ‘bag-of-words’-technique of text-mining (Loughran et al. 2009). Specifically, we employ our list of ‘sitg’ terms and phrases as dictionary, for which we count the frequency of term/phrase occurrences in the respective fund LS. We create an indicator variable, ‘sitg’_Communication_{i,t}, denoting whether a fund manager communicates her personal investment in fund *i* managed in year *t* in the funds’ LS. The variable equals to one if personal investment is communicated, zero otherwise. In total, we screen 15,746 LS from the 1,334 funds in our sample and find instances of ‘sitg’ communication in about 21 percent of the LSs.

2.2.3. Fund manager ownership

We use our hand-collected database on fund manager ownership from SAIs filed with the SEC to construct our measures of ‘real’ fund manager ownership. Following Khorana et al. (2007), we convert dollar-ranges into actual money amounts invested by using the midpoint of the respective range. E.g., for the range \$500,001–\$1,000,000, we assume the fund manager to be invested with \$750,000. For managerial ownership reported at the dollar-range boundaries, none (lower) or above \$1,000,001 (upper), we refer to \$0 and \$1,000,001, respectively.¹⁹ In case a fund is managed by more than one fund manager, we aggregated fund manager investments by simply adding up individual levels:

$$‘skin\ in\ the\ game’ - investment_ \$_{i,t} = \sum_{j=1}^N Individual_Ownership_{j,i,t} \quad (2)$$

where *Individual_Ownership*_{j,i,t} represents the individual investment of manager *j* in fund *i* and year *t*. To account for the skewed distribution of ‘skin in the game’ – investment_ \$_{i,t} we use log values of the variable in our regression models. Furthermore, we create two alternative measures of fund manager ownership building on the above measure. First, we create a dummy variable, ‘skin in the game’ – investment_ d_{i,t} indicating whether the absolute investment is positive, i.e. at least one of the fund managers holds ownership in the fund.

¹⁹ For robustness checks of our results, we also construct fund manager ownership variables using the lower (upper) bound of the dollar-ranges provided in the SAI. All results reported remain qualitatively unchanged. Results are available upon request.

Second, we follow Ma and Tang (2019) and compute the average investment per fund manager to compare single with team-managed funds:

$$\text{‘skin in the game’ – investment_avg}_{i,t} = \frac{\sum_{j=1}^N \text{Individual_Ownership}_{j,i,t}}{N} \quad (3)$$

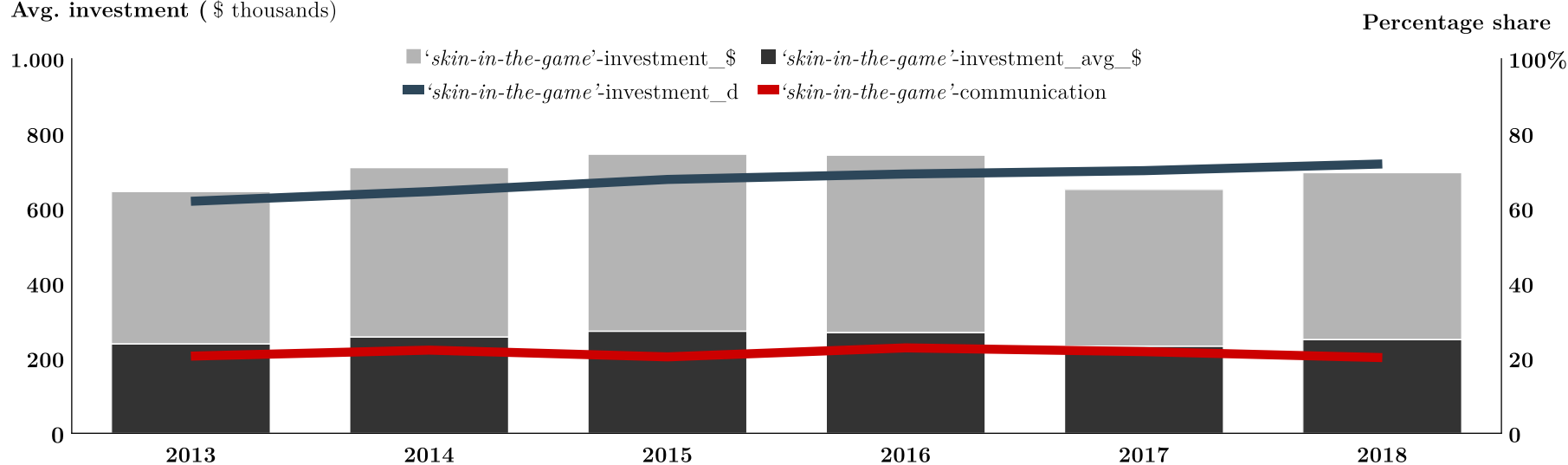
Figure III-1 illustrates descriptive statistics of fund manager ownership and ‘*sitg*’ communication in our sample for each year under observation. ‘*sitg*’ communication is present in approximately 21% of the funds LS. By contrast, fund managers hold beneficial ownership in roughly 68% of funds in our sample. The absolute amount averages at \$698,050 representing 0.09% of fund’s net assets²⁰, while the average investment per manager amounts to \$253,117 taking account of the average team size of three managers. While the share of funds with managerial ownership monotonically increases starting 2013, we observe a drop in absolute investment in 2017. Interestingly, a closer look into the fund managers’ stakes reveals, that investments are not constant. In a given year, we observe that every third fund manager increases (or decreases) her investment. This corroborates evidence reported in Hornstein and Hounsell (2016), who find that about 37% of managers investments fluctuate from one year to the next. Our descriptives square in well with prior evidence on portfolio manager ownership. At the lower end, Khorana et al. (2007) report that 51% of funds feature fund manager ownership with an average (percentage) investment with roughly \$210,000 (0.10% of TNA). At the upper end, Ma and Tang (2019) report that 71% of funds in their sample feature managerial ownership with an average investment of portfolio managers of \$540,000 (0.30% of TNA). Thus, our descriptives suggest the percentage share of funds with managerial ownership lies in the middle of those extremes, while the average absolute amount invested is fairly larger than those reported by Ma and Tang (2019). This is not surprising keeping in mind that we focus on the largest funds in the industry. In fact, Ma and Tang (2019) report an average investment of \$646,000 for large-cap funds, which is comparable in terms of fundsize to our sample.

²⁰ In supplemental analysis, we repeat our main regressions using the percentage fraction of total net assets owned by fund managers. Results remain qualitatively unchanged and are available upon request.

Figure III-1—Descriptive statistics on letter to shareholders and fund manager investment

Letter to the Shareholder (LS)	2013	2014	2015	2016	2017	2018	Total
'skin-in-the-game'-communication (Dummy=1 if yes)	0.206	0.222	0.204	0.228	0.218	0.202	0.210
Day difference (days) (Reporting Date to Filing Date)	62.81	63.79	62.45	63.22	62.61	62.36	62.87
N (Shareholder Letter)	2,505	2,609	2,613	2,660	2,647	2,712	15,746
Fund manager investment (SAI)	2013	2014	2015	2016	2017	2018	Total
'skin-in-the-game'-investment_d (Dummy=1 if yes)	0.619	0.645	0.678	0.692	0.701	0.719	0.676
'skin-in-the-game'-investment_\$ (USD k)	645.219	709.130	744.911	742.365	650.949	695.726	698.050
'skin-in-the-game'-investment_avg_\$ (USD k)	238.431	256.817	272.430	268.660	232.438	249.925	253.117
N (Funds)	1,267	1,292	1,319	1,327	1,331	1,324	1,334

Avg. investment (\$ thousands)



Notes: This figure illustrates the share of funds with at least one of the managers being invested (blue line), the average aggregated investment per fund (grey bar), the average investment per fund manager (dark grey bar) and the percentage share of fund managers communicating 'skin-in-the-game' in the LS (red line) for the period 2013-2018. 'skin-in-the-game'-communication is a binary variable indicating whether a fund manager strategically communicates her skin-in-the-Game, i.e. private co-investment, in the LS. Day difference captures the difference in absolute days between the reporting date, which marks the fiscal year end of a fund and the filing date with the SEC. 'skin-in-the-game'-investment_d captures whether at least one fund manager is invested (dummy), whereas 'skin-in-the-game'-investment_\$ ('skin-in-the-game'-investment_avg_\$) indicate the absolute fund level investment (average investment per manager), respectively.

Furthermore, **Table III-1** reports summary statistics for the 1,334 funds and roughly 96,000 fund-month observations in our sample. From Morningstar Direct we retrieve all fund characteristics also used by recent studies in the field. The average fund in our sample experienced monthly net inflows of 0.73% of its total net assets (however, with marginal negative median), has been run 10 years since inception, manages USD 2.4 billion in assets, is managed by three fund managers with an average tenure of 8 years, yielded a yearly (gross) return of 9.3 percent¹, however, with a slightly negative risk-adjusted four-factor alpha, turns over 54% of its assets in a given year and charges fees of approximately 1.2% to its retail investors.²

Table III-1—Sample descriptive statistics

	Mean	P1	P50	P99
Panel A: Fund managers				
<i>‘skin-in-the-game’-communication</i> (Dummy=1 if yes)	0.210	0	0	1
<i>‘skin-in-the-game’-investment_d</i> (Dummy=1 if yes)	0.676	0	1	1
<i>‘skin-in-the-game’-investment_\$</i> (USD k)	698.058	5	600.000	5,800.004
Manager Tenure (Years)	8.045	0	7.280	22.920
Panel B: Fund characteristics				
Net Fund Flows (in %, monthly)	0.731	-45.731	-0.557	83.860
Fund Size (USD bn)	2.430	0.109	0.834	26.001
Total Net Assets – Retail SC (USD bn)	1.791	0.083	0.542	22.950
# Managers per fund	2.972	1	2	13
Fund Age (Years)	10.501	7.797	10.167	44.500
Advisor Fee (%)	0.731	0	0.750	1.500
Director Fee (%)	0.005	0	0	0.050
Total Net Assets - Fund Family (USD bn)	161.000	0.109	60.680	2,297.000
Segment Net Fund Flows (USD bn)	13.140	3.268	13.770	17.810
Segment Growth (%)	-0.171	-2.105	-0.244	2.378
Morningstar Rating	2.087	0	2	5
(Yearly) Gross Return (%)	9.307	-22.323	7.543	45.458
(Yearly) 4F Alpha Return (%)	-0.242	-2.697	-0.185	2.244
Risk (Yearly) Standard Deviation (%)	11.790	0	11.870	25.090
Turnover Ratio (%)	53.893	3	42	240
Tracking Error (%)	7.422	1.640	6.630	24.371
Gross Expense Ratio (%)	1.242	0.409	1.210	2.485
N (Observation)		96,048		
N (Funds)		1,334		

Notes: This table reports (monthly) descriptive statistics of our sample. The sample covers the period between January 2013 and December 2018 (72 months). A detailed description of the variables is provided in **Appendix III-1**.

¹ The average yearly (gross) return of the S&P 500 in our sample period amounts to 12.81%.

² For reference, Ma and Tang (2019) report the average fund in their sample to feature USD 1.4 billion assets, being 17 years old, achieving a yearly return of 9.82% and charging an expense ratio of 1.26%.

2.2.4. Dates

Note that the date investors receive a mutual funds' (semi)-annual reporting (*filing date*) differs from the fiscal year end of that fund (*report date*). The report date of mutual funds in our sample is evenly distributed across the entire year. On average, fund disclosures are filed with the SEC within 63 days from the funds' fiscal year-end (cf. **Figure III-1**).³ Following Hillert et al. (2016), we assume that management companies have no incentive to postpone the distribution of shareholder reports to retail investors and therefore label the SEC filing date of the funds' reports as the date on which retail investors receive the LS.⁴ Furthermore, as we intend to measure investors' reaction on '*sitg*' communication using monthly fund flows acknowledging that filing dates are not restricted to months' beginning, we have to define *which month* to consider in our regression model. We refer to fund flows in month t if the filing date is prior to or on the 15th calendar day of month t . In case the filing occurs after the 15th day of month t , we refer to fund flows in month $t+1$.⁵

2.3. Model

First, in order to identify the determinants of whether a fund manager signals her '*sitg*' to investors in the funds' LS⁶, we apply a logit regression

$$\begin{aligned} & \text{'skin in the game' – communication}_{i,t} \\ & = \alpha + \beta_1 \text{'skin in the game' – investment}_{i,t} + \delta' \mathbf{c}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

where '*skin in the game*' – *communication* _{i,t} is a binary dependent variable denoting whether a fund manager communicated her personal investment in fund i in the LS filed in the month t . We either include a dummy variable on the actual fund manager investment ('*skin in the game*' – *investment* _{i,t}) or employ the logarithm of the absolute amount invested ('*skin in the game*' – *investment* _{i,t}) as explanatory variable. The vector $\mathbf{c}_{i,t-1}$ includes lagged fund, fund family and manager controls specified in **Appendix III-1**. Furthermore, we include reporting-period lagged control

³ Note that the time span from reporting to filing date varies between 43 and 71 days.

⁴ The SEC requires management companies to distribute the (semi)-annual fund reports within 10 days from the SEC filing date to their investors.

⁵ According to Hillert et al. (2016) we apply robustness test to test if our results hold when referring to fund flows in month t (the actual filing month), irrespective of the day the filing occurred in the month. Our findings prove robust to this specification. Results are available upon request.

⁶ Note that the SEC requires that LSs need to be certified by the executive committee and are required by law to present a "fair and truthful picture", i.e. no untrue or misleading statement should be made in the letter.

variables to capture long-term confounding effects, e.g., risk and return in the reporting period (six months). **Appendix III-3** provides summary statistics of the classification quality of this logit regression model and an alternative probit regression model (unreported). With a predicted mean of 20.6% (20.5%), the logit (probit) model is very close to the mean of the underlying sample (21%). Furthermore, the logit model reaches a sensitivity ('true positives') of almost 80% and a specificity ('true negatives') of close to 95%. In sum, the logit model classifies roughly 90% of the '*sitg*' communication in LS correctly based on fund manager investments as well as fund and manager controls.

Second, with regard to investors' reaction, we try to assess the impact of both, fund manager signaling in the LS and actual amount invested by the manager, on mutual fund flows. We use a time-series linear regression model to investigate investors' response, formally:

$$FF_{i,t} = \alpha + \beta_1 'skin\ the\ game' - communication_{i,t} + \beta_2 'skin\ in\ the\ game' - investment_d_{i,t} + \delta' c_{i,-1t} + \varepsilon_{i,t} \quad (5)$$

where $FF_{i,t}$ measures monthly (daily) net fund flows into (and out of) funds i 's retail assets in month (on day) t . We estimate the effect of fund manager signaling in the LS, as proxied by the indicator variable '*skin-in-the-game*'- $communication_{i,t}$ and fund managers actual aggregate investment measured by '*skin-in-the-game*'- $investment_d_{i,t}$ together with a large set of (lagged) control variables as well as fund and time fixed effects from equation (4).

3. Regression results

3.1. Determinants of '*sitg*' communication

We start by analyzing the determinants of '*sitg*' communication. **Table III-2** reports coefficient estimates and odds ratios pertaining to the logit regression model in equation (4) using '*skin-in-the-game*'- $communication_{i,t}$ as binary dependent variable. As can be taken from the first row, the choice whether to verbally communicate co-ownership of the fund managers strongly depends on whether at least one of the fund managers is privately invested in the fund. While the effects' magnitude in the unconditional setting (specification 1) decreases when including fund category (specification 2) and firm level fixed effects (specification 3), the statistical significance of the observed relation persist. In specification (4) including the full set of fund and fund manager controls as well as

fixed effects, we observe actual fund manager investment to increase the odds of communicating ‘*sitg*’ in the LS by 1.35. Replacing the manager investment dummy by the (log) absolute dollar investment (‘*skin-in-the-game*’-*investment*_ $\$_{i,t}$), we observe a (significant) positive coefficient indicating that higher private investment relates to a higher propensity of communicating ‘*sitg*’ in the LS in specifications (5)–(8). Thus, we find a strong positive link between fund managers ownership and the strategic signaling thereof in the LS.⁷ Interestingly, ‘*sitg*’ communication also depends on various fund and fund manager characteristics.⁸ While there are plenty economic reasons explaining why fund managers might hold beneficial ownership in self-managed funds⁹, it is *ex ante* not clear to us which mechanisms drive the signaling of ‘*sitg*’ in the LS. For instance, we find that the propensity to signal ‘*sitg*’ (slightly) decreases with manager tenure on the fund, while Khorana et al. (2007) document managerial ownership to increase in tenure. In the same vein, we do not observe a significant impact of past performance on fund manager ‘*sitg*’ signaling, although Khorana et al. find a strong positive relation on actual investment. For fund manager signaling, however, one could argue that an “advertisement” of aligned incentives might be of special importance after weak fund performance—we do not find evidence for this to be the case either. Surprisingly, we find a negative association between fund risk and ‘*sitg*’ signaling, which runs counter to the general hypothesis that fund managers have a higher incentive to communicate their private wealth investment the higher their investment is at risk. With respect to fund characteristics, we document that managers in smaller teams, managing older funds, smaller funds, growth funds, funds with lower Morningstar ratings and funds associated to larger fund families show a higher tendency to communicate their co-investment with retail investors.¹⁰

⁷ While incidental to our main analysis, we also document that fund managers do not arbitrarily or dishonestly communicate ownership in the funds’ they manage. For all of cases, in which we detect ‘*sitg*’ communication in the LS, fund managers in fact hold shares in the fund. Results are available upon request.

⁸ In our analysis, we employ all variables used by Khorana et al. (2007) in determining managerial ownership (section 5 of their paper), except measures on *board effectiveness* as we lack data thereof.

⁹ For example, rational (and risk-averse) managers should refrain from investing their money in funds with high return volatility or *ceteris paribus* high expenses resulting in lower returns (see, e.g., Wermers 2000). On the other side, longer tenure on the fund allowing more time to build up ownership and team size should positively affect managerial ownership. Please refer to Khorana et al. (2007) section 5 (*The determinants of managerial ownership*) for a detailed discussion on the different mechanisms.

¹⁰ For reference, Khorana et al. (2007) find managerial ownership to be higher for well performing funds, small funds and fund families, funds with low front end loads, funds with high board compensation and long manager tenure.

Table III-2—Determinants of 'skin-in-the-game'-communication – logit model

Dependent variable: 'skin-in-the-game'-Communication in Letter to Shareholder								
	Coefficients			Odds ratio	Coefficients			Odds ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fund managers								
'skin-in-the-game' -investment_d	0.785*** [0.046]	0.687*** [0.051]	0.303*** [0.106]	1.354***				
'skin-in-the-game' -investment_\$						0.132*** [0.007]	0.123*** [0.008]	0.035** [0.016]
Manager tenure		0.022*** [0.004]	-0.023** [0.010]	0.977**		0.015*** [0.004]	-0.023** [0.010]	0.977**
Fund characteristics								
Gross return		-0.005*** [0.002]	-0.003 [0.004]	0.997		-0.005*** [0.002]	-0.003 [0.004]	0.997
Alpha return		0.089*** [0.027]	0.082 [0.052]	1.086		0.092*** [0.027]	0.086 [0.053]	1.090
Risk		-0.054*** [0.006]	-0.036*** [0.012]	0.964***		-0.058*** [0.006]	-0.037*** [0.012]	0.964***
Fund size		-0.225*** [0.029]	-0.162*** [0.055]	0.851***		-0.257*** [0.029]	-0.161*** [0.056]	0.852***
Family assets		-0.101*** [0.013]	1.030*** [0.236]	2.801***		-0.091*** [0.013]	1.036*** [0.236]	2.819***
Fund age		0.005** [0.002]	0.031*** [0.006]	1.032***		0.005** [0.002]	0.031*** [0.006]	1.032***
Expense ratio		-0.454*** [0.070]	-0.151 [0.108]	0.860		-0.481*** [0.070]	-0.151 [0.110]	0.860
Morningstar rating		0.045*** [0.013]	-0.151*** [0.034]	0.860***		0.043*** [0.013]	-0.155*** [0.034]	0.857***
Turnover ratio		-0.005*** [0.001]	-0.001 [0.001]	0.999		-0.004*** [0.001]	-0.001 [0.001]	0.999
Tracking error		0.055*** [0.006]	-0.012 [0.012]	0.988		0.060*** [0.006]	-0.012 [0.013]	0.988
Value		-0.055 [0.059]	-0.093 [0.129]	0.911		-0.080 [0.060]	-0.104 [0.129]	0.901
Growth		0.294*** [0.051]	0.315*** [0.115]	1.370***		0.253*** [0.052]	0.306*** [0.115]	1.358***

Table III-2 (cont'd)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Small-cap		-0.000 [0.071]	-0.194 [0.156]	0.823		-0.012 [0.071]	-0.201 [0.156]	0.818
Large-cap		-0.001 [0.052]	0.353*** [0.114]	1.424***		0.004 [0.052]	0.335*** [0.114]	1.398***
# managers per fund		-0.089*** [0.010]	-0.135*** [0.027]	0.874***		-0.101*** [0.011]	-0.136*** [0.027]	0.872***
Advisor fee		0.193*** [0.029]	-0.227*** [0.058]	0.797***		0.190*** [0.029]	-0.230*** [0.058]	0.794***
Director fee		0.082*** [0.021]	0.405*** [0.062]	1.500***		0.082*** [0.021]	0.407*** [0.062]	1.502***
Category dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
<i>N</i>	10,181	9,916	5,732	5,732	10,181	9,916	5,732	5,732
Adjusted <i>R</i> ²	0.020	0.080	0.521	0.521	0.027	0.086	0.521	0.521

Notes: This table reports coefficient estimates and odds ratios obtained from time series (2013-2018) logit regression models using 'skin-in-the-game'-communication, which indicates whether a fund manager communicated her personal investment in fund *i* managed in year *t* in the funds' letter to shareholders (LS), as dependent variable. The variable equals to one if personal investment is communicated, zero otherwise. As key explanatory variable, logit regression models use either a dummy variable on the actual fund manager investment, 'skin-in-the-game'-investment_d, in models (1)-(4) or the aggregated absolute (logarithmized) dollar investment of fund managers in a fund, 'skin-in-the-game' -investment_\$, in models (5)-(8). Odds ratios in model 4 (8) refer to the regression coefficient of model 3 (7), respectively. All explanatory variables except Gross Return and Alpha Return are measured in the month prior to the disclosure of the shareholder letter (and therefore the potential communication of 'skin-in-the-game' in it). A detailed description of the variables is provided in **Appendix III-1**. We include fund investment category dummies (e.g., domestic, sector, global, etc.) in models (2)-(4) and (6)-(8) and control for fund family (firm level) fixed effects in models (3)-(4) and (7)-(8). We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

3.2. Investor response to ‘sitg’ communication

Next, we turn to the investor’s side and analyze whether they act on the prevalence of ‘sitg’ communication in the funds’ LS. **Table III-3** reports results on the time series regression model introduced in equation (5) using monthly net flows of retail investors as dependent variable. We observe a statistically significant and economical meaningful effect on the coefficient pertaining to ‘sitg’ communication. Including our full set of (lagged) controls previously shown to impact investor flows, e.g., return (Sirri and Tufano 1998), risk (e.g., Spiegel and Zhang 2013), Morningstar rating (e.g., Del Guercio and Tkac 2008) and expenses (e.g., Barber et al. 2005), as well as fund and time fixed effects (specification 3), we find that retail investors strongly respond to ‘sitg’ communication which manifests in an increase in fund flows of almost 0.85%. For reference, monthly fund flows in our sample average at 0.73% of funds’ TNA (cf. **Table III-1**) with the mean fund managing USD 2.4 billion assets, this translates into USD 20.7 million, which represents more than a doubling of monthly net inflows in the LS filing month under investigation.

By contrast, we do not find a significant retail investor reaction to actual fund manager investment as disclosed in the SAI. While the unconditional effect even indicates a negative relation (specification 4), the significance on the coefficient pertaining to our binary variable, ‘skin-in-the-game’-*investment_d*, washes out once including controls (specification 5) and fixed effects (specification 6). In specifications 7-9 of the table, we replace the dummy by the (log) of absolute fund manager investment to control for the potential impact of low (high) fund manager investments. Again, we do not find any positive (significant) relation of fund manager ownership on retail investors’ fund flows. When including ‘skin-in-the-game’-*communication* and actual fund manager investment, either using absolute managerial ownership (specification 10) or our investment dummy (specification 11), our results prove robust. Thus, we document that salient signaling of ‘sitg’ in the LS indeed alters funds flows, while the level of wealth investment, which is presented to investors only in form of the SAI does not. Our findings on the investor non-response to actual fund manager investment are in line with prior evidence from Hornstein and Hounsell (2016), who conclude that fund flows are generally unrelated to managerial investment.

Table III-3—Investor response to 'skin-in-the-game'-communication

	Dependent variable: <i>Net fund flows</i>										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
' <i>skin-in-the-game</i> '-communication	0.819** [0.385]	0.994** [0.389]	0.847** [0.425]							0.833** [0.424]	0.847** [0.425]
' <i>skin-in-the-game</i> '-investment_d				-1.064*** [0.298]	-0.310 [0.283]	0.034 [0.289]					0.035 [0.288]
' <i>skin-in-the-game</i> '-investment_\$							-0.101*** [0.035]	-0.027 [0.032]	-0.055 [0.037]	-0.053 [0.037]	
Gross return		0.013** [0.005]	0.036*** [0.010]		0.013** [0.005]	0.035*** [0.010]		0.013** [0.005]	0.035*** [0.010]	0.036*** [0.010]	0.036*** [0.010]
Alpha return		-0.040 [0.079]	-0.093 [0.092]		-0.035 [0.080]	-0.086 [0.092]		-0.036 [0.080]	-0.082 [0.092]	-0.089 [0.092]	-0.092 [0.093]
Risk		-0.027*** [0.010]	-0.057** [0.024]		-0.028*** [0.010]	-0.057** [0.024]		-0.027*** [0.010]	-0.057** [0.024]	-0.057** [0.024]	-0.057** [0.024]
Fund size		-2.309*** [0.412]	-2.285*** [0.471]		-2.274*** [0.413]	-2.270*** [0.473]		-2.278*** [0.412]	-2.240*** [0.475]	-2.258*** [0.474]	-2.286*** [0.472]
Family assets		1.144*** [0.317]	1.440** [0.629]		1.161*** [0.312]	1.401** [0.630]		1.155*** [0.312]	1.397** [0.629]	1.436** [0.629]	1.440** [0.629]
Fund age		-0.148*** [0.030]	-0.085 [0.091]		-0.142*** [0.030]	-0.079 [0.091]		-0.147*** [0.030]	-0.075 [0.091]	-0.082 [0.092]	-0.085 [0.091]
Expense ratio		-0.524 [0.520]	-0.568 [0.564]		-0.519 [0.524]	-0.565 [0.565]		-0.519 [0.522]	-0.561 [0.565]	-0.564 [0.563]	-0.568 [0.563]
Turnover ratio		-0.007** [0.003]	-0.007** [0.003]		-0.007** [0.003]	-0.007** [0.003]		-0.007** [0.003]	-0.007** [0.003]	-0.007** [0.003]	-0.007** [0.003]
Tracking error		0.058** [0.025]	0.049 [0.032]		0.057** [0.025]	0.048 [0.032]		0.056** [0.025]	0.047 [0.032]	0.048 [0.032]	0.049 [0.032]
MoSt segment fund flows		1.233*** [0.128]	1.078*** [0.146]		1.236*** [0.128]	1.080*** [0.146]		1.237*** [0.128]	1.077*** [0.146]	1.075*** [0.146]	1.078*** [0.146]

Table III-3 (cont'd)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
# Managers per fund		0.028	-0.031		0.029	-0.030		0.028	-0.029	-0.031	-0.032
		[0.123]	[0.141]		[0.123]	[0.141]		[0.123]	[0.141]	[0.141]	[0.141]
MoSt rating		1.187***			1.170***			1.175***			
		[0.260]			[0.260]			[0.261]			
Value		1.442			1.434			1.433			
		[1.323]			[1.322]			[1.324]			
Growth		0.057			0.130			0.126			
		[1.019]			[1.019]			[1.021]			
Small-cap		-0.328			-0.381			-0.384			
		[1.469]			[1.466]			[1.468]			
Large-cap		0.760			0.752			0.765			
		[1.009]			[1.007]			[1.009]			
Manager tenure		0.138*			0.148*			0.146*			
		[0.078]			[0.077]			[0.077]			
Fund fixed effects	No	No	Yes	No	No	Yes	No	No	Yes	Yes	Yes
Year-month fixed effects	No	No	Yes	No	No	Yes	No	No	Yes	Yes	Yes
<i>N</i>	13,136	12,718	12,718	13,136	12,718	12,718	13,136	12,718	12,718	12,718	12,718
Adjusted <i>R</i> ²	0.001	0.077	0.101	0.001	0.076	0.101	0.000	0.076	0.100	0.102	0.101

Notes: This table reports coefficient estimates of a time series (2013-2018) linear regression model. (Monthly) net fund flow is the dependent variable. Fund flows are measured in the month the LS is filed with the SEC (sent to all investors). We replace flows of the filing month by flows of the subsequent month whenever the filing of the LS takes place after the 15th calendar day (Hillert et al. 2016). 'skin-in-the-game'-communication is a binary variable indicating whether a fund manager communicates her personal investment in fund *i* managed in year *t* in the funds' LS. The variable equals to one if personal investment is communicated, zero otherwise. In models (4)-(9), we regress fund flows on actual fund manager investment, either using a dummy variable, 'skin-in-the-game'-investment_d, in models (4)-(6)) or by using log aggregate dollar investments, 'skin-in-the-game'-investment_\$, in models (7)-(9). A detailed description of the variables is provided in **Appendix III-1**. We include fund and time (year-month) fixed effects as indicated. We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

3.3. ‘sitg’ investor reaction over time

Our prior results suggest that retail investors read the LS and respond strongly in terms of asset allocation in the month they receive the LS, if it entails a verbal communication of ‘sitg’. In this section, we elaborate on the temporal dynamics of the effect, analyzing a) the short-term effect using daily data and b) the long-term effect on fund flows from one filing to the next (6 months later) methodically building on Hillert et al. (2016). This will allow us to understand better when investors trade on the ‘sitg’ information and if the effect is time persistent. To analyze daily data, we retrieve daily net assets for all funds and days (for the years 2013-2018) in our sample from Morningstar. We compute the change in daily net assets as the respective fund flow. To gauge cumulative effects, we investigate accumulated daily (monthly) fund flows starting the day (month) the LS has been filed with the SEC.

Figure III-2 plots the development of cumulated daily (upper graph) and monthly (lower graph) net fund flows around the SEC filing date ($t=0$) restricted to all funds, for which ‘sitg’ communication is in principle possible, i.e. funds with at least one fund manager being privately invested. The red line indicates cumulative fund flows for funds, in which the fund manager communicates her ‘sitg’ to investors in the LS, while the grey line represents those funds not communicating ‘sitg’. On a daily basis, we notice a steady increase in cumulative flows up to 15 days after the filing date for the ‘sitg’ communicating funds (red line). In contrast, net fund flows for the non-‘sitg’ communicating funds remain close to zero for up to 8 days after the filing (grey line). Turning to monthly data, we observe that cumulative fund flows of ‘sitg’ communicators vs. non-communicators differ by almost 5% one month after the filing. While this effect gradually vanishes in the months thereafter, a difference of cumulative flows persists until the next reporting periods’ filing.

To formally test if those effects turn out significant in a multivariate setting, we re-estimate our model from equation (5) with cumulative daily (monthly) data. **Table III-4** reports coefficient estimates on cumulative monthly (specifications 1 to 3) and daily net fund flows (specifications 4 to 7). As before, we include the full set of (lagged) controls as well as fixed effects. Analogously to the univariate setting of **Figure III-2**, cumulative monthly fund flows in the filing month (specification (1)) and one month thereafter (specification (2)) are (weakly) statistical significant. The cumulative

difference in fund flows one month after the filing amounts to roughly 1.5%, which translates into an amount of USD 35.9 million for the average fund in our sample. Notably, the significance of the effect disappears starting two months after the filing, but does not revert. Turning to the daily perspective, we find a significant positive coefficients on the cumulative daily fund flows within one and two weeks after the filing. Interestingly, however, we do not report a positive impact of ‘*sitg*’ communication on the day of the SEC filing itself. We have a practical interpretation for this finding. First, the lag between the electronic filing of the fund management company with the SEC and the receipt of the actual paper based copy¹ by retail investors is driven by post-delivery, which, according to the US Postal service, usually ranges between one and three days.² Second, investors might not be able or willing to read the LS the day they receive the information, but intentionally wait for an opportunity to do so, e.g., the next weekend. Third, retail investors might not be able or willing to trade on the information the day they have read the LS. Prior literature documents instances of increased buying and selling activity of retail investors after the weekend (e.g., Venezia and Shapira 2007). Thus, it might be an impractical assumption to see investor funds being altered by fund manager signaling on the day the LS is filed with the SEC. A closer look on the regressions in specification (5) and (6) of **Table III-4** supports this notion. While being statistically significant within one week (1st to 7th day) from the filing, the coefficient pertaining to fund managers’ ‘*sitg*’ communication is of greater magnitude for the window ranging from one week to two weeks (8th to 15th day) after the SEC filing. In addition, we document that the effect of ‘*sitg*’ signaling becomes insignificant from two weeks until 30 days after the filing (specification 7).

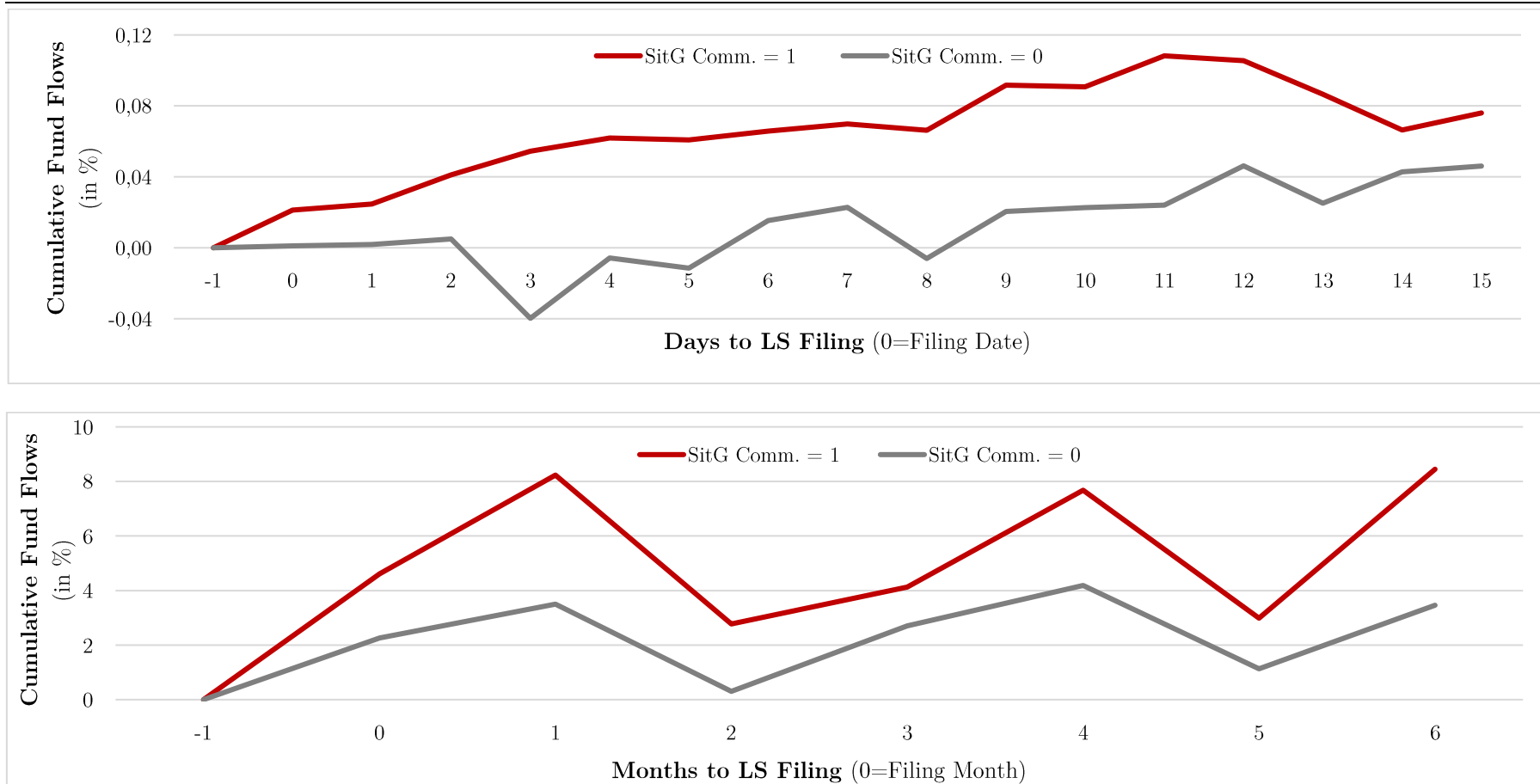
In sum, we document a substantial investor reaction to manager signaling in the first two weeks after the filing. Moreover, the reaction seems to be time persistent. Furthermore, when replicating the temporal analysis using actual dollar investment, we find no relation of managerial ownership on monthly (daily) net funds flows.³

¹ In the US, (semi-)annual fund reports including the LS have to be send as paper copies to all investors in the fund (cf. SEC 2018). Beginning January 2021, the SEC permits management companies to stop sending out paper based shareholder reports and instead allows them to use a new “notice and access” method (rule 30e-3) for delivery of fund reports.

² For reference, Amazon's average ‘click-to-door’ time in the United States has been reported to 3.07 days by 2018 (eMarketer 2019).

³ Results are available upon request.

Figure III-2—Daily and monthly cumulative fund flows



Notes: This figure illustrates cumulative net funds flows around the filing date of the funds' Letter to the Shareholders (LS). The period spans the time from one day prior to 15 days after (last figure: 1 month prior to 5 months after) the funds' filing. The red line indicates cumulative net funds flows for funds of fund managers that communicated their 'skin-in-the-game' in the funds' LS, whereas the grey line displays funds flows for fund managers that did not communicate 'skin-in-the-game' in their respective LS. The sample is restricted to funds with managerial investment larger than \$0.

Table III-4—Temporal dynamics—cumulative investor reaction around LS filing date

	Cumulative monthly Net fund flows			Cumulative daily Net fund flows			
	(1) t	(2) t;t+1	(3) t+2;t+5	(4) t	(5) t+1;t+7	(6) t+8;t+15	(7) t+16;t+30
‘ <i>skin-in-the-game</i> ’ -communication	0.847** [0.425]	1.495* [0.877]	0.907 [0.967]	0.003 [0.014]	0.101** [0.049]	0.203** [0.090]	0.084 [0.134]
Gross return	0.036*** [0.010]	0.103*** [0.021]	0.154*** [0.025]	0.083*** [0.005]	-0.011 [0.013]	-0.001 [0.016]	-0.028 [0.024]
Alpha return	-0.093 [0.092]	-0.528 [0.422]	-0.146 [0.283]	-0.108 [0.066]	0.795 [0.800]	0.191 [0.121]	0.975 [0.785]
Risk	-0.057** [0.024]	0.115 [0.090]	-0.226*** [0.064]	-0.001 [0.001]	0.000 [0.003]	-0.001 [0.003]	-0.011** [0.005]
Fund size	-2.285*** [0.471]	-4.749*** [0.772]	-9.842*** [1.153]	-0.009* [0.005]	-0.066*** [0.018]	-0.087** [0.041]	-0.106* [0.061]
Family assets	1.440** [0.629]	1.977* [1.081]	2.121 [1.673]	0.018*** [0.006]	0.041* [0.024]	-0.449*** [0.125]	-0.826*** [0.192]
Fund age	-0.085 [0.091]	-0.383*** [0.131]	-0.645*** [0.230]	-0.001 [0.001]	-0.010*** [0.003]	-0.048*** [0.012]	-0.108*** [0.018]
Expense ratio	-0.568 [0.564]	-0.927 [1.041]	-2.184 [1.568]	0.016 [0.011]	-0.029 [0.035]	-0.112** [0.047]	-0.188*** [0.071]
Turnover ratio	-0.007** [0.003]	-0.015** [0.006]	-0.012 [0.009]	0.000 [0.000]	-0.001 [0.001]	-0.001 [0.001]	0.000 [0.001]
Tracking error	0.049 [0.032]	-0.218* [0.113]	0.025 [0.088]	-0.003* [0.002]	-0.009* [0.005]	-0.021*** [0.008]	-0.000 [0.012]
MoSt segment flows	1.078*** [0.146]	1.941*** [0.346]	1.579*** [0.342]	0.039*** [0.007]	0.235*** [0.019]	0.281*** [0.023]	0.378*** [0.035]
# managers per fund	-0.031 [0.141]	-0.181 [0.208]	0.100 [0.254]	0.002 [0.003]	-0.001 [0.011]	-0.000 [0.030]	-0.058 [0.045]
Fund & manager controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	9,779	9,779	9,770	11,286	11,285	11,286	11,224
Adjusted <i>R</i> ²	0.094	0.106	0.123	0.081	0.074	0.075	0.070

Notes: This table reports coefficient estimates of a time series (2013-2018) linear regression model. The dependent variable is cumulative monthly (models (1)-(3)) and daily (models (4)-(7)) net fund flows. Flows are cumulated on monthly (daily) basis with the LS filing date (t) as reference. We apply several time windows: from the filing date up to five months after the filing for the analysis of cumulative monthly fund flows and up to 30 days after the filing for the daily dynamics. Fund, fund family and manager controls as applied in Table 3 are included in all regressions – please refer to **Appendix III-1** for a detailed description of those variables. Standard errors are clustered on the fund level. We include fund and year-month (daily) fixed effects in all models. We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

4. Further analyses

4.1. *Heterogeneous treatment effects*

To investigate whether our main results from section 3 remain robust and gain a deeper understanding of fund managers’ signaling, we perform several additional analyses. In this section, we explore whether the magnitude of retail investors’ reaction depends on fund and market characteristics using heterogeneous treatment analysis. First, we expect ‘*sitg*’-communication to be of major importance when a fund has performed poorly in an attempt to retain investors’ money and prevent capital outflows (e.g., Coval and Stafford 2007). Retail investors might be emotionally inclined to stay invested in a previously poorly performing fund, when they are persuaded that their fund management is personally committed on the funds’ future success. Therefore, we create an indicator variable, *Good Performance*, indicating that the respective fund features an above-median performance in our cross section in the last reporting period (6 months).

Second, we analyze whether the market environment plays a role when communicating ‘*sitg*’. We expect that fund managers in a bullish market strategically use ‘*sitg*’ communication to provide investors with a differentiating ‘value proposition’ of their fund. In order for them to stand out from the crowd of passive investment strategies, which naturally perform well in absolute terms during bullish markets, actively managed funds potentially build on fund manager commitment as to attract investors. Following prior literature, we obtain monthly S&P 500 returns for our observation period to proxy for the overall market environment. The median monthly return of the S&P 500 in our sample is 1.08%. We create an indicator variable, *Bullish Market*, which marks months with above median S&P 500 market returns in the prior month.

Third, we hypothesize that investors’ reaction is most pronounced when funds are single-managed, as incentive alignment signals are most credible when investors can clearly identify and attribute commitment to a solo manager (Hornstein and Hounsell 2016). In this regard, studies on consumer preferences have revealed a predilection for brands with attributable personalities (e.g., Aaker 1997). Consequently, we create a dummy, *Single Managed*, distinguishing single and team managed mutual funds.

Fourth, information-processing cost increases with document length. Everything else equal, longer and ‘less well written’ documents are more deterring and more difficult to read (e.g., Li 2008). Therefore, given the limited information search capacity of retail

investors, we expect that investors may refrain from reading long and ‘hard to read’ LS and consequently are unable to respond on fund manager signaling contained therein. Thus, we construct two indicator variables capturing the complexity of the LS. *Short LS* indicates funds with LS with below median length measured as total count of words. In addition, we measure the readability of the LS as proxied by the Flesh Reading Ease Score (Flesh 1948) applying textual analytics. We assign a LS to be ‘*easy to read*’ for above median readability scores based on the Flesh Reading Ease.¹

Finally, as already indicated in **Table III-3**, we do not expect the absolute amount invested to impact the signaling effect of ‘*sitg*’ communication. We split our sample based on the median absolute investment to test this formally, assigning the indicator variable *High FM Investment* to those funds with above median cross sectional fund manager investment on the filing date.

To formally test for heterogeneous treatment effects of ‘*sitg*’ communication, we separately interact our key explanatory variable, ‘*skin-in-the-game*’-communication, with all six indicator variables described above. We estimate the linear regression model

$$\begin{aligned}
 FF_{i,t} = & \alpha + \beta_1 \text{‘skin in the game’} - communication_{i,t} \\
 & + \beta_2 [Indicator\ variable_{i,t}] \\
 & + \beta_3 \text{‘skin in the game’} \\
 & - communication_{i,t} \times [Indicator\ variable_{i,t}] + \delta' c_{i,-1t} + \varepsilon_{i,t}
 \end{aligned} \tag{6}$$

where the dichotomized variables enter our regression model from equation (5).

Table III-5 presents coefficient estimates for the above regression model row-wise by indicator variable. For example, $\beta 1$ in the first column and row captures the ‘*sitg*’ signaling effect on fund flows for the subgroup of funds with below median cross sectional performance in the last reporting period (i.e., *Good Performance* = 0). Conversely, $\beta 1 + \beta 3$ denotes the effect for funds with above median returns and the coefficient pertaining to $\beta 3$ indicates the difference between *good* and *bad* performing funds. Starting with the separation based on lagged fund performance (first row), we find that our regression coefficient estimate on $\beta 1$ is positive and statistically significant, while there is no significance on the $\beta 1 + \beta 3$ coefficient. This means that the signaling effect of

¹ As we manually ‘clear cut’ extracted LS from the (semi-) annual shareholder reporting only for 2013, we assign the LS length and readability to all fund-year LS observations, assuming constant length and readability of same fund LS throughout time.

‘*sitg*’ communication is sizeable only after poor fund performance. In addition, we document a highly significant difference between the two subgroups (β_3), supporting our expectations regarding the relation of fund performance, strategic signaling and investor flows. Fund managers privately committed, not only by contract but also through private money invested, most probable emotionally approach investors after poor performance. When convincing shareholders that the fund management ‘is in the same boat’ the effect on net fund flows is substantial. Next, we observe that the overall market environment in which ‘*sitg*’ is communicated influences the effects’ magnitude. According to our hypothesis, ‘*sitg*’ communication affects investor flows significantly when markets are bullish (row 2). We interpret strategic signaling in strong markets as a differentiating factor. From the retail investors’ standpoint, co-investment of the fund manager might be associated with particular managing efforts that enable the fund to outperform. Furthermore, we find a significant stronger effect of ‘*sitg*’ communication for solo versus team managed funds (row 3). Single managed funds have a clear-cut responsibility of an individual. The signaling of ‘*sitg*’ might be worth most, when investors can project their investing hopes (and fears) in a single person.² Turning to investors’ search cost measured by document length and language complexity, we observe a substantial difference of the signaling effect depending on the number of words and Flesch Reading Ease score. While short LS are subject to a significant treatment effect ($\beta_1 + \beta_3$ coefficient for *Short LS*), long LS are not. Search costs (and potentially investors’ willingness) associated to read long LS potentially cause investors to refrain from processing it. Analogously, we document the ‘*sitg*’ treatment effect on retail investor only to be significant for fairly easy to read LS, supporting our notion on the limited information search and processing capabilities of investors. Finally, when splitting our sample on funds with below and above median fund manager investment, we do not observe any measurable difference of the effects’ magnitude. This underpins our results from **Table III-3** indicating that retail investor reaction is not affected by the actual amount invested.

² Our finding is line with results obtained by Massa et al. (2010) showing that named-manager funds receive higher inflows.

Table III-5—Heterogeneous effects of ‘skin-in-the-game’-communication

Indicator variable	Dependent variable: <i>Net fund flows</i>			N
	β_1	$\beta_1 + \beta_3$	β_3	
Good Performance	0.762** [0.372]	0.237 [0.350]	-0.525** [0.232]	12,591
Bullish Market	0.354 [0.210]	0.619** [0.287]	0.265 [0.242]	12,591
Single Managed	0.291 [0.379]	1.472*** [0.532]	1.180** [0.573]	12,718
High FM Investment	0.713 [0.509]	0.455 [0.308]	-0.258 [0.436]	12,718
Short LS	0.087 [0.322]	1.376** [0.563]	1.463*** [0.662]	12,718
‘Easy to read’ LS	0.026 [0.382]	1.190*** [0.449]	1.230* [0.686]	12,718

Notes: This table reports coefficient estimates obtained from a linear panel regression model of the generic form:

$$FF_{i,t} = \alpha + \beta_1 \text{‘skin-in-the-game’-communication}_{i,t} + \beta_2 [\text{Indicator variable}_{i,t}] + \beta_3 \text{‘skin-in-the-game’-communication}_{i,t} \times [\text{Indicator variable}_{i,t}] + \delta' c_{i,-1t} + \varepsilon_{i,t}$$

where ‘skin-in-the-game’-communication_{*i,t*} is a binary variable indicating whether a fund manager communicates her personal investment in fund *i* managed in year *t* in the funds’ LS. All indicator variables are dummy variables of our continuous variables (Gross Return, Market Return, # Managers per fund, ‘skin-in-the-game’-investment_\$, LS length and LS readability) via cross sectional median splits. Performance is based on funds’ previous 6-month (reporting period) cross sectional return rank within its Morningstar category. Good (Bad) Performance includes funds above (below) the median rank (50), respectively. Market environment is split on the previous 6-month return of the S&P 500 as proxy for the US market. Bullish Market denotes fund-month observations for which the lagging 6-month return of the S&P 500 has been above the sample median. Single and Team Managed funds are split based on the number of managers as reported in Morningstar. We assign a fund to be single-managed if one fund manager manages it at the time of the funds’ reporting. Short LS feature LS with below median length as measured by the total number of words. ‘Easy to read’ LS refers to the readability of the LS as proxied by the Flesh Reading Ease Score (Flesh 1948). We assign LS to be ‘easy to read’ for above median readability based on its Flesh Reading Ease Score. As we manually extracted LS only for 2013, we assign the LS length (readability) to all fund-year LS observations, assuming constant length (readability) of same fund LS throughout time. Finally, High FM Investment indicates funds with above median aggregated managerial ownership. We refer to the cross-sectional reporting date managerial ownership for the median and assign funds accordingly. For the first row, β_1 reports the effect of ‘sitg’ communication in the funds’ LS on retail investors fund flows (dependent variable) for the group of fund-month observations with below median performance in the last reporting period (i.e., Good Performance = 0). Conversely, $\beta_1 + \beta_3$ reports the signaling effect of ‘sitg’ communication on funds with above median performance in the reporting period. The coefficient of the interaction term, β_3 , shows the difference in the reported effects for Good vs. Bad performing funds. We include fund and year-month fixed effects in all models and apply robust standard errors clustered on fund-level. We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

4.2. Investor reaction to changes in SitG signaling

The relative share of fund managers communicating their ‘sitg’ in the funds’ LS remains fairly stable at around 20% as can be taken from **Figure III-1**. Nevertheless, we observe time-serial variation in fund managers communication strategy. On average, about 11%

of LS differ from the funds' previous LS in that the fund manager starts (stops) to signal 'sitg' therein (given she is (still) invested). Based on our evidence from the previous sections, we expect investors to carefully read the LS. Therefore, we explore the signaling effect if managers are communicating 'sitg' in the LS for the first time (or stopping it). We create an indicator variable, *Change in 'sitg'-communication*, for whether a fund manager started (or stopped) communicating her 'sitg' in the funds' LS from one year to the next. The variable takes the value 1, if 'skin-in-the-game'-communication is started, -1 if it is stopped and zero if no change to the previous year appears. In **Table III-6**, we restrict our sample to all filing months, in which the variable holds non-zero values, i.e. in which a change in communication occurred. Specification (1) reports the coefficient on the change in 'sitg' employing the full set of controls and fixed effects as before. We find a positive effect, which is slightly larger in magnitude and gains in statistical significance compared to the main effect from **Table III-3**. Thus, investors' appear to be especially sensitive to changes in the signaling efforts of their fund managers. Next, we separately test starting (ending) 'sitg' communication to better understand what drives investor flows. As expected, the effect increases in magnitude for fund managers signaling their 'sitg' for the first time (specification 2). By contrast, we find a large and significant negative coefficient related to the ending of 'sitg' communication in specification (3). This effect is not only statistical significant, but also economically meaningful. For the average fund in our sample, the coefficient pertaining to the ending of 'sitg'-communication in the LS, -1.8%, translates into almost USD 44 million net outflows.

To control for the possibility, that our results are biased by the actual amount invested by fund managers, we repeat the analysis using the change in fund manager ownership as predictor. In specifications (4) to (6) of **Table III-6** we restrict our sample to those filing months, for which we retrieve a change in the absolute amount invested from one year to the next from the funds' SAI. Specification (4) reports the coefficient on our dummy, *'skin-in-the-game'-investment_d*, in case fund managers start investing private money in the funds, which they have not done before. Specification (5) reports the coefficient taking into account the (log) absolute investment of the initial investment. Finally, specification (6) reports the estimate on the change in (log) absolute investment from one year to the next considering not only initial investments, but all changes in

absolute fund manager ownership in our sample. Note that none of the regression estimates turns out significant.

In sum, those diametric results point to the importance of fund manager’ signaling of ‘*sitg*’ as an incentive alignment mechanism in the LS. Furthermore, they corroborate our prior notion on the inaccessibility of valuable fund manager ownership information in the funds’ SAI as retail investors are not trading on any changes in beneficial co-ownership of their fund managers.

Table III-6—Investor reaction to changes in ‘skin-in-the-game’-communication/-investment

	Dependent variable: <i>Net fund flows</i>					
	<i>‘sitg’ Communication in LS</i>			<i>Actual fund manager investment</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in ‘ <i>sitg</i> ’-communication	0.896*** [0.276]					
Starting ‘ <i>sitg</i> ’-communication		1.792*** [0.552]				
Ending ‘ <i>sitg</i> ’-communication			-1.801*** [0.556]			
Starting ‘ <i>sitg</i> ’-investment_d				9.597 [9.350]		
Starting ‘ <i>sitg</i> ’- investment_\$					0.913 [0.973]	
Δ ‘ <i>sitg</i> ’- investment_\$						4.435 [4.236]
Fund & manager Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	1,271	1,271	1,271	456	456	4,864
Adjusted <i>R</i> ²	0.292	0.263	0.271	0.073	0.073	0.081

Notes: This table reports coefficient estimates of a time series (2013-2018) linear regression model. The dependent variable is (monthly) net fund flow. The sample is restricted to observations for which either a change in the ‘*skin-in-the-game*’-communication (models (1)-(3)), an initial investment by the fund management (models (4)-(5) or a change in the actual amount invested from the last observation period (year t-1) to the current period (year t) appeared (model (6)). Models (1)-(3) report coefficient estimates on fund managers’ verbal communication of beneficial ownership in own funds, their ‘*skin-in-the-game*’. Change in ‘*sitg*’-communication is an indicator variable for whether a fund manager started/stopped communicating her ‘*sitg*’ in the funds’ letter to the shareholder from one year to the next. Starting (Ending) ‘*sitg*’-communication differentiate those cases in model (2) (model (3)), respectively. Models (4)-(6) report coefficient estimates on fund managers’ actual investment as disclosed in the Statement of Additional Information. Starting ‘*sitg*’-investment_d is a binary variable indicating whether the fund management starts holding beneficial ownership in the fund at time of the observation, whereas no prior ownership has been disclosed. Analogously, Starting ‘*sitg*’-investment_\$ refers to the (logged) total dollar amount of (initial) investment. Δ ‘*sitg*’-investment_\$ indicates the change in money invested from one year to the next. Fund, fund family and manager controls as applied in **Table III-3** are included in all regressions – please refer to **Appendix III-1** for a detailed description of those variables. Standard errors are clustered on the fund-level. We include fund and year-month fixed effects in all models. We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

4.3. Individual vs. professional investors

Lastly, we explore whether signaling of ‘*sitg*’ in the LS affects individual and professional investors differently. In contrast to retail investors, we expect professional investor fund flows not to be influenced by the fund managers’ communication style in the LS, because information on fund manager ownership is readily available via professional fund data providers.³ Therefore, we replicate our analysis from **Table III-3** using fund level aggregates of institutional share classes only. We refer to share class labeling “Institutional” within Morningstar Direct to identify fund share classes restricted to professional investors only.

Appendix III-4 reports the corresponding regression results. Using the full set of fund and manager controls and applying fund and time fixed effects, we observe no impact of ‘*sitg*’ communication on institutional investor flows in specification (1). Moreover, we find signaling to be unrelated even after bad fund performance (specification 2) or in bullish markets (specification 3), which has been the case for retail investors (cf. **Table III-5**). Against what would be predicted as ‘rational’ investor behavior following prior literature establishing a positive link between fund manager investment and performance, neither of our measures on actual fund manager investments turns out significant. Regardless of whether we apply the investment dummy (specification 6), the (log) absolute investment (specification 7) or focusing on funds with an increase or change in managerial investment (specifications 8 and 9), professional investors seem to be trading on fund manager ownership information.

³ For example, Morningstar reports the actual fund manager investment dollar range in its licensed fund database.

5. Conclusion and discussion

(Potential) mutual fund investors are provided with an abundance of information and data in order to make an informed investment decision. However, when it comes to the assessment on how committed the fund managers are on the funds' success, it has been difficult for investors to gain a thorough understanding.

Since 2005, US fund managers have to provide an indication of their personal wealth investment in the fund(s) they manage, which, according to the regulator, constitute a good proxy for whether their incentives are aligned with those of the shareholders. Prior research has documented superior fund performance in case fund managers have their own money at risk. In consequence, the information if and to what extent fund managers have “*skin-in-the-Game*” (*'sitg'*) should matter to investors. Unfortunately, the valuable information is disclosed only in a supplemental fund reporting, which can be considered unread by the average retail investor and, in contrast to the semi-annual shareholder reporting, is only provided upon request. Unlike this non-salient disclosure document, we built on an alternative source for investors to explore whether fund managers wealth is tied with the funds' success - the funds letter to shareholders (LS). We find that about one fifth of the LS include verbal signaling of co-ownership by the fund management. Most important, our results, based on a comprehensive sample of roughly 16,000 LS and 96,000 fund-month observations for 1,334 actively managed US equity mutual funds, provide evidence that retail investors strongly react on the fund manager signaling of *'sitg'* in the LS controlling for a comprehensive set of controls. *'sitg'* communication triggers substantial retail investor net inflows up to one month following the filing of the LS, which amount to 0.85% or USD 21 million for the average fund in our sample. This effect is most pronounced in the first two weeks after the LS has been sent to investors. Moreover, our documented effect seems to be persistent, i.e. it does not revert until the next periods filing. In addition, we document the effect to be substantial after bad fund performance, during a bullish market, for single managed funds and lastly for short and easy to read LS. Furthermore, we identify investors to be potentially sensitive to LS of fund managers starting or stopping to signal their *'sitg'* in the LS. In contrast, we observe no reaction of retail investors on the actual amount invested by fund managers. Finally, we show that *'sitg'* communication

is only altering retail investors’ decision. Institutional investors do not react upon fund manager signaling.

Taken together, our strong and carefully identified investor reaction suggests that retail investors do read the LS. This supports findings in the field, which stress the importance of the LS as a communication tool affecting investors’ asset allocation (Hillert et al. 2016, Chu and Kim 2019). In this regard, the LS turns out to be an important strategic device for fund companies to manage mutual fund flows, especially for those funds that are concerned with redemptions (e.g., Coval and Stafford 2007).⁴ In addition, retail investors appreciate their fund managers being committed to their funds success. Thus, ‘*sitg*’ represents an accurate proxy for aligned incentives as anticipated by the SEC. Given the performance enhancing ability of managerial ownership establishing a ‘natural’ incentive alignment mechanism between fund managers and investors, regulators may review current disclosure rules on beneficial holdings with special emphasis on the presentation format. The prevalent trade-off herein has been summarized by Kozup et al. (2012): “*At one end of the continuum, [...] regulators find simple availability of information to be sufficient. At the other end, a cohort believes that information comprehension and actual use by the consumer must be the norm.*” – Kozup et al. (2012), p. 313.

⁴ Clearly, our findings bear implications for practitioners, as well: Management companies should keep in mind investors’ sensitivity and the effects of strategic signaling, when crafting LS in their (semi-)annual filings. Analogous to the corporate context, where *easy to read* disclosures have been found to positively impact firm value (Hwang and Kim 2017), it [may] pay off “to write well” for fund companies too.

6. References

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7. Appendix

Appendix III-1—Variable descriptions

Variable name	Description
Panel A: Dependent variables	
‘skin-in-the-game’-communication	Dummy variable indicating whether a fund manager communicated her personal investment in fund i managed in year t in the funds’ letter to shareholders. The variable equals to one if personal investment is communicated, zero otherwise.
(monthly / daily) Net fund flows (FF)	Monthly / daily net fund flows are the net growth in fund assets beyond reinvested dividends: $Net\ fund\ flows\ (FF)_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}}{TNA_{i,t-1}} - r_{i,t}$ where $TNA_{i,t}$ denotes the dollar value of total net assets (TNA) of fund i in month t (on day d) and $r_{i,t}$ denotes the return of fund i in month t (on day d) as reported in Morningstar Direct. We apply the fund merger correction as proposed in Lou (2012). The variable is winsorized at the 1st and 99th percentile.
Panel B: Key explanatory variables	
‘skin-in-the-game’-investment_d	Dummy variable equals one if in a given year at least one of the funds’ managers has beneficial ownership (greater than \$0) in a self-managed fund, zero otherwise. Fund manager ownership is retrieved from the fund’s SEC filing in the respective year (Statement of Additional Information [SAI]).
‘skin-in-the-game’-investment_\$	Aggregate amount of beneficial ownership (greater than \$0) of all fund manager in a fund for a given year, formally: $SitG - Invest_absolute_{i,t} = \sum_{j=1}^N Individual_Ownership_{j,i,t}$ where $Individual_Ownership_{j,i,t}$ represents the individual investment of manager j in fund i and year t . We translate dollar ranges as provided in the funds’ SEC filing [SAI] using the mid-point of ranges according to Khorana et al. (2007). We use the logarithm of ‘skin-in-the-game’-investment_\$ in our main regressions.
Panel C: Fund, fund manager and director controls	
Gross return (%, annually)	A funds’ (yearly) raw return before any fees and cost in percent. The variable is winsorized at the 1st and 99th percentile.
Alpha return (%, annually)	A funds’ (yearly) four-factor model abnormal return employing three factors used by Fama and French (1992) as well as the momentum factor (Carhart 1997). We retrieve monthly factor loadings from Kenneth French’s database.
Fundsize (USD bn.)	Funds total net assets – aggregating both, institutional as well as retail share classes of a given fund. We use the natural logarithm of <i>Fund TNA</i> in our main regressions. The variable is winsorized at the 1st and 99th percentile.
Fund family TNA (USD bn.)	Total net assets of fund family (company). Refers to the total net assets reported in Morningstar Direct for a fund family. The variable is winsorized at the 1st and 99th percentile. We use the logarithm of <i>Fund Family TNA</i> in our main regressions.
# managers per fund	Number of managers responsible for managing a fund as reported by Morningstar.

Fund age (years)	Age in years since a funds’ inception date.
Gross expense ratio (% , annually)	A fund’s annual gross expense ratio in percent. The variable is winsorized at the 1 st and 99th percentile.
Morningstar rating (1 to 5 stars)	Morningstar rates mutual funds and ETFs from 1 to 5 stars based on how well they have performed (after adjusting for risk and accounting for sales charges) in comparison to similar funds and ETFs. Within each Morningstar Category, the top 10% of funds and ETFs receive 5 stars and the bottom 10% receive 1 star.
Turnover ratio (% , annually)	Percentage amount of a mutual fund’s portfolio that has changed within a given year in percent. The variable is winsorized at the 1st and 99th percentile.
Tracking error (% , annually)	Standard deviation of the difference between the fund’s and the benchmark index’ return. The variable is winsorized at the 1st and 99 th percentile.
Value	Equals one if a fund primarily invests in value stocks, zero otherwise.
Blend	Equals one if a fund primarily invests in blend stocks, zero otherwise.
Growth	Equals one if a fund primarily invests in growth stocks, zero otherwise.
Small Cap	Equals one if a fund primarily invests in small cap stocks, zero otherwise.
Mid Cap	Equals one if a fund primarily invests in mid cap stocks, zero otherwise.
Large Cap	Equals one if a fund primarily invests in large cap stocks, zero otherwise.
Institutional	Equals one if a fund is available for institutional investors only, zero otherwise.
Manager tenure	Average tenure of all the fund managers managing a particular fund in years.
Advisor fees (USD k)	The amount charged by manager(s) as represented in the fund’s annual report. The variable is winsorized at the 1st and 99th percentile. We use the logarithm of <i>Gross Expense Ratio</i> in our main regressions.
Director fees (USD k)	The amount the fund paid to the board of directors and trustees during the last fiscal year, as reported in the most recent annual report. The variable is winsorized at the 1st and 99th percentile. We use the logarithm of <i>Gross Expense Ratio</i> in our main regressions.

Appendix III-2—Data matching procedure

- We use three different data sources:
 - a) Morningstar Direct Fund Database (fund characteristics: e.g., fund flows)
 - b) SEC EDGAR: (Semi-) annual shareholder reporting containing Letter to Shareholders (LS)
 - c) SEC EDGAR: Statement of Additional Information (SAI) containing information on fund manager ownership (dollar ranges)
- Sources do not share a unique identifier in order to link data across sources.
- We apply a multi-step procedure to address this issue:
 1. From Morningstar we obtain the entire universe of actively managed equity mutual funds for sale in the US.
 2. From the SEC EDGAR archive, we download all (semi-)annual shareholder reports filed in our observation period and retrieve *Share Class IDs* using textual analysis¹ from each report.
 3. We link shareholder reporting *Share Class IDs* with *Class Tickers*² using data provided by the SEC in their filing on “Investment Company Series and Class Information” retrieved from: https://www.sec.gov/open/datasets-investment_company.html for all years in our observation period.
 4. We map data from a) Morningstar and b) (semi-) annual shareholder reports based on the *Class Ticker*.
 5. We restrict our sample to all funds, which a) manage more than USD 100 mn total assets by 2018 and b) can be linked on the *Class Ticker*
 6. From the SEC EDGAR archive, we download all SAIs for our restricted sample (using the Morningstar variable *SEC ID* as unique identifier) and manually extract information on fund manager ownership from the SAIs.

¹ Share Class IDs are a unique identifier assigned by the SEC to each series of an investment company. Share Class IDs are provided in the format of a "C" followed by nine digits, for which we screen using text mining techniques.

² The stock market symbol (if any) for a class. An investment company series may include one or more share classes with differing sales charges and expenses. (cf. SEC 2020 – Investment Company Series and Class Information).

Appendix III-3—Quality of logit and probit regression models

	<i>'skin-in-the-game'-communication in Letter to the Shareholder</i>					<i>Classification</i>		
	<i>Summary Statistics</i>					Correctly classified	Sensitivity Pr (+ D)	Specificity Pr (- ~D)
	Mean	Std-Dev.	Min	Median	Max			
Sample	0.210	0.407	0	0	1			
Predictions - Logit Model	0.206	0.332	0.0004	0.168	0.813	89.43%	79.16%	94.58%
Predictions - Probit Model	0.206	0.334	0.0007	0.175	0.780	89.36%	79.11%	94.50%

Notes: This table reports summary statistics as well as prediction classifications of the logit (**Table III-2**) and probit (unreported) model on the dependent variable '*skin-in-the-game*'-communication. '*skin-in-the-game*'-communication equals one if personal investment of fund manager(s) is communicated in the funds' letter to the shareholders, zero otherwise. Classification statistics indicate the model fit. Correctly classified measures the percentage share of fund manager '*sitg*' communication that is correctly specified by the logit (probit) regression model. Sensitivity measures the share of funds, for which the respective model correctly classifies them to communicate '*sitg*' when in fact they do. Specificity measures the share of funds, for which the models correctly classified those funds as not communicating '*sitg*' in the shareholder letter when in fact they do not communicate.

Appendix III-4—Institutional investor response to 'skin-in-the-game'-communication

	Dependent variable: <i>Institutional Net fund flows</i>								
	<i>Full Sample</i>	<i>Bad Perform.</i>	<i>Good Perform.</i>	<i>Bearish Market</i>	<i>Bullish Market</i>	<i>Full Sample</i>	<i>Full Sample</i>	<i>Change in 'sitg'</i>	<i>Change in 'sitg'</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
'skin-in-the-game'-communication	0.793 [0.509]	2.260 [0.331]	1.050 [0.541]	-1.205 [0.575]	2.587 [0.200]				
'skin-in-the-game'-investment_d						0.212 [0.863]			
'skin-in-the-game'-investment_\$							-0.257 [0.420]		
Starting 'sitg'-investment_d								-0.150 [0.281]	
Δ 'sitg'- investment_\$									0.736 [2.357]
Fund & Manager Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	1,738	884	854	834	925	1,738	1,738	2,712	2,712
Adjusted <i>R</i> ²	0.114	0.169	0.230	0.139	0.112	0.114	0.114	0.085	0.092

Notes: This table reports coefficient estimates of a time series (2013-2018) linear regression model. (Monthly) net fund flow of institutional share classes is the dependent variable. Institutional funds are labelled based on Morningstar Directs' fund database. Fund flows are measured in the month the shareholder letter is filed (sent to) investors and replaced by flows of the subsequent month whenever the filing of the shareholder letter takes place after the 15th calendar day (Hillert et al. 2016). 'skin-in-the-game'-communication is a dummy variable indicating whether a fund manager communicates her personal investment in fund *i* in the funds' LS. The variable equals to one if personal investment is communicated, zero otherwise. In models (2)-(5), we split our sample according to **Table III-5** applying a cross-sectional median splits on performance (market returns), respectively. In models (6)-(9), we regress (institutional) fund flows on actual fund manager investment, either using a dummy variable (model (6)) or by using log aggregate dollar investments (model (7)), while we focus on funds with a change in managerial investment in models (8) and (9). Please refer to **Appendix III-1** for a detailed description of those variables. Standard errors are clustered on the fund-level. We include fund and year-month fixed effects in all models. We report robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

IV. Fund manager narcissism

Co-author: Anna-Lena Bauer, Oscar Stolper

Own contribution: Concept, data preparation, methodology and identification strategy, results documentation, documentation of implications

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* Due to the ongoing Covid-19 pandemic (at the time this dissertation has been submitted), the 10th International Conference of the Financial Engineering and Banking Society informed us that the conference eventually cannot take place.

Fund manager narcissism

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Abstract— Analyzing verbatim transcribed interviews with mutual fund managers, we show that their level of narcissism is highly relevant for the delegated investment task they are entrusted with. We find that narcissistic fund managers are 41% more likely to deviate from the advertised investment style. Moreover, while funds run by narcissistic managers on average feature significantly higher investment risk, this does not reflect in higher returns. While fund manager narcissism matters for investors, its effects are mitigated by teamwork and also significantly lower for female managers.

Keywords: Mutual fund manager narcissism, personality trait, risk-taking, style drift, retail finance, textual analysis

JEL-Classification: D12, D14, G21

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1. Introduction

“*Epidemic of narcissism*” – Twenge and Campbell (2009), the renowned psychologists and experts on the personality trait narcissism, label their finding that narcissism is on the rise and further call these days the *age of entitlement*. Narcissism as a personality trait has been the focus of psychology studies for decades now¹. Yet, only recently has finance research shed light upon personality traits and potential consequences thereof on professional investors even though findings indicate meaningful impact of cognitive traits on actions and decisions of top-level executives (e.g., Finkelstein and Hambrick 1996, Carpenter *et al.* 2004).

Clinically diagnosed narcissists as classified by the American Psychology Association’s (APA) DSM-V criteria feature at least three main characteristics: an exaggerated sense of self-importance, a lack of empathy and the persistent need for admiration from others (APA 2013). Psychology literature suggests that decision-making of narcissistic personalities is impaired in at least two fundamental ways. In the pursuit of preserving a favorable image of ones’ self to others, narcissists are prone to overestimate their own capabilities. Moreover, the second element pertains to risky decision-making which may be a result of narcissists’ inflated self-beliefs that facilitate them to misjudge probabilities of failure (Campbell, Goodie and Forster 2004). Both aspects are potentially detrimental for stakeholders involved in these decisions.

In the light of continuously growing assets under management² with half of all American households being invested in at least one mutual fund, understanding antecedents of fund managers investment decision-making process is vital for stakeholders. As the majority of fund assets are invested in actively managed funds (ICI 2019), investors’ return arguably relies on rational decision-making of the fund manager. Yet, professional investors, such as fund managers, are shown to be susceptible to cognitive biases³, which are adverse to the investors’ goal of maximizing (risk-adjusted) returns. In contrast to biases such as overconfidence or herding, narcissism is a complete

¹ Havelock Ellis (1898) was the first to introduce the term narcissism as a concept of psychology. Yet, he introduced the term rather with a focus on perverse self-love.

² Mutual fund industry is expected to further increase in importance: by 2025 assets under management will have almost doubled in comparison to 2016 – rising to USD 145.4 trillion (PWC 2017).

³ See, for instance, evidence from overconfidence (Puetz and Ruenzi 2011) and herding (Grinblatt, Titman and Wermers 1995) among mutual fund managers.

personality trait and remains stable regardless of time and context. Thus, it seems worthwhile to examine the effect of narcissism on fund management and potential consequences thereof for investors. It is of utmost importance, if narcissistic fund managers are able to attract more investors compared to non-narcissistic ones, as evidence from the organizational business literature has established (Galvin, Balthazard and Waldmann 2010). Galvin, Balthazard and Waldmann (2010) point out that, in a leader-follower context, narcissists are apt to attract followers as they are perceived to be charismatic leaders. In a similar vein, we believe that the leader-follower relation holds true in the mutual fund context and therefore expect investors to be lured by the fund management leaders with narcissistic tendencies to a greater extent compared to non-narcissistic managers. Thus, if narcissism negatively affects fund managers' decisions, investing with them could be detrimental for these investors. Similarly, this investigation may have also practical implications for fund companies. When appointing fund managers, screening potential candidates with respect to their personalities is potentially beneficial for the fund company in the long run.

Due to the above outlined impact, this study aims to address this research gap. While narcissism in psychology research is a well-documented phenomena and an increasing body of literature examines the impact of narcissism among CEOs, professional investors and in particular fund managers have not been in focus yet. To the best of our knowledge, we are the first to investigate narcissism among fund managers by examining verbatim transcribed interviews. In that, we identify the impact of narcissistic fund managers on investor relevant fund characteristics (i.e.: style drift, performance, risk-taking, management fees and fund size).

Thus, our study adds to various strands of the literature. First, by investigating narcissism, we add to research on the impact of personality traits and behavioral biases among professional investors. By establishing the link between narcissism and fund management, we confirm previous findings on cognitive biases and personality traits that found meaningful impact on the fund managers' decision-making (for a summary see e.g., Kumar and Goyal 2015).

Second, we contribute to literature on textual analysis in finance by analyzing transcribed verbatim interviews of fund managers⁴. We show that interviews indeed provide indication of the individuals' personality traits in that we are able to detect narcissistic tendencies in the fund managers' use of words.

Finally, we are able to contribute to finance literature on narcissism by examining the impact thereof on fund managers. Closely related studies on CEO narcissism were able to show that narcissism indeed has an impact on investment behavior. First, CEO narcissism is associated with a rather bold investment style. The continuous aspiration of narcissistic personalities to seek for attention of others, invites them to engage in large stake initiatives with great exposure to the public. Aktas *et al.* (2016), for instance, find that narcissism is linked to greater frequency of M&A deal initiation and deal size. At the same time, the probability of deal completion is decreased for narcissistic CEOs. Second, further studies indicate that narcissism is a determinant of performance and volatility of firm performance. While Lubit (2002), Petrenko *et al.* (2016) and Ham *et al.* (2017) find evidence of poorer performance for narcissistic CEOs, Wales, Patel and Lumpkin (2013) and Kim (2018) find opposing results and argue that pronounced entrepreneurial spirit rather increases firm performance. Even though studies remain inconclusive on the direction of the impact on firm performance, consensus among studies prevails regarding the impact of performance volatility. Among them, Wales, Patel and Lumpkin (2013) show that narcissism is positively linked to higher risk in terms of performance volatility. Third, CEO narcissism is associated with unethical behavior and failure to adhere to rules. By investigating Accounting and Auditing Enforcement Releases released by the SEC for the S&P 500 companies' CEOs, findings of Rijsenbilt and Commandeur (2013) suggest that firms headed by narcissistic CEOs are more frequently accused of fraud. In addition, (Chen 2010) shows that narcissism increases financial misreporting and that this effect is moderated by CEOs dishonesty.

To address the research question, we draw on a comprehensive dataset of fund manager interviews provided by The Wall Street Transcript that we match to their respective fund characteristics gathered using the Morningstar Direct database. We apply

⁴ See e.g., Loughran and McDonald (2016) for a summary on textual analysis in finance literature. We provide details on our sample and methodology in section 3.

textual analysis⁵ to the fund managers' interviews and retrieve a proxy of narcissism as proposed by (Raskin and Shaw 1988), which to date has been the only unobtrusive proxy of narcissism that has been confirmed by experimental psychology literature.

Supporting a narcissism effect, we document that narcissistic fund managers invest less conform with their defined investment style as stated in the funds' prospectus. Controlling for several previously identified determinants of deviation from investment style, we observe an economically significant effect with narcissistic fund managers being 41% more likely to deviate from their advertised investment style. Thus, these fund managers seem do not seem to adhere to conventions regarding the composition of their portfolios in terms of style. More importantly, we find that narcissistic fund managers engage in significantly riskier investment, while performance on average does not differ from their counterparts. Interestingly, we find that this effect is mediated by gender. In that, narcissistic female fund managers are far less risk prone than their narcissistic male counterparts. Furthermore, our findings provide evidence for narcissistic fund managers' pursuit of making their mark in a competitive environment in the form of managing greater assets under management. We document a significantly positive link between narcissism and fund size that is also significant in economic terms. In that, a one standard deviation increase in narcissism translates into 10% higher assets under management, which corresponds to an average of USD 54.9 million higher net assets for our sample of mutual funds. Lastly, neither do we find evidence of more narcissistic fund managers charging higher management fees, nor do we find that those managers are able to keep investors loyal to their funds regardless of their previous performance. We argue that fund managers are not able to arbitrarily set the management fees themselves, as it is at the fund directors' discretion to set appropriate management fees. In addition, we do not find evidence for the investors reacting to fund manager narcissism neither after good, nor after poor performance. We believe that the average investor does not know about the personality of the fund manager and thus has no chance to react to it. This also implies that the investor does not have the opportunity to dodge the narcissistic fund managers' risky and less consistent investment decision-making. Therefore, investors appear to be rather unable to forgo the full consequences of narcissistic fund management including significant style deviations and higher risk taking. Results are robust to the application of

⁵ The approach of the present study follows the 'bag-of-words' method (Salton and McGill, 1983) .

a further narcissism proxy, the number of lines in biography, which has been utilized in prior studies (Rijssenbilt and Commandeur 2013; Buchholz, Lopatta and Maas 2019) by accessing the respective fund managers' LinkedIn profiles and identify their voluntarily provided description of themselves in their profile biography.

We discuss our findings in the light of practitioner implications: on the one hand, we recommend fund companies - if possible – to consider personality criteria when screening potential fund manager candidates. On the other hand, we believe that investors should familiarize themselves with the fund managers that they entrust their money with. While we believe that investors should consider prospective return on their investment before investing in a fund, we also suggest to critically reflect one's risk-preferences and the preferred investment style, which both should ideally match those of the fund manager invested with.

2. Related literature and hypothesis development

2.1. Impact of narcissism on decision-making

Actions and decisions of top-level managers are greatly influenced by their personalities and past experiences (e.g., Carpenter et al. 2004; Finkelstein and Hambrick 1996). Contrary to the assumptions of fully “rational” agents as the predominant notion in neoclassical finance suggests, more recent findings established that behavior and decision-making is susceptible to each executives' information processing, preferences and dispositions (among others see Finkelstein and Hambrick 1996). Thus, agents and may not at all times act fully rational.

In general, there are numerous studies in finance focusing on the impact of biases and heuristics on investment decision-making⁶. Surprisingly, not only individual investors are inclined to draw on simple heuristics and biases, but even professionals investors. Evidence suggests that cognitive biases, such as herding, familiarity bias, home bias, the disposition effect or overconfidence significantly impact fund managers' decisions and trading behavior. Studies closest to the present study examine the “Big Five” personality dimensions and find that these significantly impact fund management,

⁶ See, for instance, Kumar and Goyal (2015) for a comprehensive review on behavioral biases in investment decision-making.

in particular, the fund manager performance (e.g., Camgoz *et al.* 2011)⁷. However, literature has not shed light on the impact of narcissism as complete psychological trait on investment decision-making of professional investors.

Research identified the cognitive frame and personality dimension *narcissism* to fundamentally influence strategic decision-making of top-level executives (see Braun 2017, for a comprehensive review). Narcissism is a well-studied personality trait in psychology that in its essence can be described as a personality disorder (“narcissistic personality disorder” (NPD)) which is characterized by three main elements: an exaggerated sense of self-importance, a lack of empathy and the persistent need for admiration from others (APA⁸ 2013). These characteristics typically cover up the narcissists lack of self-confidence as a self-protection mechanism in that the narcissist aims to feel superior to others and seek attention and admiration from them (APA 2013; Rijsenbilt and Commandeur 2013). The DSM-V criteria further state that narcissism develops early in adulthood and remains a stable trait irrespective of the time and setting the individual is situated.⁹

Research in the business and organization context finds that narcissists tend to compensate anger and overlook negative feedback by means of engaging in counterproductive work behavior (CWB) (Penney and Spector 2002). Chatterjee and Pollock (2017) find that this also holds true for executives. Decision-makers with narcissistic tendencies that continuously seek admiration and approval make it difficult for co-workers and employees to work with them, which in turn may impede management team performance. Moreover, the sense of self-importance rather often manifests itself in entitlement and arrogance towards others that in turn arguably affects their decision-making style (Campbell *et al.* 2011).

⁷ The Big-Five personality pertains to 5 dimensions: Agreeableness (A), Conscientiousness (C), Extraversion (E), Neuroticism (N) and Openness to Experience (O) (McCrae & John 1992).

⁸ The American Psychiatric Association established the DSM-5 criteria which serve as a guideline for diagnosis of mental disorders for health care professionals. The first release of the DSM was in 1952 and has been updated a five times since. More than 1,500 mental health and medical experts contributed to the criteria.

⁹ Note that this study does attempt to claim that fund managers reveal a clinical and mental disorder of narcissistic personality disorder (NPD), but rather addresses the personality trait narcissism (also referred to as or “normal“ or “grandiose” narcissism) as defined by Raskin and Hall (1979) and Raskin and Terry (1988) in their narcissistic personality inventory (NPI) that is derived from the American Psychiatric Association’s DSM-III criteria. We mainly refer to the American Psychiatric Association’s DSM criteria to outline the characteristics of a narcissistic personality. Moreover, we refer to managers scoring high in terms of “normal” narcissism as narcissistic fund managers.

Only recently, research in finance has shed light on narcissism and found meaningful impact, particularly, upper echelon research analyzing the impact of narcissism among CEOs of a firm. Evidence suggests that the investment style of a firm is moderated by fund manager narcissism. By analyzing CEO interviews recorded on Lexis Nexis and The Wall Street Transcript (TWST), Aktas *et al.* (2016) study the effect of narcissism on takeover negotiations and find that target and acquirer CEO narcissism correlates with more frequent M&A deal initiations, greater deal size and faster negotiations. They reason that narcissistic CEOs are in constant search for admiration and thus rather frequently engage in high-stake endeavors, such as M&A deals. However, they also find that M&A deal completion is less likely. Ham *et al.* (2017) confirm this finding by showing that in particular R&D and M&A expenditures are increased for companies led by narcissistic CEOs. CEO narcissism may also impair company value by executive dismissals even in times when their value is rather high (Johnson, Kolasinski and Nordlund 2018). Johnson, Kolasinski and Nordlund (2018) argue that this can be attributed to a lack of empathy which arguably makes narcissistic CEOs more likely to let off staff.

The impact of CEO narcissism on firm performance, however, remains controversially discussed. While Lubit (2002), Petrenko *et al.* (2016) and Ham *et al.* (2017) find poorer firm performance for rather narcissistic CEOs compared to non-narcissistic ones, Wales, Patel and Lumpkin (2013) and Kim (2018) find the opposite. Ham *et al.* (2017), for instance, ascribe inferior performance to lower operating cash flows and thus profits, whereas Wales, Patel and Lumpkin (2013) and Kim (2018) argue that narcissism positively attributes to performance, due to a pronounced entrepreneurial spirit among narcissistic CEOs.

In addition, studies on CEO narcissism were able to confirm the findings of psychological research that narcissistic personalities fail to adhere to rules and are linked to unethical behavior (e.g., Morf and Rhodewalt 2001). Rijsenbilt and Commandeur (2013), for instance, find that narcissism is associated with higher fraud accusations among CEOs. In addition, Chen (2010) illustrates that narcissism and CEOs dishonesty positively attributes to financial misreporting. Even though CEO narcissism has been in the spotlight of recent studies, narcissism among mutual fund managers has, to the best of our knowledge, not been considered in prior research.

2.2. Hypothesis development

In the light of increasing assets under management (estimated to rise to a total of US\$ 145.4 trillion in 2025 by PWC 2017) and the majority of fund assets being invested in actively managed funds that are subject to the fund managers' rational decision-making (ICI 2019) it is of key interest to stakeholders to understand how narcissistic tendencies of managers affects fund management.

Inflated self-beliefs and feelings of uniqueness manifest themselves in a failure to adhere to rules (Brunell and Buelow 2017; Kets de Vries 2004; Morf and Rhodewalt 2001). Research in the sports context shows that narcissism is predictive of making use of antisocial behavior (such as an aggressive action in a soccer match) which is triggered by moral disengagement (Boardley and Kavussanu 2008; Jones *et al.* 2016). Narcissists are convinced that rules and standards apply to others, yet not to themselves. Consequently, in the prospect of enjoying an advantage, narcissists are inclined to violate rules and social norms. The divergence from standards has also been confirmed by the finance literature in the context CEO narcissism (Chen 2010; Rijsenbilt and Commandeur 2013).

Moreover, the need for admiration may also nurture grandiose strategic decisions. Findings of Chatterjee and Hambrick (2007) demonstrate that narcissistic CEOs are prone to greater strategic dynamism measured by the number and size of acquisitions. In the mutual fund context, a greater style inconsistency has been found to significantly outperform the less style-consistent funds (cf. Brown, Harlow and Zhang 2009). In addition, comparability between funds of the same style is impaired by managers diverting from the targeted style, which makes investment less transparent for the investor. Due to above outlined findings, we propose that fund managers with narcissistic tendencies may arguably be more drawn to fail to adhere to conventions, such as the style framework they operate in, but rather deviate from its benchmark investment strategy and therefore exhibit a greater style drift.

Hypothesis 1): Narcissistic fund managers exhibit a greater style drift.

The need of admiration and applause from others drives narcissistic individuals to actively pursue compensating opportunities (Finkel *et al.*, 2006). In their study, the find that these individuals do not shy away from going over and above their natural environments for their goal of admiration from others. Therefore, narcissists are prone to

make decisions that are considered to be bold and very noticeable in the search of continuous affirmation (Chatterjee and Hambrick 2007; APA 2013). In that they do not consider preventing negative outcomes, but rather focus on their ultimate goals (Foster *et al.* 2009). Lakey *et al.* (2008) call this approach a “myopic focus on reward”. Ignoring the probability to having to accept losses, paves the way for risky decision-making (Sanders and Hambrick 2007). As managers with narcissistic tendencies remain rather unconcerned in the light of prospective loss, they are also willing to tolerate a greater range of consequences (Campbell, Goodie and Forster 2004). Research has shown that narcissism is indeed related to riskier decision-making (Foster *et al.* 2009; Lewellen 2006; Campbell, Goodie and Forster 2004). Accepting a greater dispersion of possible outcomes has also been linked to narcissistic CEOs. In their study, Chatterjee and Hambrick (2007) find mixed results with regards to the firm’s performance and conclude that it is not clear whether CEOs with a higher level of narcissism have a negative or positive impact on the firms’ performance. However, they find that performance volatility is increased compared to their non-narcissistic counterparts. Thus, firms headed by narcissistic CEOs evidently engage in riskier investment decision-making. Analogously, we hypothesize that narcissistic fund managers tend to be attracted by bold and rather risky investments that would result in greater fund risk (volatility of returns):

Hypothesis 2a): Fund performance of narcissistic fund managers is more volatile.

Increased performance volatility reduces the investors to anticipate performance, dispersion of returns is increased and if this risk does not pay off in terms of outperformance, the investor is arguably impaired. Based on the above outlined findings, we therefore hypothesize that narcissistic fund managers on average do not outperform less narcissistic managers:

Hypothesis 2b): Average fund performance of narcissistic fund managers is not significantly different from less narcissistic fund managers.

Highly narcissistic top-level managers tend to have an exaggerated sense of their own importance, in their personal capabilities and a lack of empathy towards others (APA 2013). Combined with a great sense of entitlement narcissistic fund managers may feel to be able to take advantage of others, as they do not experience the feelings of guilt compared to non-narcissists (Campbell and Foster 2007). Evidence from Ham *et al.*

(2017) indeed shows that narcissistic CEOs compensation was higher (in absolute and relative terms) compared to less narcissistic executives. Thus, we hypothesize that narcissists reveal their feelings of self-importance and a certain degree of ruthlessness towards the investors by requesting a higher payment from them, resulting in a higher management fee:

Hypothesis 3): Narcissistic fund managers charge higher management fees.

Wallace and Baumeister (2002) find that narcissists perform well in competitive environments. As rivaling in highly competitive environments is also a great opportunity for the narcissist to reach more external admiration and glory, narcissists arguably appreciate competitions.¹⁰ Combined with the tendency of narcissistic managers in the quest of making their mark and thus gaining approval by others, we hypothesize that fund managers manage greater funds (i.e. reflected in assets under management (AUM)). In that, larger assets under management may function as a benchmark for narcissistic fund managers with which they can gather recognition from peers. Moreover, the fund managers compensation depends on the AUM, as managers typically receive a percentage of the total assets under management. Therefore, these fund managers are arguably pursuing to increase their fund size. At the same time, in their quest for appreciation, fund managers may prefer to work for greater funds in the first place.

Hypothesis 4) Narcissistic fund managers manage larger funds.

Furthermore, literature on psychology established that narcissism correlates with leadership and in particular charismatic leadership (Brunell *et al.*, 2008; Galvin, Balthazard and Waldmann 2010). Galvin, Balthazard and Waldmann (2010) state that this link is channeled via visionary boldness. Inspirational and convincing rhetoric is arguably a gift for narcissists that helps them to attract followers (Maccoby 2004). In the context of fund managers, we thus expect narcissistic fund managers to be able to attract a greater flock of investments when performing well and keep their investors onboard in times of poor performance.

Hypothesis 5) Narcissistic fund managers generate higher inflows after good performance, no penalty after bad performance.

¹⁰ See also (Uziel 2007) for a review of social facilitation and personality traits.

3. Data and summary statistics

3.1. *The Wall Street Transcript fund manager interviews*

Our main data consists of fund manager interviews by The Wall Street Transcript (TWST), a paid subscription publication and web site that features first-hand transcripts of interviews with CEOs, money managers, equity analysts and top-level corporate executives¹¹. Specifically, we obtain all transcribed interviews with fund managers since 2012 from the websites' archive in the "investment strategies" category. Interviews differ in style and content but most often serve fund managers to discuss a fund's investment strategy, explain the investment environment or provide expert insights on a funds' management philosophy including ideas for specific stock picks (see excerpts in **Appendix IV-2** for examples of those interviews). In contrast to existing literature analyzing textual information in regulatory documents (e.g., annual reports: Chatterjee and Hambrick 2007) or analyst calls (e.g., Price *et al.* 2012; Aktas *et al.* 2016) interviews in the Wall Street Transcript provide first-hand information directly and unfiltered from the fund managers without being impacted by any investor relations or company communication department"¹².

Prior studies using The Wall Street Transcript (e.g., Aktas *et al.* 2016) analyzed interviews of top-level corporate executives. For our analysis, we focus on interviews with only one interviewee for assignment purposes, thus, we are able to draw on 744 fund manager interviews throughout the period from 2012 until 2018 that are disclosed in a bi-weekly fashion on the TWST website.

3.2. *Fund data*

We collect information for all mutual funds of fund managers for which we have at least one interview in our sample of The Wall Street Transcript. We retrieve a host of fund characteristics from Morningstar Direct, among them style deviation, fund size, fund age, turnover ratio, (monthly) returns and fund flows. Variables at the share class level are converted to fund level aggregates by value-weighting their respective contribution to the fund's total net assets (c.f., e.g., Doshi *et al.* 2015). Most importantly, we collect (historic)

¹¹ The Wall Street Transcript (www.twst.com) was established in 1963. Nowadays, The Wall Street Transcript has approximately 200,000 monthly readers and comprises more than 25,000 interviews.

¹² The Wall Street Transcript's interviews are verbatim, the interviewee may review the interview before publications, but only for factual errors.

fund data on fund managers including their respective start and exit dates at the fund allowing us to delimit the time period in which a fund manager has been in charge of managing the funds. Thus, our sample period starts with the first fund managers' start date on January 1st, 1982 and ends with the last observation in December 31st, 2018. As we are interested in examining active decision making of fund managers and due to the ease of comparability of key fund characteristics across funds, we limit our sample to actively managed mutual funds by restricting the sample to equity funds and eliminating index funds¹³. We are able to match 504 out of 744 fund manager interviews with respective data on fund characteristics on actively managed funds.

3.3. Summary statistics

Table IV-1 reports summary statistic for the overall sample. Our sample consists of 504 single manager interviews since 2012 from The Wall Street Transcript with 424 different mutual fund managers being interviewed¹⁴. Panel A documents the interview characteristics: on average an interview is about 2.700 words in length (with large deviation to min and max number of words), contains 152 sentences, entails more plural (33.6) than singular (21.6) personal pronouns and is given in a positive tone (0.218). Panel B describes our sample of fund managers. The average fund manager in our sample has a tenure of about 5 years and is male (gender = 0). Panel C provides descriptive statistics of the mutual fund characteristics. We aggregate fund information on a fund manager level by value weighting the fund characteristics of all funds managed by a respective fund manager. In total, we retrieve fund characteristics for 2,110 funds. The average fund manager in our sample manages a 10 year old fund with USD 527 million assets under management. Moreover, the average fund charges 1.581 percent from its investors, thereof 0.876 percent in management fees, is managed by a team, provides a yearly return of 0.448 percent, turns over approximately 58 percent of its assets in a year, and is slightly

¹³ We apply the standard method in mutual fund literature (see e.g., Solomon, Soltes and Sosyura, 2014) and filter fund names for words that include "index" "idx" "S&P" and variations of these words in addition to the Morningstar Direct filter.

¹⁴ Some fund manager have multiple interviews in the respective period: two interviews (N= 44), three interviews (N=12), four, five or six (with N=1 each).

less consistent in its declared investment style^{15,16}. Overall, the fund characteristics (in particular fund age and expense ratio) in our sample are in line with similar studies examining actively managed funds (e.g., Bär, Kempf and Ruenzi 2011)¹⁷.

Table IV-1—Summary statistics

	N	Mean	Sd	Min	25th	Median	75th	Max
Panel A: Interviews								
# Words	504	2.685	774.7	341	2.119	2.623	3.114	5.451
# Sentences	504	151.90	42.39	23	125	147	173	340
# PS Pronouns	504	21.62	17.92	0.00	9	16	29	124
# PP Pronouns	504	33.57	18.75	0.00	20	30	44	98
Tone	504	0.218	0.258	-0.65	0.046	0.229	0.416	0.867
Panel B: Fund manager characteristics								
Tenure (avg. tenure, in years)	424	4.993	3.007	0.070	2.732	4.741	6.709	15.497
Gender	424	0.074	0.261	0.000	0.000	0.000	0.000	1.000
Panel C: Fund characteristics								
Fund Size (TNA in mio. USD)	415	527.1	1.340	1.242	22.34	80.25	390.4	8.864
Fund Age (in months)	424	10.03	7.017	0.287	4.907	8.690	13.16	46.56
Expense Ratio (in %)	312	1.581	0.632	0.316	1.108	1.435	1.920	3.260
Return (in %)	414	0.448	0.669	-6.498	0.265	0.487	0.785	2.321
Fund Risk (std. dev. of returns)	372	19.88	7.414	2.234	14.99	19.25	23.52	42.47
Style Dispersion	377	150.37	19.09	98.82	137.27	149.96	163.66	191.64
Tracking Error (in %)	375	5.158	2.153	0.682	3.772	4.940	6.353	14.23
Turnover (in %)	389	58.03	42.41	1.950	28.26	47.44	75.67	226.00
Mgmt Fee (in %)	363	0.876	0.330	0.060	0.695	0.833	1.000	2.000
Team Size	424	2.878	2.096	0.000	1.613	2.239	3.429	14.93
MoSt Rating	359	2.949	0.886	1.000	2.362	3.000	3.420	5.000
# Stock Holdings	406	129.8	242.9	3.516	39.89	65.24	115.5	2.553
Segment Flow (in mio. USD)	349	-457	1.350	-5.230	-852.0	-274.0	185.0	3.690
Fund Family TNA (in bn. USD)	318	68.30	210.0	0.062	0.533	5.470	38.70	1.190
Max Drawdown	411	-9.626	3.906	-25.10	-12.19	-9.640	-6.909	-1.220
Kurtosis	411	0.298	0.369	-0.830	0.072	0.286	0.512	1.989
Skewness	411	-0.228	0.211	-1.160	-0.336	-0.231	-0.130	0.515
12b-1 Fee (in %)	254	0.328	0.157	0	0.250	0.291	0.427	0.750

Notes: This table reports descriptive statistics of our sample of N=504 interviews conducted with N=424 fund managers, who manage N=2,110 funds. Interview variables reported in Panel A are average values per fund manager

¹⁵ Style Dispersion (StyleDis) as noted in Morningstar Direct measures the degree of the overall scatter of the holdings in the most recent portfolio along with both the value-growth and size dimensions. Morningstar indicates that low dispersion values are below 100, medium values between 100 and 148, whereas high dispersion is above 148. Thus, investments with a high score is considered to be less consistent. Prior studies (e.g., Blanchett 2011) and especially practitioners refer to this metric.

¹⁶ The fund characteristics (such as size, fund age, expense and turnover ratio) in our sample are comparable other studies examining actively managed funds (e.g., Bär, Kempf and Ruenzi 2011).

¹⁷ Even though the average turnover ratio of funds in our sample is with about two thirds of the ratio in the study of Bär, Kempf and Ruenzi (2011) significantly lower.

i, for managers that gave more than one interview. Panel B reports fund manager characteristics and fund characteristics in Panel C reflect averages per fund manager over the fund(s) managed by the fund manager. Moreover fund characteristics are average values per fund manager throughout the time the interviewed fund manager is actively managing the fund(s). Tone is measured by the fraction of negative words by all words that the respective fund manager said in an interview according to the Loughran and McDonald (2011) dictionary. Style Dispersion denotes Morningstar's measure of the degree of overall scatter of the holdings in the most recent portfolio along both the value-growth and size dimensions. We provide a detailed description of the applied variables in *Appendix IV-1*. The sample includes all actively managed equity funds managed by the interviewed fund manager (starting from the first observation in 1982 until 2018).

4. Methodology and univariate evidence

4.1. Measuring fund managers narcissism

Textual information, especially if unscripted, can provide valuable information on the authors' personality (e.g., Ramsay 1968; Hogben 1977). Therefore, we make use of the fund manager interviews to learn about their level of narcissism and its potential impact on investor relevant fund metrics. Following Raskin and Shaw (1988) we construct a textual based measure of fund managers narcissism computed as

$$NarScore_i = \sum_{j=1}^n \frac{\sum 1st\ Person\ Singular\ Pronouns}{\sum 1st\ Person\ Singular\ Pronouns + \sum 1st\ Person\ Plural\ Pronouns} \quad (1)$$

where we average the relative usage of first person singular among all first person pronouns¹⁸ if fund manager *i* in interview *j* over all interviews given by fund manager *i*. Thus, by definition *NarScore_i* is distributed between [0, 1]; 1 being the highest narcissism score attainable and 0 denotes managers that do not show any narcissistic tendencies. Moreover, *NarScore_i* is a time invariant narcissism measure, which is in line with the DSM-V criteria stating that narcissism is a fairly stable trait (APA 2013). We merge our key independent variables, fund managers narcissism, with the mutual fund data by fund manager names.¹⁹ To synthesize data on fund manager level, we average fund characteristics per manager over all funds managed by this manager. We limit observations to a manager's "active" period in a fund taking account of the time period in which a manager was in charge of managing a fund. Further, we exclude turnover years, in which a change of the fund manager (team) could bias our results.

We utilize Raskin and Shaw's (1988) indicator of narcissistic tendencies, as this is

¹⁸ 1st person singular pronouns comprise I, Me, My, Myself; 1st person plural pronouns comprise We, Us, Our, Ourselves.

¹⁹ We are able to match fund managers with fund characteristics one-to-one by verifying each of the manager's fund management history. Thereby, we mitigate potential "John Smith" issues, as fund managers with common names are matched accurately to their corresponding fund characteristics.

the only unobtrusive narcissism proxy that has been confirmed by experimental psychology research.²⁰ Prior research in finance used this measure in order to detect narcissism among CEOs (e.g., Chatterjee and Hambrick 2007; Aktas *et al.* 2016; Capalbo *et al.* 2018; Johnson, Kolasinski and Nordlund 2018).

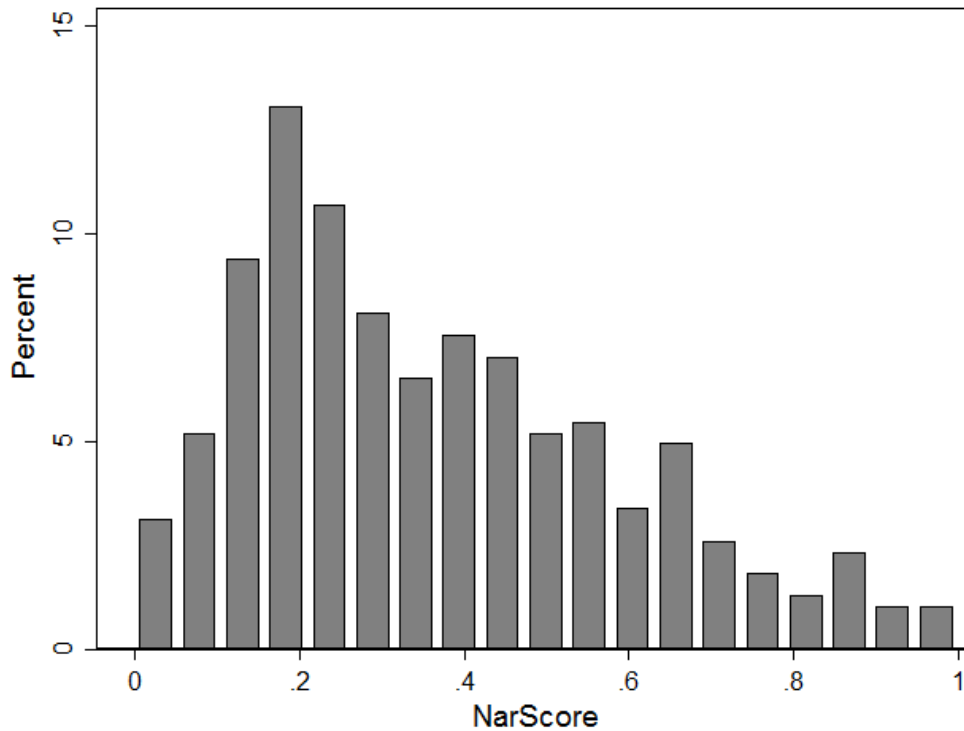
In the vein of Raskin and Shaw's (1988), we believe that the measure captures the tendency of the respective manager to express superiority towards others. In that, the measure indicates his / her feeling of being the central character of the fund instead of pointing out that running a fund is rather a team effort given the amount of people involved in managing the fund's assets²¹.

Figure IV-1 depicts the distribution of our primary proxy for fund manager narcissism, $NarScore_i$ showing an apparent right-skewed distribution indicating that the most fund managers do not exhibit high narcissistic tendencies. Moreover, $NarScore_i$ shows sufficient heterogeneity and features a mean of 0.373 indicating that 37.3% of the first person pronouns used by this manager are in the singular form²². Prior studies on CEO narcissism observe slightly lower mean scores (Johnson, Kolasinski and Nordlund 2018: 0.184; Aktas *et al.* 2016: 0.215 for the acquirer CEO and 0.185 for the target CEO; Capalbo *et al.* 2018: 0.26 and Chatterjee and Hambrick 2007: 0.21). The elevated average $NarScore_i$ may suggest that fund managers show on average higher narcissistic tendencies compared to CEOs. For interpretation reasons, we standardize the measure in our multivariate analysis by subtracting the mean and dividing by its standard deviation.

²⁰ In their experimental study, Raskin and Shaw (1988) show that Raskin and Terry's (1988) Narcissism Personality Inventory (NPI) positively correlates with the ratio of first person singular to the sum of first person plural pronouns.

²¹ We are aware of the measures' sensitivity to managers talking in their interviews in the role of managers of single-managed funds vs. team-managed funds (as a count of first person singular vs. plural pronouns should increase respectively). Yet, when examining the distribution of $NarScore$ among team managed vs. single managed funds, the variation in $NarScore$ virtually does not deviate from the distribution illustrated in Figure 1. Moreover, in section 6.1, we touch further upon the impact of team on fund manager narcissism. $NarScore$ distributions for team-managed as well as single-managed funds are available upon request.

²² $NarScore_i$ features the following moments: Std dev.: 0.227; 25th-percentile: 0.185; 50th-percentile: 0.331; 75th-percentile: 0.524.

Figure IV-1—Distribution of narcissism proxy *NarScore*

Notes: This figure illustrates the distribution of our main independent variable, NarScore, computed as

$$NarScore_i = \frac{\sum_{j=1}^n \text{1st Person Singular Pronouns}}{\sum_{j=1}^n \text{1st Person Singular Pronouns} + \sum_{j=1}^n \text{1st Person Plural Pronouns}}$$

where $NarScore_i$ is the relative usage of first person singular among all first person pronouns of fund manager i in interview j over all interviews given by fund manager i . The sample comprises $N=504$ interviews conducted with $N=424$ fund managers.

4.2. Univariate evidence

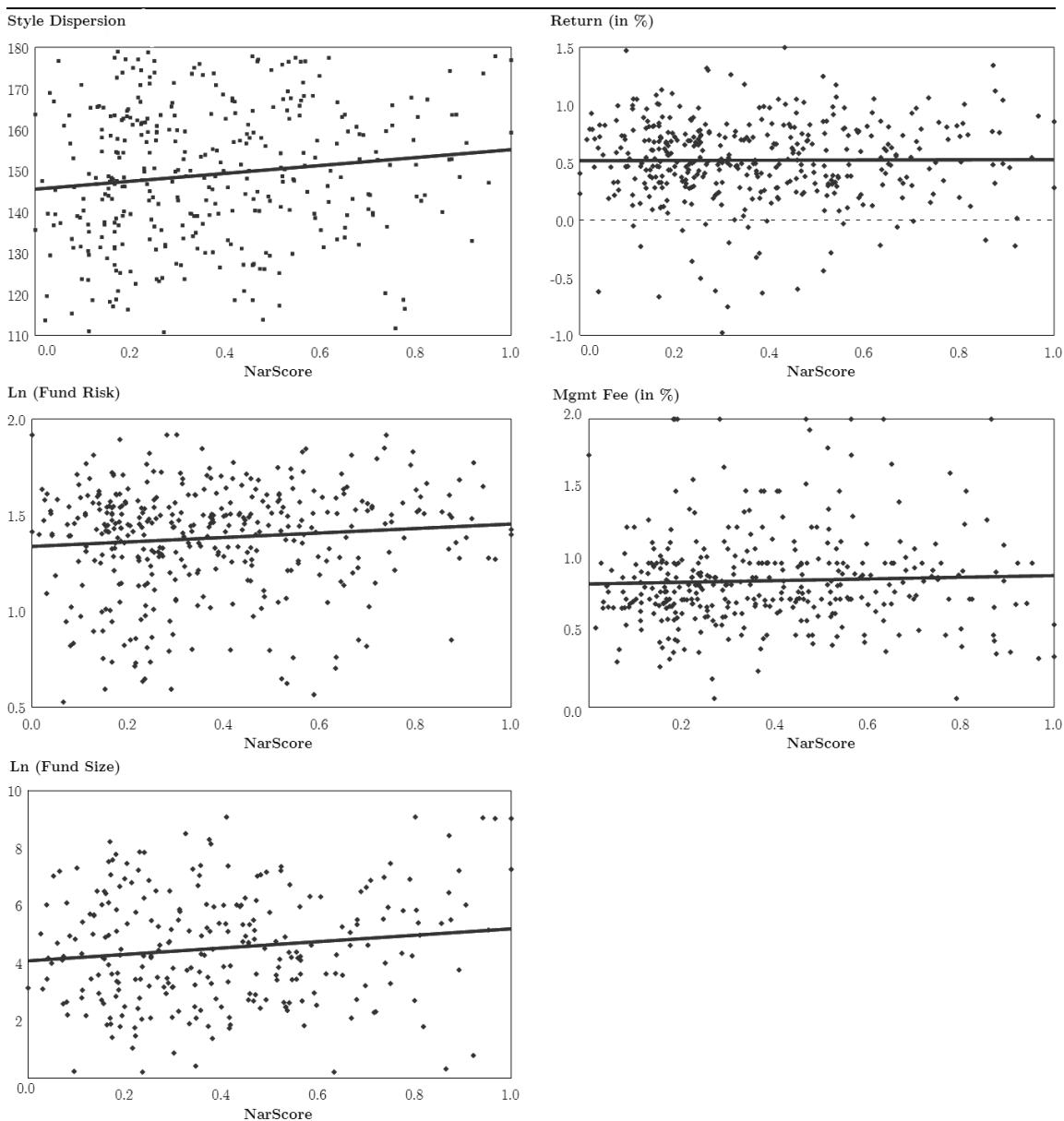
To illustrate the relation of fund manager narcissism on the respective main fund characteristics of interest, **Figure IV-2** provides scatter plots with univariate evidence on the differences between narcissistic and non-narcissistic fund managers.

As hypothesized under H1, we spot an apparent increase in style dispersion with increasing values of fund manager narcissism. While we do not observe a relation between return and narcissism, we find similar results for fund risk (i.e. logarithmized standard deviation of returns²³). The slope of the fitted values visibly indicates that risk-taking appears to be positively correlated with narcissism, as would be in line with our hypotheses 2a and 2b.

²³ Note that we log-transform volatility, as in log form it is much closer to being normally distributed (Andersen, et al. 2001).

With respect to management fees, the univariate evidence points to narcissistic managers charging their investors similar fees when compared to non-narcissistic managers, which does not support our hypothesis 3 in the univariate context. As can be inferred from the last scatter plot, highly narcissistic fund managers appear to manage significantly greater funds than their non-narcissistic counterparts. We will test robustness of our univariate findings in the next section.

Figure IV-2—Narcissism scatter plots on style, return, risk, fees and size



Notes: This figure illustrates scatter plots using our main independent variable, NarScore, on the horizontal axis and different fund manager level characteristics as variables on the vertical axis. Fitted values are indicated by a line.

In sum, the results presented in **Figure IV-2** provide preliminary evidence in support of the hypotheses that fund manager narcissism has a positive effect on deviating from their conventional rules of investment style, greater fund risk and larger assets under management. In section 5, we examine whether this relationship persists once we control for a battery of independent variables which have been shown to explain the respective key fund characteristic of interest.

5. Results

5.1. Model

In order to test our main hypothesis of narcissistic manager tendencies on key fund metrics from section 2, we run several linear regressions on (collapsed) cross-sectional data from our mutual fund sample on fund manager level outlined in 3.2. The generic regressions model takes the form

$$\begin{aligned} & \textit{StyleDis}_i; \textit{FundRisk}_i; \textit{Return}_i; \textit{MgmtFees}_i; \textit{Fund Size}_i \\ & = \alpha + \beta \textit{NarScore}_i + \delta' \textit{MF}_i + \delta' \textit{IV}_i + \varepsilon_i \end{aligned} \quad (2)$$

where $\textit{NarScore}_i$ captures the effect of fund manager i 's narcissism on the respective dependent variable. $\textit{StyleDis}_i$ denotes Morningstar's measure of the degree of overall scatter of the holdings along both, the value-growth and size dimensions, providing a proxy for how consistent a fund manager invests in terms of investment style of a fund as outlined in the fund's prospectus. For interpretation purposes, we dichotomize $\textit{StyleDis}_i$ using the proposed methodology by Morningstar assigning 1 to managers that on average exhibit values above 148, indicating highly style inconsistent portfolio management and 0 for rather style consistent fund managers. \textit{Return}_i captures the performance outcome using abnormal returns in excess of the respective fund benchmark, $\textit{FundRisk}_i$ captures the overall level of risk measured as the standard deviation of (monthly) returns. $\textit{MgmtFees}_i$ displays the fund's fees charged for asset management and $\textit{Fund Size}_i$ denotes the size of the fund in total net assets (million). \textit{MF}_i and \textit{IV}_i are vectors controlling for fund and interview characteristics, respectively. Fund controls are listed in **Table IV-1** and comprise the full set of fund-level determinants found to affect the respective dependent variable. (e.g., Cremers and Petajisto 2009; Hillert, Niessen-Ruenzi and Ruenzi 2018).

In a second step, we analyze the relation of fund manager narcissism on investor behavior using net fund flows (Fund Flows) as dependent variable. Based on the approach of Jin et al. (2016), we estimate the regression model

$$\begin{aligned} Fund\ Flows_{i,t} = & \alpha + \alpha_1 D_{i,t-1}^{Low} + \alpha_2 D_{i,t-1}^{Top} + (\beta_1 D_{i,t-1}^{Low,Neg} + \beta_2 D_{i,t-1}^{Top,Neg} \\ & + \beta_3 D_{i,t-1}^{Low,Pos} + \beta_4 D_{i,t-1}^{Top,Pos}) + \delta' MF_{i,t-1} + \delta' IV_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

where $D_{i,t}^{Low}$ is an indicator variable of fund manager narcissism in the lowest quintile of fund manager i in month $t - 1$ 24. Analogously, $D_{i,t}^{Top}$ denotes narcissism in the top quintile. $D_{i,t}^{Low,Neg}$ is an interaction between $D_{i,t}^{Low}$ and thus low narcissism and an indicator variable denoting negative past performance in $t - 1$, whereas $D_{i,t}^{Low,Pos}$ denotes positive past performance and fund manager narcissism in the lowest quintile simultaneously. For this analysis, we utilize a subset of our sample by limiting it first, to single-managed funds (which reduces sample size to 399 funds) and second, fund managers that only managed one fund throughout their tenure reducing the sample to a total of 383 funds. Consequently, total fund-month observations amount to 10,607 for which the fund manager in a single-managed mutual fund has been in charge of actively managing the assigned fund.

5.2. Main results

Table IV-2 reports the main results of our investigation into the effect of fund manager narcissism on key fund metrics for our hypotheses 1-4. Specifications (1) and (2) report the effect of fund manager narcissism on investment *Style Dispersion*. We have dichotomized our dependent variable (*StyleDis*) into management styles that do deviate from the conventional investment flexibility along a funds' value, growth and size dimension (*StyleDis* = 1) and those that do not (*StyleDis* = 0). Accordingly, coefficient estimates on NarScore display log-odds of a fund manager to deviate from its respective 'target' investment style. Specification (2) provides evidence that narcissistic fund managers are about 41% ($=\exp(0.341)-1$) more likely to deviate from their defined investment style as stated in the funds' prospectus. Clearly, this finding is highly significant (statistically and economically) and therefore supports our hypothesis 1. Our

²⁴ Please note that in order to capture a time-varying NarScore_{it} we refer to the raw NarScore_{it} on the interview level rather than referring to averages by fund manager. We impute missing values in-between interviews by fund manager using the last observation carried forward (LOCF) method.

finding confirms previous findings in the corporate context, (Chen, 2010; Rijsenbilt and Commandeur, 2013) in that narcissistic CEOs care less about conventional rules, at least with respect to style conformity in the mutual fund context.

Table IV-2—Style, risk, return, fees, size and narcissism

	Dependent variable									
	StyleDis (H1)		Return (H2)		Fund Risk (ln) (H2)		Mgmt Fee (H3)		Fund Size (ln) (H4)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>NarScore</i>	0.266*** (2.58)	0.341** (2.19)	0.007 (0.05)	0.184 (1.02)	0.041* (1.92)	0.068** (2.47)	0.020 (0.70)	0.094 (1.29)	0.101** (2.16)	0.099* (1.91)
Fund specific control variables										
Tenure (ln)		-0.043 (-0.18)		1.301*** (4.35)		-0.010 (-0.30)		0.178*** (3.61)		-0.195*** (-2.93)
Fund Age (ln)		-0.340 (-1.30)		-0.043 (-0.12)		0.130*** (2.76)		-0.125*** (-3.00)		0.245*** (3.49)
Turnover		0.000 (0.01)		-0.003 (-0.52)		0.001 (0.64)		0.002** (2.22)		0.001 (1.23)
Expense Ratio		-0.034 (-0.10)		0.485 (0.92)		0.232*** (3.03)				-0.232*** (-3.28)
Fund Size (ln)		-0.176 (-1.42)		0.168 (1.03)		0.064** (2.36)		-0.044** (-2.32)		
Return (4-Factor Alpha)		-0.283 (-0.74)						0.114* (1.68)		
12b-1 Fee		0.648 (0.69)								
Net Fund Flow				20.335** (2.04)		-0.185 (-0.14)				
Fund Risk (ln)				0.060 (0.12)				9.460* (1.73)		
Max Drawdown								-0.009 (-1.16)		
FundFam TNA (ln)								0.033** (2.36)		
Segment Flow (ln)								-0.011 (-0.87)		
# Stock holdings (ln)								-0.109*** (-3.46)		
Interview control variables										
# Words (ln)		-0.363 (-0.38)		-2.002 (-1.41)		0.318 (1.59)		0.285** (2.25)		0.135 (-0.48)
# Sentences (ln)		-0.296 (-0.29)		3.136** (2.17)		-0.123 (-0.60)		-0.232 (-1.37)		-0.21 (-0.70)
Tone		-1.447* (-1.90)		2.375** (2.54)		0.582*** (4.43)		0.070 (0.69)		0.274 (-1.49)

Robust s.e.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	377	235	373	206	414	211	363	126	418	312
R ² (adj.)	0.0126	0.0852	0.000	0.206	0.009	0.247	0.002	0.546	0.013	0.118

Notes: This table shows the regression results of Style Dispersion (*StyleDis*), Return, Fund risk (logarithmized), Management Fees and Fund size (logarithmized) on the narcissism proxy and various fund characteristics and interview control variables. *StyleDis* denotes Morningstar's measure of the degree of overall scatter of the holdings in the most recent portfolio along both the value-growth and size dimensions. We dichotomize *StyleDis_i* using the proposed methodology by Morningstar assigning 1 to managers that on average exhibit values above 148, indicating highly style inconsistent portfolio management and 0 otherwise. Return is measured as the excess returns of the respective benchmark return. Fund risk is measured by the logarithmized standard deviation of returns. Fund specific control variables are average values by manager over the time a fund manager actively managed the fund(s). *NarScore* is calculated as: (# of first-person singular pronouns/(# of first-person plural pronouns + # of first-person singular pronouns)) following Raskin and Shaw (1988). Return denotes estimated 4-factor alphas (Carhart, 1997). We provide a detailed description of the applied variables in **Appendix IV-1**. In (1) and (2) logit regressions are estimated due to the dichotomous nature of *StyleDis*. Interview control variables are average values per manager *i*, for managers that gave more than 1 interview, these variables denote the average scores thereof. Adjusted R-squared is reported in the last row except for logit regressions in specification (1) and (2), where the pseudo R-squared is reported. t-statistics based on robust standard errors are provided in parentheses. Statistical significance, denoted by *, **, and ***, corresponds to the significance levels of 10%, 5%, and 1%, respectively.

As hypothesized, specifications (3) and (4) show that fund manager narcissism is not associated with a significant outperformance. This effect is neither statistically nor economically meaningful and confirms the univariate evidence (see **Figure IV-2**) in a multivariate setting. At the same time we find evidence supporting the second part of hypothesis 2 (2b) as risk-taking increases with fund manager narcissism. From specification (6) follows that an increase in narcissism of the fund manager by one standard deviation increases fund risk, as measured by a fund managers' average standard deviation of monthly returns, by approximately 7%²⁵. This relation is not only statistically significant at conventional levels, but also economically meaningful and therefore underlines our prior findings in the univariate setting (see **Figure IV-2**), where we observed an increase in fund risk for high narcissistic fund managers. Moreover, this finding extends literature on the relationship between financial performance, performance volatility and narcissism. Although we do not observe significant out- or underperformance of narcissistic managers (as do e.g., Chatterjee and Hambrick 2007; Ham *et al.* 2017) in the CEO context), we are able to underpin previous findings of finance research (e.g., Wales, Patel and Lumpkin 2013; Chatterjee and Hambrick 2007) as we are able to establish a clear and significant link between narcissism and

²⁵ Coefficient estimate (*NarScore*) = 0.068, therefore effect on Fund Risk can be measured as $\exp(0.068) = 1.074$, which corresponds to an increase of about 7%. Compared to a fund managers' average standard deviation in monthly returns (19.88), holding all things equal, a fund manager with a one standard deviation higher narcissism score features a standard deviation of 21.28.

performance volatility. We argue that increased fund risk that does not pay off in terms of return to the investor may be detrimental to investors.

Although we document a positive effect of fund manager narcissism on management fees when analyzing the unconditional and conditional effect, in specification (7) and (8), respectively, we do not find a significant effect— neither statistically nor economically²⁶. Hence, we are not able to verify our hypothesis 2 stating that more narcissistic managers charge their investors higher fees for management. We argue that fund managers – as much as they would like to – are not able to set management fees arbitrarily. In fact, the SEC²⁷ points out that ultimately it is incumbent upon the fund’s directors to set an appropriate management fee and that negotiating on contracts with the advisers belongs to their most important duties on the fund. Thus, narcissistic fund managers themselves do not have authority to set the management fees at their own discretion and therefore narcissism does not translate into higher management fees.

Lastly, we find a significant effect of narcissism on fund size confirming our hypothesis 4. Analogously to our finding on fund risk, specification (10) underlines our finding from the scatter plot. More narcissistic fund managers indeed manage larger funds. An increase by one standard deviation in narcissism translates into 10% higher assets under management, which corresponds to an average of USD 54.9 million higher net assets. In line with Wallace and Baumeister (2002), we argue that fund managers are inclined to seek opportunities to make a name for themselves and simultaneously appreciate competition where profiling and approval of others is more likely. On the one hand, larger assets under management may function as an accolade for narcissistic fund managers with which they can gather appreciation from others. As fund managers typically receive a percentage of the total assets under management, their compensation hinges on the fund size to a certain extent. Therefore, these fund managers are arguably pursuing to increase their fund size. Simultaneously, in their quest for appreciation, fund managers may prefer to work for greater funds in the first place.

In sum, we find that narcissistic fund managers are by far (41%) more prone to deviate from conventional rules set out by their expected investment style, more likely to

²⁶ An increase in NarScore by one std. dev. increases fee by 0.094%, which compares very small to an average mgmt. fee of 0.88%.

²⁷ SEC Pub. No. 162 (5/14) (https://www.sec.gov/files/ib_mutualfundfees.pdf)

engage in riskier investments while exhibiting no outperformance and appear to manage greater funds compared to their non-narcissistic counterparts. While we are able to confirm hypotheses 1, 2, and 4, our findings do not support hypothesis 3. Management fees remain fairly unresponsive and thus a ‘narcissism effect’ may not be observed.

6. Further analyses

6.1. Impact of teams on fund manager narcissism

Nowadays, most mutual funds are not managed by a single fund manager but rather a management team in charge of the daily portfolio tasks (e.g., Patel and Sarkissian 2017). In this environment, narcissistic tendencies of fund managers may have a different impact on the fund metrics. Hence, it might be worthwhile investigating if teams mediate the impact of narcissistic fund managers as proposed by the diversification of opinions hypothesis (e.g., Bär, Kempf and Ruenzi 2011), in that extreme investment behaviors are averaged out. If narcissism would, however, be aggravated in teams, these findings would support the opposing literature strand on the group shift theory (e.g., Moscovici and Zavalloni 1969; Kerr 1992). This would imply that narcissistic fund managers are able to persuade the other fund manager(s) of their opinion and push through their approach to investment decision-making. We estimate the linear regression model

$$\begin{aligned} & \text{StyleDis}_i ; \text{FundRisk}_i ; \text{Return}_i ; \text{MgmtFees}_i ; \text{Fund Size}_i \\ & = \alpha + \beta_1 \text{NarScore}_i + \beta_2 \text{Team}_i + \beta_3 \text{NarScore}_i \times \text{Team}_i \quad (4) \\ & + \delta' \text{MF}_i + \delta' \text{IV}_{i,t} + \varepsilon_i \end{aligned}$$

where we analyze several fund characteristics as defined in our hypothesis in 2.2. and include an indicator variable, Team_i , which equals one if a fund is team-managed. The interaction term $\text{NarScore}_i \times \text{Team}_i$ captures the mediation effect of teams on the fund characteristics of narcissistic fund managers. Specifications (1), (3), (5) and (7) of **Table IV-3** report coefficient estimates on this model.

We do not observe a mediation effect of team-managed funds on any of the fund characteristics under investigation (StyleDis (1), Return (3), Fund Risk (5) or Fund Size (7)). Yet, our finding on Fund Risk , support the general notion made above with regard to the ‘opinion diversification theory’ (e.g.; Bär, Kempf and Ruenzi, 2011). Even though the effect is not statistically significant, we observe that the direction of the interaction term of $\text{NarScore} \times \text{Team}$ is negative. Fund manager teams achieve less volatile

performance outcomes, which might be a consequence of a less risk seeking investment style.

6.2. Impact of gender on fund manager narcissism

There is ample evidence for females being less risk-seeking than men (e.g., Barber and Odean 2001). Female managers are found to have different risk preferences and thus engage significantly less in risky decision-making, while average performance is indistinguishable from those of male fund managers (e.g.; Brenner 2015; Niessen-Ruenzi and Ruenzi 2018), and follow more consistent investment styles (Niessen-Ruenzi and Ruenzi, 2018). In addition evidence from upper echelon literature suggests that female CEOs have been found to work for relatively smaller firms (Khan and Vieito 2013). Thus we believe that it is worthwhile to examine the impact of gender on fund manager narcissism, as literature suggests that especially the key fund metrics *StyleDis*, *Fund Risk*, *Return* and *Fund Size* may be affected by gender and thus gender potentially takes a moderating role of fund manager narcissism.

Thus, we estimate the linear regression model

$$\begin{aligned} & \text{StyleDis}_i; \text{FundRisk}_i; \text{Return}_i; \text{MgmtFees}_i; \text{Fund Size}_i \\ & = \alpha + \beta_1 \text{NarScore}_i + \beta_2 \text{Gender}_i + \beta_3 \text{NarScore}_i \times \text{Gender}_i \quad (5) \\ & + \delta' \text{MF}_{i,t} + \delta' \text{IV}_{i,t} + \varepsilon_{i,t} \end{aligned}$$

where we include a gender indicator variable, Gender_i , which equals one if fund manager i is female. Thus, the interaction term $\text{NarScore}_i \times \text{Gender}_i$ captures the mediation effect of women on narcissism. Specifications (2), (4), (6) and (8) of **Table IV-3** report coefficient estimates on this model.

As can be taken from the insignificant coefficient estimates, we cannot document an effect of gender on the majority of fund characteristics. Except for performance volatility, where we find a highly significant effect indicating that narcissistic female fund manager exhibit a less risky investment style resulting in less volatile performance outcomes compared to their narcissistic male counterparts. Compared to male managers, female managers – even if they exhibit narcissistic tendencies – perform less volatile. Our findings support the notion that female fund managers engage less in risk-taking actions. This effect remains unchanged, even among narcissistic female fund managers. Next, we turn to the investors' side and analyze how narcissistic tendencies of fund managers impact their investing behavior as measured by fund flows.

Table IV-3—Team, gender, experience and narcissism

	Dependent Variable									
	StyleDis (H1)		Return (H2)		Fund Risk (ln) (H2)		Mgmt Fee (H3)		Fund Size (ln) (H4)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>NarScore</i>	0.260 (0.68)	0.346** (2.14)	-0.223 (-0.58)	0.205 (1.08)	0.078* (1.75)	0.058** (2.15)	-0.064 (-1.35)	-0.012 (-0.41)	0.099* (1.91)	0.044 (0.38)
<i>Team</i>	0.145 (0.36)		-2.039*** (-3.86)		0.048 (0.58)		-0.035 (-0.42)		0.077 (1.36)	
<i>NarScore</i> <i>x Team</i>	0.191 (0.46)		0.358 (0.87)		-0.038 (-0.72)		-0.029 (-0.37)		0.063 (1.38)	
<i>Gender</i>		-0.776 (-1.48)		-0.088 (-0.14)		-0.078 (-0.88)		0.069 (0.44)		0.122 (0.73)
<i>NarScore</i> <i>x Gender</i>		0.169 (0.31)		-0.280 (-0.54)		-0.175*** (-3.35)		-0.085 (-0.89)		-0.134 (-0.84)
Fund controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Interview controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Robust s.e.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time-fund FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	233	235	204	206	204	206	126	126	308	312
R ² (adj.)	0.106	0.0915	0.277	0.206	0.283	0.291	0.426	0.473	0.115	0.115

Notes: This table shows the regression results of StyleDis, Return, Fund risk (logarithmized), Management Fees and Fund size (logarithmized) on the narcissism proxy and various fund characteristics and interview control variables. Experienced denotes an indicator variable being equal to 1 for above median tenure, 0 for below median tenure. Gender denotes an indicator variable being equal to 1 for female fund managers and 0 for male fund managers. Team denotes an indicator variable being equal to 1 for managers that are on average part of team-managed and 0 for managers that are on average part of single-managed funds. Style Dispersion denotes Morningstar's measure of the degree of overall scatter of the holdings in the most recent portfolio along both the value-growth and size dimensions. We dichotomize $StyleDis_i$ using the proposed methodology by Morningstar assigning 1 to managers that on average exhibit values above 148, indicating highly style inconsistent portfolio management and 0 otherwise. Return is measured as the excess returns of the respective benchmark return. Fund risk is measured by the logarithmized standard deviation of returns. Fund specific control variables are average values by manager over the time a fund manager actively managed the fund(s). NarScore is a standardized measure calculated as: $(\# \text{ of first-person singular pronouns} / (\# \text{ of first-person plural pronouns} + \# \text{ of first-person singular pronouns}))$ following Raskin and Shaw (1988). Ret denotes estimated 4-factor alphas (Carhart, 1997). We provide a detailed description of the applied variables in **Appendix IV-1**. In (1) and (2) logit regressions are estimated due to the dichotomous nature of StyleDis. Interview control variables are average values per manager i , for managers that gave more than 1 interview, these variables denote the average scores thereof. Adjusted R-squared is reported in the last row except for logit regressions in specification (1) and (2), where the pseudo R-squared is reported. t-statistics based on robust standard errors are provided in parentheses. Statistical significance, denoted by *, **, and ***, corresponds to the significance levels of 10%, 5%, and 1%, respectively.

6.3. *Investor reaction to fund manager narcissism*

In this section, we aim to capture the investor response to fund manager narcissism. In that, we run panel-regressions, as outlined in section 5.2. If the investor knows their respective fund manager and in particular, the fund managers personality traits (i.e. narcissism), then we expect them to react to accordingly. This means that in case of prior poor performance, we hypothesize (H5) that narcissistic fund managers are able to maintain the investors' money compared to their non-narcissistic counterparts, due to their charismatic and persuasive leadership style (as has been established among others by (Galvin, Balthazard and Waldmann 2010). Analogously, we expect investors to target and invest in the narcissistic fund manager to a greater extent than non-narcissistic ones, and thus hypothesize to observe a greater fund inflow in response to good performance.

Table IV-4 depicts the estimation coefficients of the panel-regression for a subset of fund managers, i.e. fund managers that are attributed to one fund only and are the sole managers on the respective fund. Specification (1) shows the results including two indicator variables pertaining to a narcissism in the highest and lowest quintile; whereas specification (2) addresses the investors' reaction in response to prior positive or negative performance. In contrast to our hypothesized impact, our estimation results do not reveal any statistically (nor economically) significant effect of fund manager narcissism on subsequent investor fund flows.

We argue that investors are hardly able to detect narcissism among the fund manager they invest in. From a retail investors' perspective, there is little information disclosed on the fund manager ²⁸ and in particular information for assessing his or her personality traits. Thus, we attribute the inattention of investors to absent information on the fund managers' personality. On the contrary, this negligence also implies that the misconduct of fund managers (i.e. engaging in higher risk-taking and style drift while performing comparably) exhibiting narcissistic tendencies arguably harms investors to the full extent in that they do not have the possibility to evade investing in these fund managers.

²⁸ Searching e.g., for Peter Dixon, a former Fidelity fund manager, we find no results on Google Finance and Morningstar.com provides only the following information: "Peter Dixon is portfolio manager of Retailing Portfolio, which he has managed since April 2010. Prior to joining Fidelity Investments in 2006 as a research analyst, Mr. Dixon received his MBA from the Kellogg School of Management at Northwestern University" (Morningstar.com).

Table IV-4—Narcissism and investor reaction

	Dependent variable: Net Fund Flows	
	(1)	(2)
<i>NarScore_low_{t-1}</i>	0.018 (1.37)	0.018 (1.29)
<i>NarScore_high_{t-1}</i>	0.007 (0.74)	0.007 (0.77)
<i>NarScore_low_neg_{t-1}</i>		-0.766 (-0.38)
<i>NarScore_top_neg_{t-1}</i>		0.747 (0.30)
<i>NarScore_low_pos_{t-1}</i>		0.009 (0.33)
<i>NarScore_top_pos_{t-1}</i>		0.012 (0.06)
Fund controls	YES	YES
Interview controls	YES	YES
Robust s.e.	YES	YES
N	1.185	1.185
R-squared (adj.)	0.062	0.063

Notes: This table shows the regression results of Net Fund Flows on quintiles of *NarScore* and various controls variables. Net Fund Flow is computed as $(TNA_{i,t} - TNA_{i,t-1}) / TNA_{i,t-1} - r_{i,t}$. *NarScore_low* represents the bottom quintile of *NarScore* and *NarScore_top* represents the top quintile of *NarScore*. The next four dummy variables are the interaction between the top and bottom quintiles of *NarScore* and the sign of past performance (e.g. *NarScore_low_neg_{t-1}* equals to one if a fund belongs to the bottom quintile of *NarScore* and has negative past performance). *Ret* denotes estimated 4-factor alphas (Carhart, 1997). Due to endogeneity concerns, we lag all other variables by one month except the Expense ratio, Skewness, Kurtosis and Turnover which are lagged one year. The sample shows monthly observations for fund managers of only one fund that is single managed. We provide a detailed description of the applied variables in **Appendix IV-1**. All regressions include fund and time fixed effects. t-statistics provided in parentheses are based on robust standard errors that are clustered at the fund dimension. Statistical significance, denoted by *, **, and ***, corresponds to the significance levels of 10%, 5%, and 1%, respectively.

7. Robustness analyses

In order to rule out that our findings are confounded by our *NarScore* proxy, we re-estimate our model using an alternative specification of narcissism. In particular, we use *LinesofBio* that pertains to the number of lines counted in the biography section of the respective fund managers LinkedIn profile as alternative proxy for narcissism. This measure has already been utilized in similar studies in the CEO narcissism context (e.g., Rijsenbilt and Commandeur 2013; Buchholz, Lopatta and Maas 2019) and serves as an indicator of the fund managers willingness to disclose information on him or her experience, past or present jobs and vita. The measure serves as a comprehensive extension of our prior analysis in at least two aspects. First, the fund manager is the only decision-maker with respect to publicly disclosed content on LinkedIn, thus there is no

other party involved that could distort the measure of narcissism. Second, the inclusion of a biography and especially the extent of the biography captures another dimension of narcissism, “profiling”. In that, the fund managers seek public exposure as an opportunity to take pride in him- or herself. Third, we are able to overcome potential limitations of the *NarScore* as proposed in 4.1, as this measure does not rely on context (as does *NarScore*) and can directly be attributed to the fund manager.

We are able to access and screen 349 out of 424 fund managers LinkedIn profiles for their *LinesofBio*²⁹ and replicate the regression setup outlined in 5.1.

Table IV-5—Alternative specification of narcissism

	Dependent variable				
	StyleDis (H1)	Return (H2)	Fund Risk (ln) (H2)	Mgmt Fee (H3)	Fund Size (ln) (H4)
	(1)	(2)	(3)	(4)	(5)
<i>NarScore (LinesofBio)</i>	0.032* (1.92)	-0.021 (-0.47)	0.032* (1.92)	0.024 (0.57)	0.027** (2.36)
Fund controls	YES	YES	YES	YES	YES
Interview controls	YES	YES	YES	YES	YES
Robust s.e.	YES	YES	YES	YES	YES
Inv. Category FE	YES	YES	YES	YES	YES
N	199	166	171	81	255
R ² (adj.)	0.110	0.195	0.227	0.392	0.192

Notes: This table shows the regression results of our alternative proxy for fund manager level of narcissism, *NarScore* (*LinesofBio*), using the managers LinkedIn profile, on *StyleDis*, Fund Risk, Return, Management Fees and Fund size (ln). We provide a detailed description of the applied variables in **Appendix IV-1**. Fund specific control variables are average values by fund *j* across the time a fund manager actively managed the fund. Interview control variables are average values per manager *i*, for managers that gave more than 1 interview, these variables denote the average scores thereof. Performance extremity is measured following the approach of Bär et al. (2011) utilizing Fama and French (1993) 3-Factor excess returns. *NarScore* is standardized and measured as outlined in section 4.1. Statistical significance, denoted by *, **, and ***, corresponds to the significance levels of 10%, 5%, and 1%, respectively.

Table IV-5 reports coefficients of the linear regression using *LinesofBio* as alternative specification. Even though the effect of our alternative narcissism proxy on *StyleDis*, using the number of lines in the fund manager’s LinkedIn biography, does not hold the same magnitude and significance as in our main analysis (**Table IV-2**), we still

²⁹ *LinesofBio*_{*i*} features the following moments: Mean: 1.917, Std dev.: 4.492; Min.: 0; Max: 35.

observe a (weakly) significant effect of narcissism on a fund managers' tendency to deviate from its style benchmark. Specifically, the coefficient in specification (1) indicates a 3.2% higher probability of narcissistic managers to deviate from their "target" investment style. Again, we do not observe any outperformance of narcissistic fund managers. While the sign of the effect has been (marginally) positive in our main analysis, it switched negative in specification (2) of **Table IV-5**, supporting our hypothesis that narcissistic managers do not outperform their non-narcissist peers. Supporting our earlier finding that narcissists are more willing to take risk, our estimate on NarScore in specification (3) remains (weakly) significant. The coefficient of 0.032 can be interpreted as the impact of an one standard deviation increase in NarScore (corresponding to approximately 4 more lines in his LinkedIn biography) translates into a higher standard deviation of almost 3.3%³⁰). Regression results applying management fees as dependent variable are similar to those of results of return, except that sign of coefficient remains constant – however far from being (statistically and economically) significant. Lastly, the effect of fund manager narcissism on fund size is still significant under alternative narcissism specification. Economically, a one standard deviation increase in narcissism is associated with USD14.43 million higher assets under management. In sum, our results outlined in section 5.2. have been found to be robust to an alternative specification of narcissism.

8. Discussion and concluding remarks

In this study, we document that the personality trait, narcissism, does indeed have an impact on fund management. First, fund managers are evidently less consistent with their defined investment style, as proposed by their fund's prospectus. The failure to adhere to rules as proposed in previous findings in business and finance literature (Chen 2010; Rijsenbilt and Commandeur 2013), manifests itself also in the fund manager context in that narcissistic fund managers tend to engage more frequently in a style drift. We find a statistically and economically significant effect even when controlling for a number of previously identified determinants of style drift. Narcissistic fund managers are 41% more likely to deviate from their defined investment style.

³⁰ (=exp(0.032)-1).

Second, and more importantly, while we find that narcissistic fund managers' average performance is virtually identical to that of their non-narcissistic counterparts, the (average) fund risk is significantly higher. This finding is in line with evidence found among narcissistic CEOs (e.g., Chatterjee and Hambrick 2007). Interestingly, we find that this effect is mediated by gender. Narcissistic female fund managers are significantly less risk prone than their male counterparts.

Third, turning to the perspective of fund managers' incentives, we document that management fees (and thus partly the fund managers compensation) are not significantly different for narcissistic fund managers compared to their non-narcissistic counterparts. This effect may be attributed to the fact that fund directors are ultimately in charge of determining the appropriate fees. Yet, we find a significant effect of fund manager narcissism on fund size. The effect is statistically and economically significant with a one standard deviation increase in narcissism translating into 10% higher assets under management. Our findings suggest that narcissistic fund managers appear to pursue on making their mark by managing greater assets under management which typically are closely linked to their compensation.

Lastly, the above findings also raise the question if investors respond to the narcissism-induced mismanagement. Are investors aware of their fund managers' personality? We find that investors do not take a fund manager personality, in this case narcissism, into account when allocating their funds. We neither find a significant reaction after good nor after poor previous performance. In turn, this means that investors do not attempt to evade narcissistic fund managers and thus the effect of rather detrimental narcissistic fund management (i.e. lower risk-adjusted returns and higher style drift) materializes in full. We believe that investors' inability to detect narcissism among the fund manager lies at the root of this issue.

As we find lower risk-adjusted returns and lower style consistency associated with fund manager narcissism and investors tend not to incorporate information on the funds managers' personality, we believe this has important practitioner implications for investors and potentially the fund companies. From the investors' perspective, thoroughly acquainting oneself with not only the funds' performance or investment style, but also the fund managers' personality may be beneficial. We emphasize – supporting the conjectures of prior research on behavioral biases among mutual fund managers – that

even though information on the fund manager may at times be scarce, it is worthwhile to get an impression of the fund manager's personality the investors entrusts their money with.

From a mutual fund companies' perspective, we advise recruiters to get an holistic impression on the (potential) fund managers' personality before delegating portfolio management tasks of a fund. As narcissism among fund managers has been shown detrimental to shareholders without 'compensating' fund companies by higher net inflows (as could have been the case through 'charismatic' leadership), neglecting this personality trait can in the long-term endanger fund companies' prestige and shareholder base.

9. References

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10. Appendix

Appendix IV-1—Variable descriptions

Variable name	Description	Source
Interview-related variables		
NarScore	<p>Narcissism proxy that denotes the number of first-person singular pronouns/(number of first-person plural pronouns + number of first-person singular pronouns) following Raskin and Shaw (1988) said by fund manager <i>i</i> in the interview. The variable denotes the average per fund manager <i>i</i> in case of multiple interviews. The proxy is calculated as</p> $NarScore_i = \frac{\sum_{j=1}^n \text{1st Person Singular Pronouns}}{\sum_{j=1}^n \text{1st Person Singular Pronouns} + \sum_{j=1}^n \text{1st Person Plural Pronouns}}$ <p>For interpretation purposes, we standardized the measure.</p>	
Tone	<p>Tone is calculated as (Positive words - Negative words)/(Positive words + Negative words) based on the Loughran and McDonald (2011) dictionary. The variable denotes the average per fund manager <i>i</i> in case of multiple interviews.</p>	L&McD (2011) dict
# Words (ln)	Natural logarithm of the number of words said by a fund manager during his/her interview. The variable denotes the average per fund manager <i>i</i> in case of multiple interviews.	
# Sentences (ln)	Natural logarithm of the number of sentences said by a fund manager during his/her interview. The variable denotes the average per fund manager <i>i</i> in case of multiple interviews.	
# PS Pronouns	Number of first-person singular pronouns (I, me, my, mine and myself) said by a fund manager during his/her interview. The variable denotes the average per fund manager <i>i</i> in case of multiple interviews.	
# PP Pronouns	Number of first-person plural pronouns (we, our, ours, ourselves) said by a fund manager during his/her interview. The variable denotes the average per fund manager <i>i</i> in case of multiple interviews.	
Fund manager – personal characteristics		
Tenure	Total tenure of mutual fund manager <i>i</i> .	MoSt
Gender	Gender is an indicator variable that equals to 1 if manager <i>i</i> is female and 0 if manager <i>i</i> is male.	MoSt
LinesofBio	Based on Rijsenbilt and Commandeur (2013) as well as Buchholz et al. (2015) LinkedIn LinesOfBio counts the lines of biography that a manager <i>i</i> published on LinkedIn.	
Fund manager – fund characteristics		
Fund Age _{<i>j</i>} (ln)	Logarithm of the fund age computed from the date of a fund's inception. The variable denotes the average per fund manager <i>i</i> in case of multiple funds managed.	MoSt
StyleDis	StyleDis measures the (average) degree of overall scatter of the holdings in the most recent portfolio along both the value-growth and size dimensions per fund manager <i>i</i> . The metric is calculated from the Value-Growth Dispersion Metric and Size Dispersion	MoSt

	Metric according to the Pythagorean theorem: $\text{SQRT}(\text{Value-Growth Dispersion Metric} + \text{Size Dispersion Metric})$. The variable denotes an average per fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile. In our regressions, we dichotomize StyleDis_i using the proposed methodology by Morningstar assigning 1 to managers that on average exhibit values above 148, indicating highly style inconsistent portfolio management and 0 otherwise.	
Fund size (ln)	Logarithm of total net assets under management. The variable denotes an average per MoSt fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
Return	Denotes the monthly return in excess of the fund j 's respective benchmark. The variable MoSt denotes an average per fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
Turnover	A fund's quarterly turnover ratio in percent reported in Morningstar Direct. The MoSt variable denotes an average per fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
Fund Risk	Standard deviation of monthly returns. The variable denotes an average per fund MoSt manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
Expense Ratio	A fund's quarterly expense ratio in percent. The variable denotes an average per fund MoSt manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
TNA	Total Net Assets of fund j measured in month t . The variable denotes an average per MoSt fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
Team	Team is an indicator variable that which is equal to one if the fund is managed by a MoSt team and zero otherwise for fund j . The variable denotes an average per fund manager i in case of multiple funds managed.	
Net Fund Flow	(Monthly) net fund flows are the net growth in fund assets beyond reinvested MoSt dividends, computed as $\text{Net Fund Flows (FF)}_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}}{TNA_{i,t-1}} - r_{i,t}$ <p>where $TNA_{i,t}$ denotes fund i's total net assets (TNA) in month t and $r_{i,t}$ denotes fund i's return in month t as reported in MoSt. The variable denotes an average per fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.</p>	
Return (4F)	Performance alpha estimated using the extension of the Fama and French (1993) model MoSt, by Carhart (1997) including factor returns for the market, HML, SMB and UMD KF factors from the Kenneth French data library. The variable is estimated on a monthly basis, denotes an average per fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
Segment Flow	(Monthly) net fund flows of all funds in a Morningstar segment, computed as $\text{Segment Flow}_{j,t} = \frac{TNA_{j,t} - TNA_{j,t-1}}{TNA_{j,t-1}} - r_{j,t}$ <p>Where $TNA_{j,t}$ denotes segment j's total net assets in month t and $r_{j,t}$ denotes segment j's equal weighted return in month t. The variable denotes an average per fund manager i in case of multiple funds managed and is winsorized at the 1st and 99th percentile.</p>	MoSt
Family TNA	Total net assets of fund family (company). Refers to the total net assets reported in Morningstar Direct managed by a fund family. The variable denotes an average per	

	fund manager <i>i</i> in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	
# Stock Holdings	Total number of (long) equity (stock) holdings in the a fund The variable denotes an average per fund manager <i>i</i> in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	MoSt
MoSt Rating (1 to 5 stars)	Morningstar rates mutual funds and ETFs from 1 to 5 stars based on how well they have performed (after adjusting for risk and accounting for sales charges) in comparison to similar funds and ETFs. Within each Morningstar Category, the top 10% of funds and ETFs receive 5 stars and the bottom 10% receive 1 star. The variable denotes an average per fund manager <i>i</i> in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	MoSt
Kurtosis	Kurtosis indicates the yearly degree of ‘peakedness’ of the return distribution for fund <i>j</i> . The variable denotes an average per fund manager <i>i</i> and is winsorized at the 1st and 99th percentile.	MoSt
Skewness	Skewness measures the yearly degree of asymmetry from the normal distribution for fund <i>j</i> . The variable denotes an average per fund manager <i>i</i> and is winsorized at the 1st and 99th percentile.	MoSt
Max Drawdown	Measures a portfolio’s maximum loss in a peak-to-trough decline before a new peak is attained. It is quoted as the percentage between the peak and the trough and measured on a yearly basis. The variable denotes an average per fund manager <i>i</i> and is winsorized at the 1st and 99th percentile.	MoSt
12b-1 Fee	Component of total fees that is attributed for marketing and distribution expenditures. The variable denotes an average per fund manager <i>i</i> in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	MoSt
NarScore_low	Indicator variabe that is equal to one for values of the bottom quintile of NarScore and zero otherwise.	TWST
NarScore_high	Indicator variabe that is equal to one for values of the top quintile of NarScore and zero otherwise.	TWST
NarScore_low_neg	Indicator variable that equals to one if a fund belongs to the bottom quintile of NarScore and has negative past performance, and zero otherwise.	TWST, MoSt
NarScore_top_neg	Indicator variable that equals to one if a fund belongs to the top quintile of NarScore and has negative past performance, and zero otherwise.	TWST, MoSt
NarScore_low_pos	Indicator variable that equals to one if a fund belongs to the bottom quintile of NarScore and has positive past performance, and zero otherwise.	TWST, MoSt
NarScore_top_pos	Indicator variable that equals to one if a fund belongs to the top quintile of NarScore and has positive past performance, and zero otherwise.	TWST, MoSt
Mgmt Fee	The management fee is reported as an actual percentage that was deducted from an investment's average net assets to pay the investment's management. The variable denotes an average per fund manager <i>i</i> in case of multiple funds managed and is winsorized at the 1st and 99th percentile.	MoSt

Notes: This table defines the main variables used in the empirical analysis. The data sources are: (i) MoSt: Morningstar Direct Database (ii) TWST: The Wall Street Transcripts (iii) LinkedIn: Online profiles on LinkedIn (iv) KF: Kenneth French Data Library (v) L&McD (2011) dict: Loughran and McDonald (2011) dictionary.

Appendix IV-2—TWST interview excerpts

Interview 1:

"[...]

TWST: I thought perhaps to get started, maybe you could tell me a little bit about your process and the current makeup of your portfolio and maybe about the parameters that you use in terms of sectors and cap size.

Mr. Montemaggiore: It's good to start here because everything comes back to philosophy and process. For me, essentially what I am trying to do is buy better-than-average or high-quality businesses when I think they are on sale or trading at valuations that are not indicative of their future earnings power. I'm trying to find the intersection of quality and price, and that's across geographies, across sectors, I really don't distinguish, and it's across market caps as well. So I don't have a whole lot of limits in terms of the size of the company.

[...]

TWST: And tell me a little bit about the sectors in your portfolio at present and where you're overweight and where you're underweight.

Mr. Montemaggiore: From a sector perspective, I am overweight health care, technology and consumer discretionary. And then there are these groups of companies that I'm overweight called business services. They generally have a lot of the characteristics I look for. It's hard to categorize, and most of them are categorized as industrials. But essentially they are capital-light, they don't have big manufacturing plants, they tend to provide a service for companies, and they tend to lower a company's cost. So they are an outsourcing-type business, whether it'd be call centers, whether it'd be a chemical distributor, there are a number of these really interesting niche businesses that fall under business services that have fantastic characteristics that I found across the world, and I lump them together in business services. [...]

Vincent Montemaggiore - Portfolio Manager at Fidelity Management & Research Company. He co-manages Fidelity Advisor Overseas Fund with Andres Sergeant.

Interview 2:

"[...]

Ms. Kessler: We sold the last of our utility holdings recently and now have no exposure to what we perceive to be an overvalued sector. That's illustrative of the process of selling into momentum and stretched valuations, and redeploying gains into undervalued issues. We also sold a company that was a beneficiary of activist activity as well as merger discussions: Staples (NASDAQ:SPLS). We bought Staples a couple of years ago and sold it recently with a nice gain. [...]

TWST: You are at over 9%, and the S&P is at 8.25%. How have you been able to perform better than the S&P 500?

Ms. Kessler: Our goal is to outperform in strong markets while protecting client assets in down markets. We're now in our seventh year of a bull market, and our portfolio returns have been solid. But just as importantly, we want to protect on the downside. That's where the attention to intrinsic value relative to valuation of an individual stock becomes critical to, we hope, build a cushion in challenging markets. [...]"

Marian L. Kessler - Portfolio Manager at Becker Capital Management, Inc. She co-manages, among others, the Becker Value Equity Fund with Blake Howells, Steve Laveson, Andy Murray, Thomas McConville and Sid Parakh.

Affidavit

Hiermit versichere ich, dass ich die vorliegende Dissertation selbstständig, ohne unerlaubte Hilfe Dritter angefertigt und andere als die in der Dissertation angegebenen Hilfsmittel nicht benutzt habe. Alle Stellen, die wörtlich oder sinngemäß aus veröffentlichten oder unveröffentlichten Schriften entnommen sind, habe ich als solche kenntlich gemacht. Dritte waren an der inhaltlich-materiellen Erstellung der Dissertation nicht beteiligt; insbesondere habe ich hierfür nicht die Hilfe eines Promotionsberaters in Anspruch genommen. Kein Teil dieser Arbeit ist in einem anderen Promotions- oder Habilitationsverfahren verwendet worden. Mit dem Einsatz von Software zur Erkennung von Plagiaten bin ich einverstanden.¹ Diese Dissertation, in der hier vorliegenden oder einer ähnlichen Form, wurde bisher bei keiner anderen in- oder ausländischen Hochschule eingereicht.

Dautphetal, 31. August 2020

Dominik Scheld (M.Sc.)

¹ Eidesstattliche Versicherung gemäß §10 (1c) der Allgemeinen Bestimmungen für Promotionsordnungen der Philipps-Universität Marburg vom 01.04.2020.